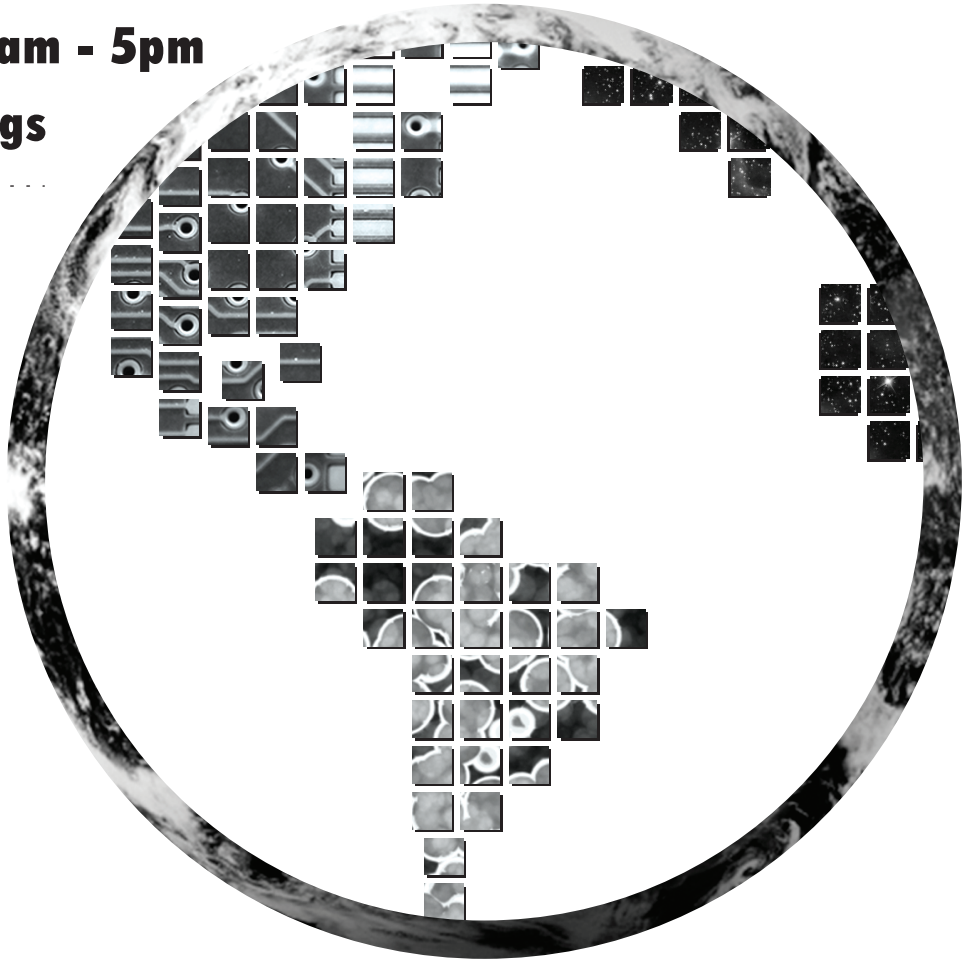
Senior Capstone Project Presentation Symposium

Department of Integrated Science and Technology

BSISAT, GS, and IA Programs

Friday, April 5, 9am - 5pm

ISAT/HHS Buildings



CISE
COLLEGE OF INTEGRATED SCIENCE & ENGINEERING
James Madison University

BSISAT PROGRAM – CAPSTONE PRESENTERS

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Jessica	Aquilino	10:45-11:10 am	HHS Room 1210	43	Dr. Karim Altaii
Joshua	Barefoot	9:00-9:25 am	ISAT Room 150	13	Dr. Maria Papadakis
Joshua	Beazley	11:15-11:55 am	HHS Room 1210	44	Dr. Emil Salib
Hugh	Blanchetti	9:45-10:25 am	ISAT Room 337	25	Dr. Nicole Radziwill
Kofi	Boafo	2:15-2:55 pm	ISAT Room 350	40	Dr. Wayne Teel
James	Boley	9:00-9:40 am	ISAT Room 337	24	Dr. Nicole Radziwill
Paul	Brefka	11:45-12:25 pm	ISAT Room 150	18	Dr. Robert Brent
Nathan	Brown	9:00-9:40 am	ISAT Room 348	29	Dr. Tony Chen
Christopher	Brown	1:30-2:10 pm	ISAT Room 350	39	Dr. Wayne Teel Dr. Joy Ferenbaugh
Joseph	Capobianco	10:05-10:45 am	ISAT Room 148	4	Dr. Geoffrey Egekwu
Joseph	Crosbie	1:45-2:10 pm	ISAT Room 148	8	Dr. Chris Bachmann
Jeffrey	Davison, Jr.	1:45-2:10 pm	HHS Room 1210	46	Dr. Emil Salib
James	Dempsey	11:30-12:10 pm	ISAT Room 337	28	Dr. Morgan Benton
Christopher	Diachok	9:00-9:40 am	HHS Room 1202	41	Dr. CJ Hartman Dr. Mary Handley
Cara	DiFiore	2:15-2:55 pm	ISAT Room 350	40	Dr. Wayne Teel
John	Doran	1:45-2:25 pm	ISAT Room 348	32	Dr. Jonathan Miles Ms. Remy Pangle Ms. Taylor Moellers
Elizabeth-Claire	Dyer	9:30-9:55 am	HHS Room 2207	50	Dr. Jeffrey Tang Dr. Mary Handley
Mark	Edwards	1:30-1:55 pm	ISAT Room 150	20	Dr. Thomas Benzing
Donald	Fenton	1:00-1:40 pm	ISAT Room 148	7	Dr. Geoffrey Egekwu
Calla	Feucht	9:00-9:40 am	ISAT Room 337	24	Dr. Nicole Radziwill
Bradley	Fischer	11:30-12:10 pm	ISAT Room 337	28	Dr. Morgan Benton
Daniel	Fishman	9:00-9:40 am	ISAT Room 348	29	Dr. Tony Chen
Samuel	Frere	9:45-10:25 am	ISAT Room 350	35	Dr. Wayne Teel Dr. Jennifer Coffman
Conor	Furey	10:30-11:10 am	ISAT Room 150	16	Dr. Robert Brent
Devin	Galloway	1:00-1:40 pm	ISAT Room 348	31	Dr. Jonathan Miles Dr. Emil Salib
Adam	Galoppa	10:50-11:30 am	ISAT Room 148	5	Dr. Geoffrey Egekwu
Samuel	Glier	10:50-11:30 am	ISAT Room 148	5	Dr. Geoffrey Egekwu
Billy	Godfrey	11:30-12:10 pm	ISAT Room 337	28	Dr. Morgan Benton
Alexander	Goehring	2:15-2:55 pm	HHS Room 1210	47	Dr. Emil Salib

BSISAT PROGRAM – CAPSTONE PRESENTERS

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Sean	Grabill	11:45-12:25 pm	ISAT Room 150	18	Dr. Robert Brent
Fanuel	Haile	10:00-10:25 am	HHS Room 2207	51	Dr. Jeffrey Tang
Adam	Hall	9:45-10:25 am	ISAT Room 337	25	Dr. Nicole Radziwill
Richard	Harriott	10:05-10:45 am	ISAT Room 148	4	Dr. Geoffrey Egekwu
Jonathan	Hawkins	3:00-3:40 pm	ISAT Room 148	10	Dr. Chris Bachmann
Andrew	Hawley	3:00-3:25 pm	HHS Room 1210	48	Dr. Emil Salib
Ryan	Hilton	10:05-10:45 am	ISAT Room 148	4	Dr. Geoffrey Egekwu
Zachary	Hopf	11:35-12:00pm	ISAT Room 348	30	Mr. Paul Goodall
Brooke	Hutchison	9:05-9:30 am	ISAT Room 136	1	Dr. Amanda Biesecker
Steven	Jackman	10:00-10:40 am	HHS Room 1210	42	Dr. Karim Altaii
Donald	Jagoda	3:45-4:25 pm	ISAT Room 148	11	Dr. David Lawrence
Amanda	Jenkins	9:00-9:40 am	ISAT Room 337	24	Dr. Nicole Radziwill
Joshua	Jewell	10:50-11:30 am	ISAT Room 148	5	Dr. Geoffrey Egekwu
James P.	Kelley	10:50-11:30 am	ISAT Room 148	5	Dr. Geoffrey Egekwu
Logan	Kendle	11:15-11:40 am	ISAT Room 350	37	Dr. Wayne Teel
Brenton	Kiomall	10:00-10:40 am	HHS Room 1210	42	Dr. Karim Altaii
Justin	Kiomall	10:00-10:40 am	HHS Room 1210	42	Dr. Karim Altaii
Robert	Kozlowski	1:00-1:40 pm	HHS Room 1210	45	Dr. Emil Salib
Erich	Lang	11:00-11:25 am	ISAT Room 337	27	Dr. Morgan Benton
Brendan	Lewis	1:45-2:25 pm	ISAT Room 348	32	Dr. Jonathan Miles Ms. Remy Pangle Ms. Taylor Moellers
Blaine	Loos	2:30-2:55 pm	ISAT Room 348	33	Dr. Jonathan Miles Ms. Remy Pangle Ms. Taylor Moellers
Kenneth	McMullen	1:45-2:25 pm	ISAT Room 348	32	Dr. Jonathan Miles Ms. Remy Pangle Ms. Taylor Moellers
Jason	McNabola	1:00-1:25 pm	ISAT Room 350	38	Dr. Wayne Teel
Scott	McNally	2:00-2:25 pm	ISAT Room 150	21	Dr. Thomas Benzing
Jason	McNamara	3:00-3:40 pm	ISAT Room 148	10	Dr. Chris Bachmann
Sarah	Mello	9:00-9:40 am	ISAT Room 350	34	Dr. Wayne Teel Dr. Jennifer Coffman
Eric	Moberg	9:30-9:55 am	ISAT Room 150	14	Dr. Maria Papadakis
Andrew	Moore	1:00-1:40 pm	ISAT Room 348	31	Dr. Jonathan Miles Dr. Emil Salib

BSISAT PROGRAM – CAPSTONE PRESENTERS

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Matthew	Morrissey	1:45-2:25 pm	ISAT Room 348	32	Dr. Jonathan Miles Ms. Remy Pangle Ms. Taylor Moellers
Erica	Mulford	9:00-9:40 am	ISAT Room 350	34	Dr. Wayne Teel Dr. Jennifer Coffman
Shanna	Murphy	11:15-11:40 am	ISAT Room 150	17	Dr. Robert Brent
Tien	Nguyen	1:00-1:40 pm	ISAT Room 148	7	Dr. Geoffrey Egekwu
Neil	O'Dell	2:30-2:55 pm	ISAT Room 150	22	Dr. Thomas Benzing
Premal	Patel	2:15-2:55 pm	ISAT Room 148	9	Dr. Chris Bachmann
Tyler	Peacock	11:15-11:55 am	HHS Room 1210	44	Dr. Emil Salib
Jeffrey	Ralph	11:15-11:55 am	HHS Room 1210	44	Dr. Emil Salib
Lee	Reynolds	10:50-11:30 am	ISAT Room 148	5	Dr. Geoffrey Egekwu
Wade	Reynolds	4:30-4:55 pm	ISAT Room 148	12	Dr. James Barnes
Christopher	Romeo	10:05-10:30 am	ISAT Room 136	3	Dr. Stephanie Stockwell
Matthew	Schumaker	1:00-1:40 pm	HHS Room 1210	45	Dr. Emil Salib
James	Sheats	9:00-9:25 am	HHS Room 2207	49	Dr. Jeffrey Tang
Maryann	Sniezek	9:00-9:40 am	ISAT Room 350	34	Dr. Wayne Teel Dr. Jennifer Coffman
Brett	Spencer	1:30-2:10 pm	ISAT Room 350	39	Dr. Wayne Teel Dr. Joy Ferenbaugh
Nicholas	Stahl	10:00-10:25 am	ISAT Room 150	15	Dr. Maria Papadakis
George	Stevens	11:35-12:00 pm	ISAT Room 148	6	Dr. Geoffrey Egekwu
Olivia	Stout	1:00-1:25 pm	ISAT Room 150	19	Dr. Mary Handley
Collin	Sumpter	10:30-11:10 am	ISAT Room 350	36	Dr. Wayne Teel
Caleb	Talbot	2:15-2:55 pm	ISAT Room 148	9	Dr. Chris Bachmann
Phillip	Tan	3:00-3:25 pm	ISAT Room 150	23	Dr. Thomas Benzing
Hunter	Tatum	11:45-12:25 pm	ISAT Room 150	18	Dr. Robert Brent
Justin	Taylor	3:45-4:25 pm	ISAT Room 148	11	Dr. David Lawrence
Abinezer	Teklegiorgis	11:15-11:55 am	HHS Room 1210	44	Dr. Emil Salib
Virginia	Thai	10:30-10:55 am	ISAT Room 337	26	Dr. Nicole Radziwill
Daniel	To	11:30-12:10 pm	ISAT Room 337	28	Dr. Morgan Benton

BSISAT PROGRAM – CAPSTONE PRESENTERS

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Kurt	Valentiner	9:45-10:25 am	ISAT Room 337	25	Dr. Nicole Radziwill
Philip	Van Gorder	10:30-11:10 am	ISAT Room 150	16	Dr. Robert Brent
Daniel	Warren	9:45-10:25 am	ISAT Room 350	35	Dr. Wayne Teel Dr. Jennifer Coffman
Joshua	Werner	2:15-2:55 pm	HHS Room 1210	47	Dr. Emil Salib
Tyler	Wert	10:30-11:10 am	ISAT Room 350	36	Dr. Wayne Teel
Kaneil	Zadrozny	9:35-10:00 am	ISAT Room 136	2	Dr. Robert McKown
Vincent	Zampelli	9:00-9:40 am	HHS Room 1202	41	Dr. Christie-Joy Hartman Dr. Mary Handley

GEOGRAPHIC SCIENCE PROGRAM – CAPSTONE PRESENTERS

*Poster Presentations will be in ISAT Room 259 from 12 noon – 1:30 pm

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Dilan	Abdullah	2:55-3:35pm	HHS Room 1202	57	Dr. Carol Nash
Taylor	Burks	*Poster Presentation	ISAT Room 259	70	Dr. Jack Gentile
David	Delano	1:00-1:40 pm	HHS Room 1208	64	Dr. Mary Tacy
P.Matthew	DiMarco	*Poster Presentation	ISAT Room 259	72	Dr. Maria Papadakis
Lauren	Frigm	2:55-3:35pm	HHS Room 1202	57	Dr. Carol Nash
Jarrod	Genesevich	1:00-1:40pm	HHS Room 1208	64	Dr. Mary Tacy
Sean	Haugh	3:40-4:05pm	HHS Room 1202	58	Dr. Helmut Kraenzle
Ryan	Housley	*Poster Presentation	ISAT Room 259	67	Dr. Amy Goodall
Bryan	Huan Vu	1:45-2:10pm	HHS Room 1208	65	Dr. Mary Tacy
Samantha	Jones	10:30-11:10am	HHS Room 1202	53	Dr. Amy Goodall Dr. Zachary Bortolot
Thomas	Kirk	10:15-10:55am	HHS Room 1208	61	Dr. Henry Way
Erin	Knight	2:55-3:35pm	HHS Room 1202	57	Dr. Carol Nash
Austin	Madden	9:00-9:40am	HHS Room 1208	59	Dr. Henry Way
Molly	Marcucilli	2:05-2:50pm	HHS Room 1202	56	Dr. Carol Nash
Benjamin	Mardiney	11:15-11:40am	HHS Room 1202	54	Dr. Amy Goodall
Peter	Markano	*Poster Presentation	ISAT Room 259	70	Dr. Jack Gentile
Michael	McLaughlin	9:00-9:40am	HHS Room 1208	59	Dr. Henry Way
Ryan	McNabola	9:00-9:40am	HHS Room 1208	59	Dr. Henry Way
Cameron	Morton	*Poster Presentation	ISAT Room 259	69	Dr. Amy Goodall Dr. Henry Way
Meghan	Mooney	10:15-10:55am	HHS Room 1208	61	Dr. Henry Way
Erica	Nordgren	9:45-10:25am	HHS Room 1202	52	Dr. Amy Goodall
Alexander	Pope	*Poster Presentation	ISAT Room 259	68	Dr. Amy Goodall
Dino	Ribaudo	*Poster Presentation	ISAT Room 259	71	Dr. Jack Gentile
Jonathan	Rivas	9:45-10:10am	HHS Room 1208	60	Dr. Henry Way
Charles	Ross	10:30-11:10am	HHS Room 1202	53	Dr. Amy Goodall Dr. Zachary Bortolot

GEOGRAPHIC SCIENCE PROGRAM – CAPSTONE PRESENTERS

First Name	Last Name	Presentation Time	Presentation Location	Abstract Page No.	Capstone Advisor
Ryan	Sabo	*Poster Presentation	ISAT Room 259	73	Dr. Maria Papadakis
Emma	Sacks	2:05-2:50pm	HHS Room 1202	56	Dr. Carol Nash
Kyle	Schwizer	9:45-10:25am	HHS Room 1202	52	Dr. Amy Goodall
Scott	Senter	1:35-2:00pm	HHS Room 1202	55	Dr. Zachary Bortolot
Alex	Smith	*Poster Presentation	ISAT Room 259	66	Dr. Jennifer Coffman
Kyle	Smith	11:00-11:25am	HHS Room 1208	62	Dr. Henry Way
Jack	Taylor	*Poster Presentation	ISAT Room 259	69	Dr. Amy Goodall Dr. Henry Way
Philip	Welsh	9:00-9:40am	HHS Room 1208	59	Dr. Henry Way
Jessica	Wright	11:30-11:55am	HHS Room 1208	63	Dr. Maria Papadakis Dr. James Wilson

*Poster Presentations will be in ISAT Room 259 from 12 noon – 1:30 pm

INTELLIGENCE ANALYSIS PROGRAM - CAPSTONE PRESENTERS

-1:00 - 1:05 pm Introduction to Intelligence Analysis Capstone Project
-3:30 – 3:40 pm Capstone Conclusion
-3:40 – 4:15 pm Capstone Discussion plus Q&A

First Name	Last Name	Presentation Time	Presentation Room Location	Abstract Page No.	Capstone Advisor
Blake	Bowman	2:00-2:25pm	HHS Room 1301	78	Dr. Jeffrey Tang
Caitlyn	Chalfant	11:05-11:30am	HHS Room 1301	74	Dr. Michael Deaton Dr. Ronald Raab Dr. Jeffrey Tang Dr. Timothy Walton
Thomas	Calhoun	2:00-2:25pm	HHS Room 1301	78	Dr. Jeffrey Tang
John	Copenhaver	2:30-2:55pm	HHS Room 1301	79	Dr. Jeffrey Tang
Michael	Craig	1:10-1:30pm	HHS Room 1301	76	Dr. Jeffrey Tang
Jason	Delaney	3:00-3:30pm	HHS Room 1301	80	Dr. Jeffrey Tang
Brian	Donohoe	3:00-3:30pm	HHS Room 1301	80	Dr. Jeffrey Tang
Michael	Hinkle	2:30-2:55pm	HHS Room 1301	79	Dr. Jeffrey Tang
Patrick	Hoge	1:35-1:55pm	HHS Room 1301	77	Dr. Jeffrey Tang
Paul	Labate	2:00-2:25pm	HHS Room 1301	78	Dr. Jeffrey Tang
Daniel	McNamara	2:30-2:55pm	HHS Room 1301	79	Dr. Jeffrey Tang
Rebecca	Montalvo	11:35-12:00pm	HHS Room 1301	75	Dr. Michael Deaton Dr. Noel Hendrickson Dr. Jeffrey Tang
Varun	Pande	1:35-1:55pm	HHS Room 1301	77	Dr. Jeffrey Tang
Molly	Picard	11:05-11:30am	HHS Room 1301	74	Dr. Michael Deaton Dr. Ronald Raab Dr. Jeffrey Tang Dr. Timothy Walton
Ryan	Platt	1:10-1:30pm	HHS Room 1301	76	Dr. Jeffrey Tang
Kyle	Pratt	2:00-2:25 pm	HHS Room 1301	78	Dr. Jeffrey Tang
Brandon	Prosser	1:35-1:55pm	HHS Room 1301	77	Dr. Jeffrey Tang
Kathleen	Rickard	3:00-3:30pm	HHS Room 1301	80	Dr. Jeffrey Tang
Elisabeth	Sill	11:35-12:00pm	HHS Room 1301	75	Dr. Michael Deaton Dr. Noel Hendrickson Dr. Jeffrey Tang
Jennifer	Sun	3:00-3:30pm	HHS Room 1301	80	Dr. Jeffrey Tang
Amanda	Windsor	11:35-12:00pm	HHS Room 1301	75	Dr. Michael Deaton Dr. Noel Hendrickson Dr. Jeffrey Tang

Presentations Listed by Time - BSISAT Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
9:00-9:25 am	Joshua	Barefoot	ISAT Room 150	Evaluating the Energy Conservation Impacts of a Solar Thermal Heat Exchanger on a Swine Farrowing Barn
9:00-9:25am	James	Sheats	HHS Room 2207	Assessing the Practicality of Implementing a Nutrient Trading Program in the Shenandoah Valley
9:05-9:30 am	Brooke	Hutchison	ISAT Room 136	How Oral Health can be a Determinant of Overall Health
9:00-9:40 am	James	Boley	ISAT Room 337	Analysis of the Relationship between Beaver Creek Reservoir Water Quality and Starr Hill Brewery Product Quality
9:00-9:40 am	Nathan	Brown	ISAT Room 348	Energy Analysis of JMU's East Campus Dining Hall
9:00-9:40 am	Calla	Feucht	ISAT Room 337	Analysis of the Relationship between Beaver Creek Reservoir Water Quality and Starr Hill Brewery Product Quality
9:00-9:40 am	Daniel	Fishman	ISAT Room 348	Energy Analysis of JMU's East Campus Dining Hall
9:00-9:40 am	Amanda	Jenkins	ISAT Room 337	Analysis of the Relationship between Beaver Creek Reservoir Water Quality and Starr Hill Brewery Product Quality
9:00-9:40 am	Sarah	Mello	ISAT Room 350	Design, Implenentation, and Analysis of Biochar Production at Hermitage Hill Farm and Stables, Waynesboro, Virginia
9:00-9:40 am	Erica	Mulford	ISAT Room 350	Design, Implenentation, and Analysis of Biochar Production at Hermitage Hill Farm and Stables, Waynesboro, Virginia
9:00-9:40 am	Maryann	Sniezek	ISAT Room 350	Design, Implenentation, and Analysis of Biochar Production at Hermitage Hill Farm and Stables, Waynesboro, Virginia
9:00-9:40 am	Christopher	Diachok	HHS Room 1202	Exploration of the effect of Microbial Fuel Cell Applications on Plant Growth
9:00-9:40 am	Vincent	Zampelli	HHS Room 1202	Exploration of the effect of Microbial Fuel Cell Applications on Plant Growth
9:30-9:55am	Elizabeth	Dyer	HHS Room 2207	Embodied Energy of Various Food Products
9:30-9:55 am	Eric	Moberg	ISAT Room 150	Analysis of Energy Consumption of JMU Residence Halls to Determine Appropriate Measure of Conservation Strategy
9:35-10:00 am	Kaneil	Zadrozny	ISAT Room 136	Synergistic Antimicrobial Activity of Lacritin and other Human Tear Proteins
9:45-10:25 am	Hugh	Blanchetti	ISAT Room 337	Analyzing the Beer at the Starr Hill Brewery in order to improve quality, acquire a more accurate alcohol percent by volume, and assist in minimizing potential beer loss
9:45-10:25 am	Samuel	Frere	ISAT Room 350	The Creation of Sustainable Local Food Production Applications and their implementaion in the Shenandoah Valley
9:45-10:25 am	Adam	Hall	ISAT Room 337	Analyzing the Beer at the Starr Hill Brewery in order to improve quality, acquire a more accurate alcohol percent by volume, and assist in minimizing potential beer loss

Presentations Listed by Time - BSISAT Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
9:45-10:25 am	Kurt	Valentiner	ISAT Room 337	Analyzing the Beer at the Starr Hill Brewery in order to improve quality, acquire a more accurate alcohol percent by volume, and assist in minimizing potential beer loss
9:45-10:25 am	Daniel	Warren	ISAT Room 350	The Creation of Sustainable Local Food Production Applications and their implementaion in the Shenandoah Valley
10:00-10:25am	Fanuel	Haile	HHS Room 2207	Electricity-powered transportation at James Madison University: Exploring options and transforming culture
10:00-10:25 am	Nicholas	Stahl	ISAT Room 150	Development of an AEE Certification for Energy Members (CEM) Program at James Madison University
10:00-10:40 am	Steven	Jackman	HHS Room 1210	Hotel Punta Leona Energy Conservation Project
10:00-10:40 am	Brenton	Kiomall	HHS Room 1210	Hotel Punta Leona Energy Conservation Project
10:00-10:40 am	Justin	Kiomall	HHS Room 1210	Hotel Punta Leona Energy Conservation Project
10:05-10:45 am	Joseph	Capobianco	ISAT Room 148	Process Development of Growing and Harvesting Soft-Shell Clams
10:05-10:45 am	Richard	Harriott	ISAT Room 148	Process Development of Growing and Harvesting Soft-Shell Clams
10:05-10:45 am	Ryan	Hilton	ISAT Room 148	Process Development of Growing and Harvesting Soft-Shell Clams
10:05-10:30 am	Christopher	Romeo	ISAT Room 136	Molecular dissection of a plant-microbe symbiosis with agricultural relevance
10:30-10:55 am	Virginia	Thai	ISAT Room 337	Predicting Emerging Trends in Technology Management using Text Mining
10:30-11:10 am	Conor	Furey	ISAT Room 150	Ozonation and Flocculation of Mine Wastewater for the Precipitation of Metals
10:30-11:10 am	Collin	Sumpter	ISAT Room 350	Refining the Design and efficiency of Small-scale Biochar Production Systems located at Avalon Acres and Polyface Farm, Virginia
10:30-11:10 am	Philip	Van Gorder	ISAT Room 150	Ozonation and Flocculation of Mine Wastewater for the Precipitation of Metals
10:30-11:10 am	Tyler	Wert	ISAT Room 350	Refining the Design and efficiency of Small-scale Biochar Production Systems located at Avalon Acres and Polyface Farm, Virginia
10:45-11:10 am	Jessica	Aquilino	HHS Room 1210	Energy Analysis
10:50-11:30 am	Adam	Galoppa	ISAT Room 148	Madison's Eye in the Sky
10:50-11:30 am	Samuel	Glier	ISAT Room 148	Madison's Eye in the Sky

Presentations Listed by Time - BSISAT Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
10:50-11:30 am	Joshua	Jewell	ISAT Room 148	Madison's Eye in the Sky
10:50-11:30 am	James P.	Kelley	ISAT Room 148	Madison's Eye in the Sky
10:50-11:30 am	Lee	Reynolds	ISAT Room 148	Madison's Eye in the Sky
11:00-11:25 am	Erich	Lang	ISAT Room 337	Patuxent Breeding Bird Atlas Geolocator
11:15-11:40 am	Logan	Kendle	ISAT Room 350	Redesigning a Biochar Production Chamber to decrease smoke loss, steel, and cost
11:15-11:40 am	Shanna	Murphy	ISAT Room 150	Quantifying the Effects of Blacks Run Restoration at Purcell Park by Implementing a Variety of Stream Quality Assessment Techniques
11:15-11:55 am	Joshua	Beazley	HHS Room 1210	Implementation Safety Features in James Madison University's Urban Transportation Methods
11:15-11:55 am	Tyler	Peacock	HHS Room 1210	Implementation Safety Features in James Madison University's Urban Transportation Methods
11:15-11:55 am	Jeffrey	Ralph	HHS Room 1210	Implementation Safety Features in James Madison University's Urban Transportation Methods
11:15-11:55 am	Abinezer	Teklegiorgis	HHS Room 1210	Implementation Safety Features in James Madison University's Urban Transportation Methods
11:30-12:10 pm	James	Dempsey	ISAT Room 337	SmartClickR
11:30-12:10 pm	Bradley	Fischer	ISAT Room 337	SmartClickR
11:30-12:10 pm	William	Godfrey	ISAT Room 337	SmartClickR
11:30-12:10 pm	Daniel	To	ISAT Room 337	SmartClickR
11:35-12:00pm	Zachary	Hopf	ISAT Room 348	Technology Assessment and Company Survey for Small, Portable Water Treatment Devices
11:35-12:00 pm	George	Stevens	ISAT Room 148	Design and Prototype of Fiber Reinforced Composite Skis
11:45-12:25 pm	Paul	Brefka	ISAT Room 150	Monitoring Siebert Creek Water Quality and Analysis of JMU Stormwater Restoration Efforts
11:45-12:25 pm	Sean	Grabill	ISAT Room 150	Monitoring Siebert Creek Water Quality and Analysis of JMU Stormwater Restoration Efforts
11:45-12:25 pm	Hunter	Tatum	ISAT Room 150	Monitoring Siebert Creek Water Quality and Analysis of JMU Stormwater Restoration Efforts
1:00-1:25 pm	Jason	McNabola	ISAT Room 350	Investigating Heat Capture Potential during Biochar Production

Presentations Listed by Time - BSISAT Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
1:00-1:25 pm	Olivia	Stout	ISAT Room 150	Invaders at the JMU Farm
1:00-1:40 pm	Donald	Fenton	ISAT Room 148	Passive Solar Powered Ceiling Fan
1:00-1:40 pm	Devin	Galloway	ISAT Room 348	Remote Data Acquisition, Networking, and Databasing for a Wind-Solar Monitoring Center
1:00-1:40 pm	Robert	Kozlowski	HHS Room 1210	Transforming Disconnected Business Processes into a fully Integrated Platform through the use of Cloud Computing. A project in Customer Relationship Management
1:00-1:40 pm	Andrew	Moore	ISAT Room 348	Remote Data Acquisition, Networking, and Databasing for a Wind-Solar Monitoring Center
1:00-1:40 pm	Tien	Nguyen	ISAT Room 148	Passive Solar Powered Ceiling Fan
1:00-1:40 pm	Matthew	Schumaker	HHS Room 1210	Transforming Disconnected Business Processes into a fully Integrated Platform through the use of Cloud Computing. A project in Customer Relationship Management
1:30-1:55 pm	Mark	Edwards	ISAT Room 150	Comprehensive Fish and Water Quality Analysis of a Pond Managed for Recreational Fishing by Naval Air Station Oceana
1:30-2:10 pm	Brett	Spencer	ISAT Room 350	Implementation of a Pyrolysis Chamber adapted for use as heat source for a Hoop House at Wildside Farms and production of Biochar as a soil amendment
1:30-2:10 pm	Christopher	Brown	ISAT Room 350	Implementation of a Pyrolysis Chamber adapted for use as heat source for a Hoop House at Wildside Farms and production of Biochar as a soil amendment
1:45-2:10 pm	Joseph	Crosbie	ISAT Room 148	Science Evaluation of a Novel Vehicle Exhaust Emission Reduction Technology
1:45-2:10 pm	Jeffrey	Davison, Jr.	HHS Room 1210	Remote Control Lawnmower intended for use by handicapped persons in their pursuit to live more independently
1:45-2:25 pm	John	Doran	ISAT Room 348	Wind for Schools Implemented at Grassfield and Luray High Schools, Virginia
1:45-2:25 pm	Brendan	Lewis	ISAT Room 348	Wind for Schools Implemented at Grassfield and Luray High Schools, Virginia
1:45-2:25 pm	Kenneth	McMullen	ISAT Room 348	Wind for Schools Implemented at Grassfield and Luray High Schools, Virginia
1:45-2:25 pm	Matthew	Morrissey	ISAT Room 348	Wind for Schools Implemented at Grassfield and Luray High Schools, Virginia
2:00-2:25 pm	Scott	McNally	ISAT Room 150	Water Quality Study of Springs in the Upper River and Their Suitability as Brook Trout Spawning Beds and Nurseries
2:15-2:55 pm	Kofi	Boafo	ISAT Room 350	The Design and Implementation of Top-Lit Updraft Stoves and the associated benefits of Biochar in Sub-Saharan Africa
2:15-2:55 pm	Cara	DiFiore	ISAT Room 350	The Design and Implementation of Top-Lit Updraft Stoves and the associated benefits of Biochar in Sub-Saharan Africa

Presentations Listed by Time - BSISAT Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
2:15-2:55 pm	Alexander	Goehring	HHS Room 1210	Mobile IPv6-IPSec
2:15-2:55 pm	Premal	Patel	ISAT Room 148	A Novel Harvesting Strategy for Algae-based Biofuels
2:15-2:55 pm	Caleb	Talbot	ISAT Room 148	A Novel Harvesting Strategy for Algae-based Biofuels
2:15-2:55 pm	Joshua	Werner	HHS Room 1210	Mobile IPv6-IPSec
2:30-2:55 pm	Blaine	Loos	ISAT Room 348	Performance Analysis of Small-Scale Vertical and Horizontal Axis Wind Turbines at a School in Southwestern Virginia
2:30-2:55 pm	Neil	O'Dell	ISAT Room 150	Brook Trout Population Survey in Spy Run and Its Implications for the Effectiveness of Stream Liming
3:00-3:25 pm	Andrew	Hawley	HHS Room 1210	Mobile IPv6 Development
3:00-3:25 pm	Phillip	Tan	ISAT Room 150	Demonstration Model of a Brook Trout Tank to Promote Formation of the Center for Coldwaters Restoration in Waynesboro, Virginia
3:00-3:40 pm	Jonathan	Hawkins	ISAT Room 148	Gas Chromatography of Biodiesel fuel and Application in local Businesses Filtration Process
3:00-3:40 pm	Jason	McNamara	ISAT Room 148	Gas Chromatography of Biodiesel fuel and Application in local Businesses Filtration Process
3:45-4:25 pm	Donald	Jagoda	ISAT Room 148	Thin Film Photovoltaic Cell Technology
3:45-4:25 pm	Justin	Taylor	ISAT Room 148	Thin Film Photovoltaic Cell Technology
4:30-4:55 pm	Wade	Reynolds	ISAT Room 148	Technology Solutions for Improving Power Line Efficiency

Presenters Listed by Time - Geographic Science Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
9:00-9:40 am	Michael	McLaughlin	HHS Room 1208	Improving "Bikeability" and "Walkability" in Harrisonburg, VA
9:00-9:40 am	Austin	Madden	HHS Room 1208	Improving "Bikeability" and "Walkability" in Harrisonburg, VA
9:00-9:40 am	Ryan	McNabola	HHS Room 1208	Improving "Bikeability" and "Walkability" in Harrisonburg, VA
9:00-9:40 am	Philip	Welsh	HHS Room 1208	Improving "Bikeability" and "Walkability" in Harrisonburg, VA
9:45-10:10 am	Jonathan	Rivas	HHS Room 1208	Landscapes: Social Division in Urban Areas
9:45-10:25 am	Erica	Nordgren	HHS Room 1202	Increasing Biodiversity through a Native Species Garden at a Local Elementary School
9:45-10:25 am	Kyle	Schwizer	HHS Room 1202	Increasing Biodiversity through a Native Species Garden at a Local Elementary School
10:15-10:55 am	Thomas	Kirk	HHS Room 1208	Re-Imagining the City: A Study in the Application of an Urban Ecosystem Model
10:15-10:55 am	Meghan	Mooney	HHS Room 1208	Re-Imagining the City: A Study in the Application of an Urban Ecosystem Model
10:30-11:10 am	Samantha	Jones	HHS Room 1202	Nature Trail Placement for W. H. Keister Elementary School, Harrisonburg, VA
10:30-11:10 am	Charles	Ross	HHS Room 1202	Nature Trail Placement for W. H. Keister Elementary School, Harrisonburg, VA
11:00-11:25 am	Kyle	Smith	HHS Room 1208	Characterizing Criminogenic Environments with Remote Sensing
11:15-11:40 am	Benjamin	Mardiney	HHS Room 1202	Winter Avian Biodiversity at the W. H. Keister Elementary School Forest
11:30-11:55 am	Jessica	Wright	HHS Room 1208	Livestock Exclusion fencing and Septic Tank Pump-out Program in the Linville Creek Watershed
1:00-1:40 pm	David	Delano	HHS Room 1208	Coastal Impact of Hurricanes on the Outer Banks Barrier Islands, NC
1:00-1:40 pm	Jarrod	Genesevich	HHS Room 1208	Coastal Impact of Hurricanes on the Outer Banks Barrier Islands, NC
1:35-2:00 pm	Scott	Senter	HHS Room 1202	Mapping the Aesthetic Beauty of Forests using LiDAR Data
1:45-2:10 pm	Bryan	Huan Vu	HHS Room 1208	Development Plan for Nan Boukan (Chic Kata), Haiti
2:05-2:50 pm	Molly	Marcucilli	HHS Room 1202	Native Gardening at the JMU Farm: A Small -scale Intervention Ecology Model
2:05-2:50 pm	Emma	Sacks	HHS Room 1202	Native Gardening at the JMU Farm: A Small -scale Intervention Ecology Model

Presenters Listed by Time - Geographic Science Program Students

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
2:55-3:35 pm	Dilan	Abdullah	HHS Room 1202	Baseline Study of the East Campus Hillside Meadow, James Madison University
2:55-3:35 pm	Lauren	Frigm	HHS Room 1202	Baseline Study of the East Campus Hillside Meadow, James Madison University
2:55-3:35 pm	Erin	Knight	HHS Room 1202	Baseline Study of the East Campus Hillside Meadow, James Madison University
3:40-4:05 pm	Sean	Haugh	HHS Room 1202	GIS Analysis to Support Emergency Managers
POSTER PRESENTATIONS IN ISAT/CS ROOM 259 (nTELOS ROOM)				
Taylor	Burks		Evaluating Sociological Behavior Associated with Campsite Conditions in Ramsey's Draft Wilderness	
P. Matthew	DiMarco		GIS Projects for Human Expansion and Black Death	
Ryan	Housley		Spatial Analysis of Stray Cats and Dogs of Rockingham County, Virginia	
Peter	Markano		Evaluating Sociological Behavior Associated with Campsite Conditions in Ramsey's Draft Wilderness	
Cameron	Morton		Harrisonburg in the Appalachian Trail Community	
Alexander	Pope		Designing a Disabilities Garden	
Dino	Ribaudo		Land-use Planning and Water Resource Management: A Creative Endeavor of Las Vegas, Nevada	
Ryan	Sabo		Red Fish in the Gulf of Mexico	
Alex	Smith		The Monetization of Food Scraps: A Study of Harrisonburg's Waste System	
Jack	Taylor		Harrisonburg in the Appalachian Trail Community	

Presenters Listed by Time - Intelligence Analysis Program

Presentation Time	First Name	Last Name	Presentation Room Location	Abstract Title
11:05-11:30am	Caitlyn	Chalfant	HHS Room 1301	Weapons of Mass Destruction and America: Assessing the Risk of a Possible Future Scenario and its implications
11:05-11:30am	Molly	Picard	HHS Room 1301	Weapons of Mass Destruction and America: Assessing the Risk of a Possible Future Scenario and its implications
11:35-12:00pm	Rebecca	Montalvo	HHS Room 1301	Future Scenarios for Afghanistan in 2024
11:35-12:00pm	Elisabeth	Sill	HHS Room 1301	Future Scenarios for Afghanistan in 2024
11:35-12:00pm	Amanda	Windsor	HHS Room 1301	Future Scenarios for Afghanistan in 2024
1:10-1:30pm	Michael	Craig	HHS Room 1301	The Russian Cyber Threat
1:10-1:30pm	Ryan	Platt	HHS Room 1301	The Russian Cyber Threat
1:35-1:55pm	Patrick	Hoge	HHS Room 1301	Space Weaponization
1:35-1:55pm	Varun	Pande	HHS Room 1301	Space Weaponization
1:35-1:55pm	Brandon	Prosser	HHS Room 1301	Space Weaponization
2:00-2:25pm	Blake	Bowman	HHS Room 1301	Implications of Developments in the South China Sea through 2023
2:00-2:25pm	Thomas	Calhoun	HHS Room 1301	Implications of Developments in the South China Sea through 2023
2:00-2:25pm	Paul	Labate	HHS Room 1301	Implications of Developments in the South China Sea through 2023
2:00-2:25pm	Kyle	Pratt	HHS Room 1301	Implications of Developments in the South China Sea through 2023
2:30-2:55pm	John	Copenhaver	HHS Room 1301	Strategic Outlook for the Arctic Region through 2023
2:30-2:55pm	Michael	Hinkle	HHS Room 1301	Strategic Outlook for the Arctic Region through 2023
2:30-2:55pm	Daniel	McNamara	HHS Room 1301	Strategic Outlook for the Arctic Region through 2023
3:00-3:30pm	Jason	Delaney	HHS Room 1301	Agro-Terrorism: Why You Should Care
3:00-3:30pm	Brian	Donohoe	HHS Room 1301	Agro-Terrorism: Why You Should Care
3:00-3:30pm	Kathleen	Rickard	HHS Room 1301	Agro-Terrorism: Why You Should Care
3:00-3:30pm	Jennifer	Sun	HHS Room 1301	Agro-Terrorism: Why You Should Care

LOCATION: ISAT/CS ROOM 136 – BS ISAT PROGRAM

Presentation Time:	9:05-9:30 am
Capstone Student:	Brooke Hutchison
Capstone Advisor:	Dr. Amanda Biesecker
Concentration:	Applied Biotech
Project No.:	BSISAT-01-13S
Abstract Title:	How Oral Health can be a Determinant of Overall Health

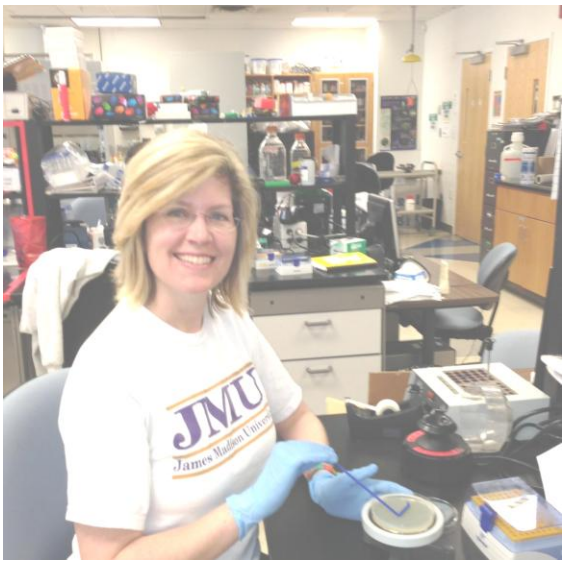
Capstone Abstract:

A person's mouth provides a structure through which a person can speak, kiss, swallow, chew, taste, and even smell. Oral health refers to much more than just the health of a person's teeth and is an essential part in the overall health of a person. The objective of this study is to conduct the necessary research in order to examine the dental techniques and skills necessary to diagnose a person's overall health. In specific, several particular health issues were analyzed including: coronary disease, eating disorders, and various others. Many of these health issues not only show symptoms in the oral region, but also can often be diagnosed by dentists based on those oral symptoms. With that in mind, a survey was created in order to analyze the confidence levels both dental students and practicing dentists posses with concerns to diagnostic skills. The survey aims to determine whether dentists feel confident diagnosing health issues such as the ones listed above both with oral symptoms present and absent. In other words with the gathering of this information, a general idea of how capable both dental students and practicing dentists feel they are in the field of diagnosis will be assembled.

LOCATION: ISAT/CS ROOM 136 – BS ISAT PROGRAM

Presentation Time:	9:35-10:00 am
Capstone Student:	Kaneil Zadrozny
Capstone Advisor:	Dr. Robert McKown
Concentration:	Applied Biotech
Project No.:	BSISAT-02-13S
External Sponsor:	This research was supported by grant funding from Virginia's Commonwealth Health Research Board
Abstract Title:	Synergistic Antimicrobial Activity of Lacritin and other Human Tear Proteins

Capstone Abstract:



Purpose: Lacritin is a 119 amino acid glycoprotein found in human tears that stimulates basal tearing in rabbits and promotes human corneal epithelial cell proliferation. Recently, it has been shown that the C-terminus of lacritin contains a potent antibacterial activity. Deletion mutants of lacritin containing C-terminal sequences are antimicrobial against *E. coli* in the uM range. Human tears contain a number of antibacterial proteins, most notably lysozyme, fist discovered by Alexander Fleming. It has been reported that the antibacterial tear proteins lactoferrin and lysozyme act synergistically to produce antibacterial activity that is greater than the sum of the two individual activities. Here we ask if the C-terminal antibacterial sequences of lacritin act in a synergistic mechanism with the human tear protein lysozyme. **Methods:** Full length lacritin and a deletion mutant of lacritin with 65 amino acids removed from the N-terminus (N-65) were generated, expressed in *E. coli,* and then purified by chitin and DEAE chromatography. Recombinant human lysozyme was purchased from (Sigma). Antibacterial activity was determined by the Colony Forming Unit (CFU) assay in which *E. coli* cells were grown to mid log, washed free of nutrients, incubated with antibacterial proteins, plated on LB agar, and incubated overnight. Single colonies were counted and plotted as CFUs compared to untreated cells or as % antibacterial activity. **Results:** The concentration dependent antimicrobial activities of lacritin, N-65, and human lysozyme were determined independently at lacritin 9%, N-65 37% and lysozyme 46%. The combination of lacritin plus lysozyme at the same concentrations produced antibacterial activity of 73% and the combination of N-65 plus lysozyme resulted in 97% antibacterial activity. **Conclusions:** We propose that cleavage of lacritin releases a potent bactericidal activity that functions under physiological conditions in a synergistic mechanism with other antimicrobial factors found in human tear film.

LOCATION: ISAT/CS ROOM 136 – BS ISAT PROGRAM

Presentation Time:	10:05-10:30 am
Capstone Student:	Christopher Romeo
Capstone Advisor:	Dr. Stephanie Stockwell
Concentration:	Applied Biotech
Project No.:	BSISAT-03-13S
Abstract Title:	Molecular dissection of a plant-microbe symbiosis with agricultural relevance

Capstone Abstract:

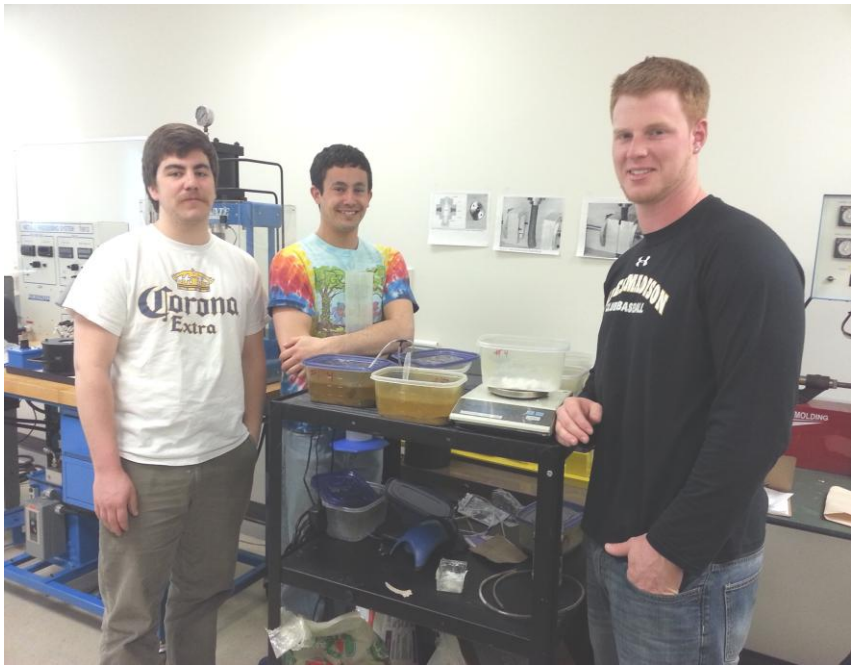
The Gram-negative bacterium, Bradyrhizobium japonicum, performs symbiotic nitrogen fixation for soybean. The United States is the leading soybean supplier, producing 33% of the world's crop equaling over 80 million tons in 2011. Nitrogen is a limiting factor for all plant growth. Typically this need is alleviated through the use of nitrogen fertilizers, however chemical application of nitrogen can lead to detrimental environmental run-off. The symbiosis with B. japonicum can serve as an alternative solution, as the bacterium naturally converts atmospheric nitrogen to a form that is directly transported to and useable by the plant. FegA is a B. japonicum strain 61A152 outer membrane receptor required for ferrichrome utilization and symbiosis. These functions are distinct, as B. japonicum USDA110 ferrichrome receptor, FhuA, is dispensable for symbiosis. We hypothesize FegA's unique role in planta is the result of structural differences between the N-terminal domains (NTDs) of FegA and FhuA. Recombinant plasmids containing fegA NTD deletion and chimeric alleles were introduced into the fegAB mutant for complementation of iron uptake. Constructs with deleted NTDs fully complement fegAB-, suggesting this domain is not critical for iron uptake and/or stability. The next phase of the project will involve testing the constructs in planta. The results of this study will aid in understanding the symbiotic relationship necessary to design engineered B. japonicum strains for use in agriculture, thus replacing the need for nitrogen fertilizers.

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	10:05-10:45 am
Capstone Students:	Joseph Capobianco, Richard Harriott, Ryan Hilton
Concentrations:	Energy, Engineering & Manufacturing, Environment
Capstone Advisor:	Dr. Geoffrey Egekwu
External Sponsor:	Dr. Brian Beal, University of Maine
Project No.:	BSISAT-04-13T
Abstract Title:	Process Development of Growing and Harvesting Soft-Shell Clams

Capstone Abstract:

The objective of this project was to develop a process by which soft-shelled clams (mya arenaria) could be grown in an artificial environment, and be potentially used to replace the existing distribution market of these clams. Research was conducted to identify all required elements in order to successfully grow these clams free of pollution, as well as to determine the most efficient ways to reproduce clams, and minimize production cost. Our team conducted several experiments on living clams to determine several different optimal growing conditions that these clams were to be exposed to. A theoretical plan was devised to lay out large scale production of these clams, assuming that it were possible and cost effective to grow these clams to optimal market size within a warehouse type facility. This plan was developed parallel to a business model that exploited both the existing wholesale market for these clams as well as developing the personal market across the country. The experiments conducted during this project were made possible by contributions from Dr.Geoffrey Egekwu, as well as marine ecology professor Dr. Brian Beal from the University of Maine at Machias.



LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	10:50-11:30 am
Capstone Students:	Adam Galoppa, Sam Glier, Josh Jewell, J.P. Kelley, Lee Reynolds
Concentrations:	Engineering and Manufacturing, Telecommunications
Capstone Advisor:	Dr. Geoffrey Egekwu
External Sponsor:	ISAT Department, Racey Engineering, Jim & Christine Galoppa, Bob & Sally Kelley, Cliff & Elise Glier, Gerry Glier
Project No.:	BSISAT-05-13T
Abstract Title:	Madison's Eye in the Sky

Capstone Abstract:

The purpose of this project is to procure an Unmanned Aerial Vehicle (UAV) as a prototype to be used in multiple domestic, non-military applications. Such applications may include uses within police and fire departments, forestry services, realty, and surveying. In general, a UAV can reduce operating costs, provide unique visual angles, ensure safety in environments too dangerous for humans, and create versatility with quick deployment in the field. The expectation is that the selected system, a DJI F550 Flame Wheel, will act as a standard but flexible operating platform for all of these applications. The F550 design features a platform from which a universal harness can be installed to hold various tools dependent upon the application. This year, a Go-Pro HD video camera, with live feed capability through WiFi, was purchased as a tool that enhances the F550's surveillance capabilities. The F550, outfitted with the Go-Pro, can be deployed for police work in a standoff, reconnaissance for the Forestry Service in determining the radius of a forest fire, or by a realtor to create unique video for marketing a house. In addition to its versatility in multiple areas, the second unique feature of the F550 prototype is its standard operating system. Although this has not yet been implemented, this can eliminate confusion among operators moving from one UAV to another. Madison's Eye in the Sky capstone incorporates both best manufacturing and assembly methodologies, in addition to basic networking that would be necessary for the implementation of a high rate operation. Recommendations for future work by the next set of ISAT students are also included.

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	11:35-12:00 pm
Capstone Student:	George Stevens
Concentration:	Engineering and Manufacturing
Capstone Advisor:	Dr. Geoffrey Egekwu
Project No.:	BSISAT-06-13S
Abstract Title:	Design and Prototype of Fiber Reinforced Composite Skis

Capstone Abstract:

The purpose of this project was to explore the Concept of composite manufacturing, and How it is applied to the process of making skis. This project involved an extensive materials research and selection process, as well as a Design stage using CAD software. The goal of this project was to explore options for composite materials that are not currently found in the ski market, and ultimately to produce a working ski with the desired flex pattern and strength to weight ratio.

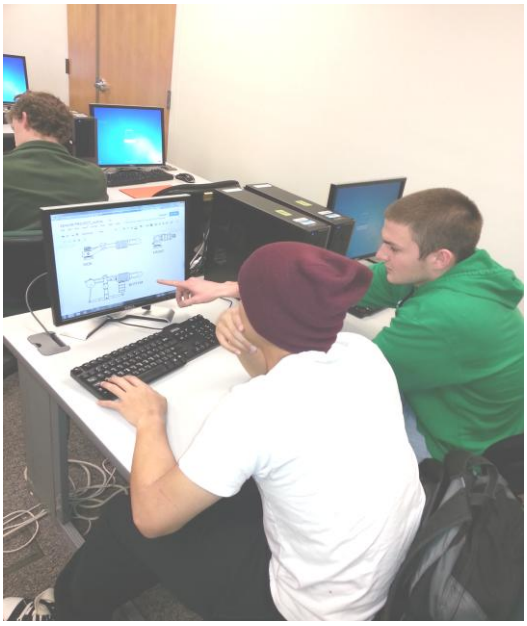
LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	1:00-1:40 pm
Capstone Students:	Donald Fenton, Tien Nguyen
Concentration:	Engineering and Manufacturing
Capstone Advisor:	Dr. Geoffrey Egekwu
Project No.:	BSISAT-07-13T
Abstract Title:	Passive Solar Powered Ceiling Fan

Capstone Abstract:

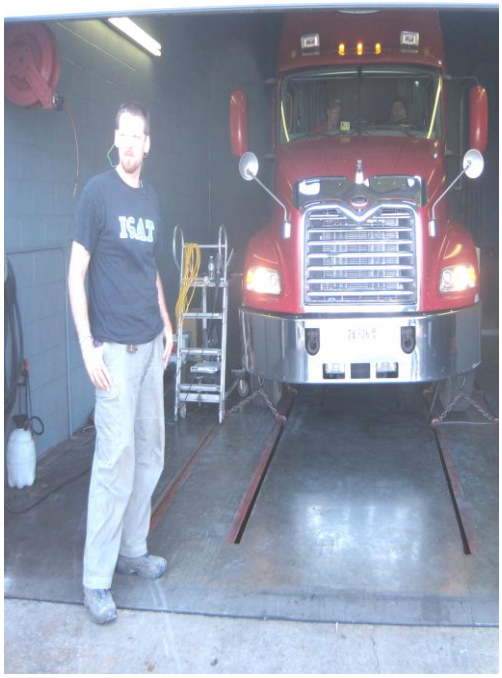
The purpose of this project is to design a solar powered passive-thermal ceiling fan. The design uses basic principles of physics, such as the laws of thermodynamics and motion, to operate a ceiling fan using clean energy. The concept will then be finalized using computer-aided designs that will provide an in-depth draft of the fan, making it ready for manufacturing.

Computer Aided Design (CAD) and analysis were used at different phases of the product development process. Our concept theoretically will reduce energy consumption during peak demands in the summer and save money for consumers through electrical bills, while providing a clean source of cooling by a ceiling fan. A bill of materials is documented with a cost/benefit analysis for the system. Additionally, an energy audit will be presented demonstrating the savings produced by our ceiling fan. The savings will be calculated using the average price of electricity in Virginia and the United States and shown on a monthly and annual basis. Our project produces a complete design to be used by manufacturers to produce and install our ceiling fan in houses across America, saving customers hundreds of dollars and promoting a cleaner source of energy.



LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	1:45 – 2:10 pm
Capstone Student:	Joseph Crosbie
Concentration:	Energy (Honors Capstone)
Capstone Advisor:	Dr. Christopher Bachmann
Project No.:	BSISAT-08-13S
External Sponsors:	Wholesome Energy, NoNOx Ltd.
Abstract Title:	Science Evaluation of a Novel Vehicle Exhaust Emission Reduction Technology

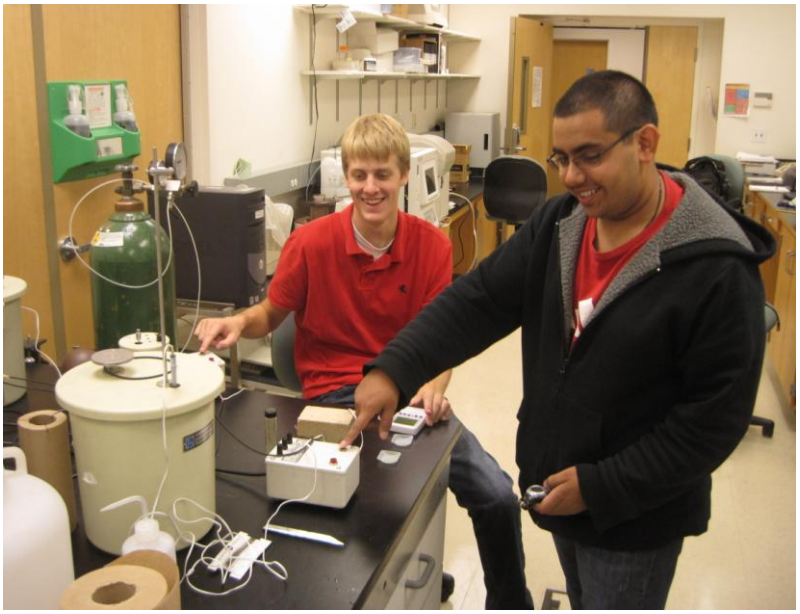


Capstone Abstract:

Exhaust emissions from internal combustion engines have been gaining increased attention as a significant source of environmental pollution.
Water-injection has been put forward as a means of reducing exhaust emissions, especially in Diesel engines, but has required extensive engine modifications and comes with high installation costs. The purpose of this study was to evaluate the effectiveness of a novel device being marketed by Wholesome Energy of Edinburgh, VA which claims to reduce emissions and fuel consumption by emulsifying water into vehicle fuel just prior to the injection system. The water-fuel emulsifying device was installed on a 2003 Mack CX600 tractor-trailer cab and tested on a Taylor water-brake dynomometer operating at 192 horsepower at 60 mph. Ten trials with water emulsion were compared to ten trials on straight Diesel fuel. Particulate matter was reduced 50% (opacity and mass, $p<0.001$) and CO fell by 48% ($p<0.001$). These results indicate that significant environmental benefits could be achieved by using this device on Diesel engines. Further tests using a gasoline-powered engine are currently underway to provide more conclusive results regarding fuel consumption and a full range of exhaust gas emissions, particularly nitrogen oxides (NOx). The device is easy to install and does not require significant engine modifications. It is also easily scalable. The device recently won an international competition against 60 entries from 16 countries because of it's ability to reduce environmental pollution in marine vehicles, trucks, trains, construction equipment and any other application employing an internal combustion engine. The Virginia-based company is continuing testing with JMU to investigate potential fuel savings and engine efficiency improvements (if any).

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	2:15-2:55 pm
Capstone Students:	Caleb Talbot, Premal Patel
Concentration:	Energy, Engineering and Manufacturing
Capstone Advisor:	Dr. Christopher Bachmann
Project No.:	BSISAT-09-13T
External Sponsors:	Valley 25x25, Wholesome Energy, NoNOx Ltd., Massanutten Regional Governor's School
Abstract Title:	A Novel Harvesting Strategy for Algae-based Biofuels



Capstone Abstract:

Algae-based biofuels have received increasing attention as an alternative to petroleum products because of their potential to provide clean, renewable energy on a global scale. However, efforts to commercialize algae-based biofuels have failed because they have not been cost-competitive with traditional gasoline and Diesel fuels. One of the main challenges in developing a cost-competitive algae-based biofuel is effective separation of algae from the growth medium. The purpose of this study is to compare several different algae-harvesting strategies that could be applied to large-scale offshore algae cultivation. Indoor and outdoor algae cultivation systems were established to provide abundant algae resources for the harvesting experiments. Nannochloropsis micro-algae were selected because of their high oil content and ability to grow rapidly in ocean environments. Preliminary experiments involving centrifugation, sonication, ultra-violet exposure, hydrocyclone separation, and electroflocculation showed that algae could be purifed effectively, but required high energy inputs and high cost. A novel solvent-medium emulsification was through a partnership with a Virginia-based company that has developed a mixing device that has proven highly-effective in different applications. Preliminary data using the device to harvest algae oil has been promising and further studies are underway. Current work is focusing on a comprehensive, quantitative analysis the percentage of algae-oil collected, energy input vs. output, scale-up potential, and economic feasibility. If successful, this innovative algae harvesting strategy would enable algae-based biofuels to be more cost competitive with traditional fossil fuels. It would also enable significant environmental improvements over traditional fossil fuels with potential large-scale impact in reducing atmospheric CO2 emissions. This technology would be appropriate for use not only in Virginia, as this novel system could be applied to algae-based biofuel production anywhere in the world.

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	3:00-3:40 pm
Capstone Students:	Jonathan Hawkins, Jason McNamara
Concentration:	Energy
Capstone Advisor:	Dr. Christopher Bachmann
Project No.:	BSISAT-10-13T
Abstract Title:	Gas Chromatography of Biodiesel fuel and Application in local Businesses Filtration Process

Capstone Abstract:

Biodiesel is a clean-burning, renewable fuel with significant potential for the Shenandoah Valley. It can be made from a wide variety of naturally occurring vegetable oils and can also be produced from purified waste cooking oil. Currently, there are four small-scale biodiesel startup companies that are hoping to produce biodiesel from locally-grown agricultural products and regionally supplied waste-cooking oils. One challenge for these startup companies is producing biodiesel that meets or exceeds the ASTM specifications for Biodiesel. The purpose of this project was to establish Gas Chromatography (GC) analysis according to the ASTM specifications and to apply the analysis in support these local-area biodiesel startup operations. In addition, in-house GC analysis will also support research at JMU into solid-phase biodiesel catalysts and non-conventional production strategies aimed at reducing production costs. In order to try and reduce the overall cost of production, woodchips and biochar will be used as a filtration medium and compared to the commercially used ion exchange resin. If ion exchange resin proves superior, which it has been in preliminary trials, the alternative filtration media will aim not to replace the ion exchange resin, but rather extend its life span and lessen the number of times it must be replaced or regenerated. A cost analysis will show whether the wood chips or biochar are a feasible option, and an estimate on how much they could save the local start-up companies annually.

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	3:45-4:25 pm
Capstone Students:	Donald Jagoda, Justin Taylor
Concentration:	Energy, Environment
Capstone Advisor:	Dr. David Lawrence
Project No.:	BSISAT-11-13T
Abstract Title:	Thin Film Photovoltaic Cell Technology

Capstone Abstract:

As the scarcity and cost of fossils fuels continues to increase it is important that the development and use of renewable clean fuels increases as well. The world is in the beginning stages of an energy shift or a transition from one main fuel to another to supply our energy needs. The hope is that renewable energy will be the frontrunner in this energy shift, but this can only be done with innovative technological advancement in the area of energy production. The renewable energy that has the greatest potential is solar; more solar energy hits the earth in two hours then the world uses in one year. The main reason solar energy is not used as much as it should is because it is more expensive than energy from fossil fuels. In order to allow solar energy to compete and surpass fossil fuels it is vital to create a cheaper solar cell that can be easily manufactured on a large scale. In this senior project earth-abundant, environmentally benign semiconductor materials were examined for their performance in photovoltaic cells. The material that was investigated for this project was Cu2ZnSnS4 (CZTS or copper zinc tin sulfide). The material was used to create thin film solar cells using inexpensive processes that could be scaled up for large volume cell manufacturing, making them a less costly and more viable option for consumers.

LOCATION: ISAT/CS ROOM 148 – BS ISAT PROGRAM

Presentation Time:	4:30-4:55 pm
Capstone Student:	Wade Reynolds
Concentration:	Energy
Capstone Advisor:	Dr. James Barnes
Project No.:	BSISAT-12-13S
External Sponsors:	Shenandoah Valley Electric Cooperative - Myron Rummel, Jason Burch
Abstract Title:	Technology Solutions for Improving Power Line Efficiency

Capstone Abstract:

Rural Electric Cooperatives provide power to more than 42 million customers in rural communities across America, making them an integral part of the electric utility industry. As demand for electricity continues to grow at a rapid pace, it is becoming increasingly difficult to maintain the infrastructure needed to meet that demand. Power loss due to inefficiency of distribution lines has been a major concern for many electric utilities, especially for Rural Electric Cooperatives, because a great deal of energy is lost traveling long distances between customers in rural areas. Modern technology may provide long term solutions to improve power line efficiency. The purpose of this research is to determine the most cost-effective and feasible technologies available that can, theoretically, be implemented into a grid system to improve efficiency, thus reducing distribution loss. Working with Shenandoah Valley Electric Cooperative, a thorough analysis was performed on one of their specified electric distribution networks, the Clover Hill Feeder System, to determine solutions for improving efficiency along that line.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	9:00-9:25 am
Capstone Student:	Josh Barefoot
Concentration:	Energy
Capstone Advisor:	Dr. Maria Papadakis
Project No.:	BSISAT-13-13S
Abstract Title:	Evaluating the Energy Conservation Impacts of a Solar Thermal Heat Exchanger on a Swine Farrowing Barn

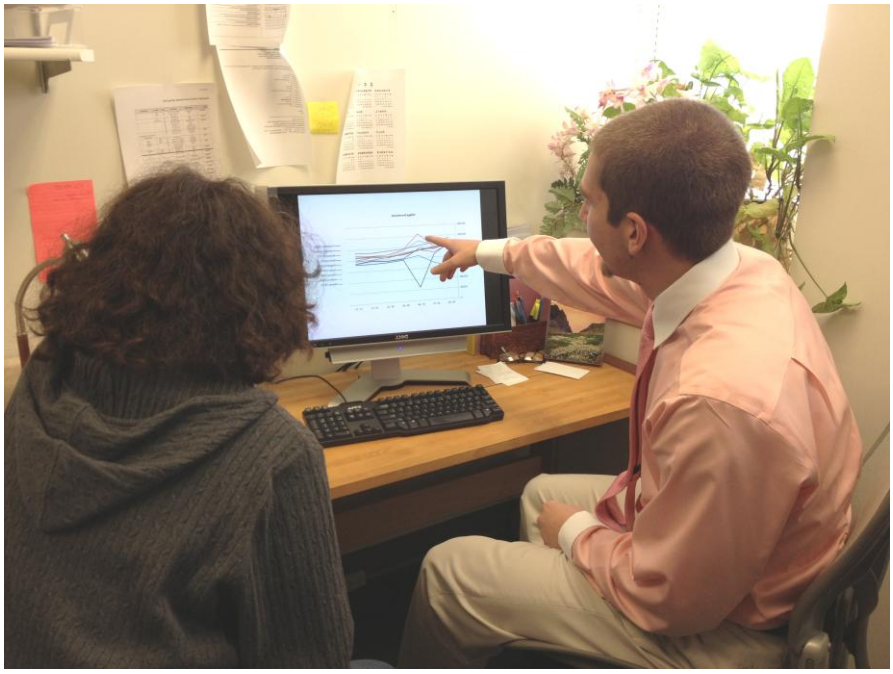
Capstone Abstract:

This project evaluates the energy conservation impacts of a home-made solar thermal heat exchanger on a pig farrowing barn in Mount Jackson, Virginia.

In this project, data was collected for several of the primary heating months, including the ambient weather temperature, the temperature inside the barn, as well as the temperature of the heat exchanger itself. The data were analyzed to determine the overall effectiveness of the heat exchanger.
A cost benefit analysis was performed and the payback period of the system was determined. Along with the cost benefit analysis, an analysis of the robustness of the heat exchanger was conducted, including component failure and the ability to withstand extreme operation conditions in the barn.
Infrared analysis was performed on the building to determine options and effectiveness of additional insulation and weatherization.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	9:30-9:55 am
Capstone Student:	Eric Moberg
Concentration:	Energy
Capstone Advisor:	Dr. Maria Papadakis
Project No.:	BSISAT-14-13S
Abstract Title:	Analysis of Energy Consumption of JMU Residence Halls to Determine Appropriate Measure of Conservation Strategy



Capstone Abstract:

This Senior Capstone was conducted to determine means of energy conservation and efficiency that have been shown to reduce energy consumption in dormitories on the campus of James Madison University.

Dormitories are some of the highest, if not the highest, energy consuming buildings on campus. Through investigating the trends of consumption of these buildings, the technologies and practices that have been shown to reduce energy consumption can be determined which will in turn reduce the impact these dormitories are having on the Earth and reduce energy costs through the further application of these technologies and practices.

Energy data was analyzed over seven academic school years, 2005-2006 through 2011-2012, during the eight academic months the dormitories are fully occupied from September to April for all 33 dorms on campus. The energy data analyzed consisted of electricity, steam, and natural gas consumption. For all dorms the heating and hot water needs are supplied by either steam or natural gas. In order to have a significant reduction of the consumption in these areas, the technological infrastructure would have to be replaced or the behavior of residents would need to change. This would require expensive implementations of equipment or mandating a behavioral change or residents, both of which are unlikely. However, with electricity the opportunity to have a significant impact on consumption with minute changes is very practical. Due to this electricity consumption became the main focus of the project.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	10:00-10:25 am
Capstone Student:	Nicholas Stahl (Honors Capstone)
Concentration:	Energy, Environment
Capstone Advisor:	Dr. Maria Papadakis
Project No.:	BSISAT-15-13S
Abstract Title:	Development of an AEE Certification for Energy Members (CEM) Program at James Madison University

Capstone Abstract:

As energy consumption and demand for fossil fuels has risen the importance of energy efficiency and conservation practices along with sustainable development has intensified. In order to promote scientific and educational interests of the energy industry the Association of Energy Engineers (AEE) was created and supplies over twenty certifications, the most prominent of which is the Certified Energy Manager (CEM). In order to become a CEM a person must take a week long course supplied by the AEE, pass the CEM exam and have their professional experience reviewed and approved. Having this certification distinguishes individuals from others in the field and shows a mark of excellence.

The purpose of this project was to establish a partnership between James Madison University and the Association of Energy Engineers to allow students to sit for the CEM exam without the need for the week long course, saving each interested student $1,700. In order to accomplish this analysis of the ISAT curriculum was conducted and several changes were planned including the creation of several courses. The most notable course is entitled “Building Energy Management” as well as potential 1-credit courses including “The Electric Power Sector” and “Visions for a Sustainable Future.”

LOCATI LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	10:30-11:10 am
Capstone Students:	Conor Furey, Philip Van Gorder
Concentration:	Applied Biotech, Environment
Capstone Advisor:	Dr. Robert Brent
Project No.:	BSISAT-16-13T
External Sponsor:	United States Geological Survey
Abstract Title:	Ozonation and Flocculation of Mine Wastewater for the Precipitation of Metals

Capstone Abstract:

Acid Mine Drainage is a water quality problem that plagues certain regions of the United States, specifically the environment surrounding abandoned mines. This project used the previously established process of ozonation and a newly applied process of flocculation to remove heavy metals from simulated acid mine drainage. Water in a 1,500-liter tank was spiked with a known amount of manganese to simulate acid mine drainage. This water was then pumped through the pilot plant system, which adds ozone into the water causing the manganese to precipitate.

This project added a flocculation step after the ozonation process to increase the size of the precipitated manganese particles. The larger flocculated particles are much easier to remove through sedimentation, reducing treatment costs. To determine the size range of particles generated in the ozonation and flocculation system, samples were filtered through five different pore-size filters.

Filtered samples were then analyzed using an Atomic Absorption Spectrophotometer to determine the remaining manganese content. Manganese removal increased with decreasing filter size and increasing settling time after flocculation. It was clear that the addition of the flocculation stage greatly contributed to manganese particle removal rates.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	11:15-11:40 am
Capstone Student:	Shana Murphy
Concentration:	Environment
Capstone Advisor:	Dr. Robert Brent
Project No.:	BSISAT-17-13S
Abstract Title:	Quantifying the Effects of Blacks Run Restoration at Purcell Park by Implementing a Variety of Stream Quality Assessment Techniques

Capstone Abstract:

In 1996, Blacks Run in Harrisonburg, Virginia, was placed on the state's list of impaired waters due to unacceptable levels of fecal coliform and benthic aquatic life impairments. Over eight miles of the 10.74-mile stream runs through urban development before entering a predominantly rural area south of Harrisonburg. In March of 2009, an extensive stream restoration project was conducted at Purcell Park, which included reestablishing the natural curvature of the stream, scaling of the steep and eroding banks, addition of rock and log structures in the channel, and the planting of approximately 3,500 native trees and grasses.

This thesis project is a continuation of post-restoration monitoring efforts and provides a comprehensive water quality profile of Blacks Run in order to quantify the effect of the restoration on the water quality and overall stream health. Data were gathered at four different locations along Blacks Run—upstream in an urban setting, two in Purcell Park, and one downstream in a rural area. Data collection included bi-monthly testing of water quality parameters and levels, macroinvertebrate counts, total phosphorus concentrations, and ion chromatography analysis. A riparian buffer survey was conducted in order to map and classify the trees planted during the restoration based on species, height, and condition. In collaboration with the Department of Game and Inland Fisheries, a fish population survey was also carried out at three different sites along Blacks Run to document the abundance, diversity, and overall health of fish in the river.

Overall, data analysis shows that the restoration has had a positive effect on Blacks Run, although a benthic macroinvertebrate assessment portrayed that the stream was still ecologically impaired. Further monitoring is essential in evaluating the long-term effects of the restoration.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	11:45-12:25 pm
Capstone Students:	Paul Brefka, Sean Grabill, Hunter Tatum
Concentration:	Environment, Applied Biotech, Telecommunications
Capstone Advisor:	Dr. Robert Brent
Project No.:	BSISAT-18-13T
Abstract Title:	Monitoring Siebert Creek Water Quality and Analysis of JMU Stormwater Restoration Efforts

Capstone Abstract:

Urban stormwater is one of the leading causes of water quality degradation in the U.S. The James Madison University (JMU) community has a significant negative impact on the surrounding environment due to pollution and urban development. This project was designed to monitor the quality of stormwater on JMU's campus. Stormwater was sampled within the JMU Arboretum and in Siebert Creek above and below Newman Lake. These locations were equipped with pressure probes that were constantly collecting data which were used to calculate stream flow. In addition to flow, levels of phosphorus, suspended solids, chloride, sulfate, and nitrate were measured at various time intervals throughout storm events. The data shows that storm events adversely affect the water quality in our local streams through a variety of contaminants. During peak storm events, levels of phosphorus and suspended solids significantly increased. The data collected during this project can be used to help implement and improve stormwater management on the JMU campus.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	1:00-1:25 pm
Capstone Student:	Olivia Stout
Concentration:	Environment
Capstone Advisor:	Dr. Mary Handley
Project No.:	BSISAT-19-13S
Abstract Title:	Invaders at the JMU Farm

Capstone Abstract:

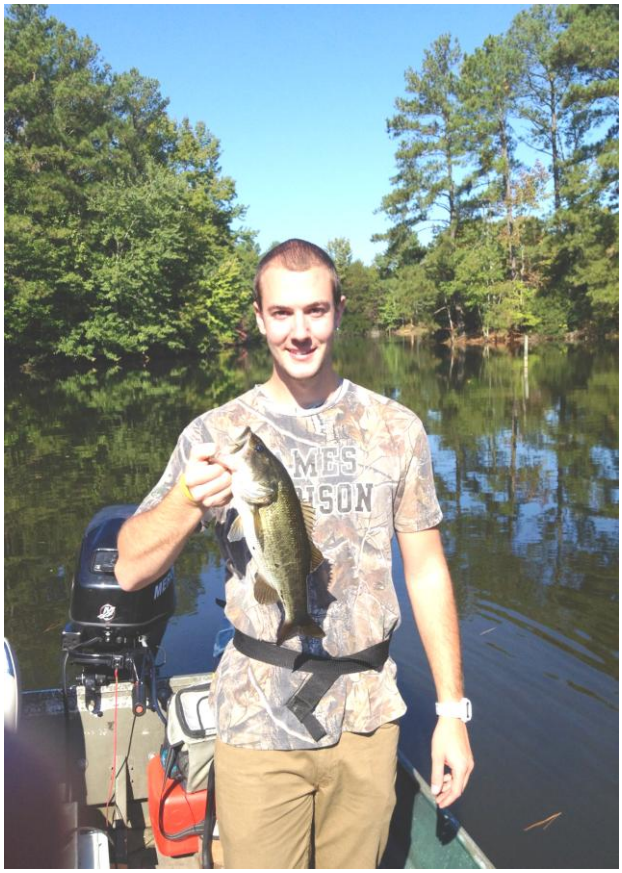
With globalization came the intermixing of cultures, languages, and even flora and fauna. Whether introduced intentionally or accidentally, some of these non-native species are now creating a greater impact on the local environment, giving them the appropriate title of invasive. It is estimated that in the United States alone, $130 billion dollars are lost annually due to these invasive species. This experiment evaluated the present extent of invasion at the JMU farm for garlic mustard, Japanese honeysuckle and Japanese stiltgrass and compared the results to those obtained by a previous ISAT project conducted in 2000. A survey of the three species was conducted at the JMU farm in September and October 2012.

A series of two meter diameter plots were surveyed along four transects through the forest. Presence, number of individuals, or percent cover estimates were obtained for the three species in each plot and compared to the previous data of the sample transects. As predicted, the invasion has expanded. Japanese stiltgrass is now present in new, and the spread of Japanese honeysuckle has increased overall. Garlic mustard has increased in the Riparian portion of the forest. These results suggest that the invasion will grow should current efforts continue.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	1:30-1:55 pm
Capstone Student:	Mark Edwards
Concentration:	Energy, Environment
Capstone Advisor:	Dr. Thomas Benzing
Project No.:	BSISAT-20-13S
External Sponsor:	NAS Oceana Natural Resource Department
Abstract Title:	Comprehensive Fish and Water Quality Analysis of a Pond Managed for Recreational Fishing by Naval Air Station Oceana

Capstone Abstract:



Located just half a mile from the front gates of Oceana Master Jet Base in Virginia Beach, VA, NASO pond is one of the premier outdoor recreation sites for the men and women serving in the United States military. Members of NASO's Natural Resource Department are in charge of maintaining the grounds around the pond and checking individuals for fishing permits. Even though the Natural Resource Department requires permits to fish the pond, there is little information about the quality of the water or the health of the fish population. As we continue to develop as a society it is becoming increasingly important to preserve our few clean water sources for everyday uses such as recreation and as a source of food. Through this project I determined overall water quality based on common water quality indicators such as dissolved oxygen, pH, hardness, and ions resulting from the presence of excess nutrients. With help from the Virginia Department of Game and Inland Fisheries, I conducted a survey of fish diversity and collected tissue samples for metals analysis during November 2012. Through the survey I found that the pond contains largemouth bass, yellow perch, bluegill, red ear sunfish, black crappie, and warmouth. Largemouth bass, bluegill, and red ear sunfish were tested for lead and mercury. Only the bass tested positive for mercury at 0.250 mg/kg, a level well below the health advisory level. In the last portion of my project I generated a bathymetric map of the pond, and investigated economical ways to improve its habitat for fish.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	2:00-2:25 pm
Capstone Student:	Scott McNally
Concentration:	Environment
Capstone Advisor:	Dr. Thomas Benzing
Project No.:	BSISAT-21-13S
Abstract Title:	Water Quality Study of Springs in the Upper River and Their Suitability as Brook Trout Spawning Beds and Nurseries

Capstone Abstract:

The South River in Waynesboro, Virginia once sustained a thriving population of eastern brook trout, the only species of trout native to the eastern United States. Over the years, anthropogenic degradation of water quality has greatly diminished brook trout populations and currently in Virginia only 9% of historical habitat remains intact. As the South River nears the city of Waynesboro, the flow is significantly increased by upwelling groundwater from springs. These springs discharge water at a much lower temperature than surface waters which provide the cold water habitats brook trout need to survive. An initial water quality assessment was conducted of the spring waters to determine which sites would be best suited for spawning brook trout. Measurements were made at each site to determine the total dissolved gas pressure (TDGP) in the water.

All of the sites had TDGP values ranging from about 104% to 110% which is unusually high and can result in severe health implications for aquatic life such as gas bubble disease. The culprit is suspected to be high levels of dissolved nitrogen that result from agricultural nitrate infiltrating groundwater. Specially designed egg jars to hatch trout eggs in the spring water were constructed and placed at several sites. The success of hatching will serve to indicate whether or not the South River is capable of supporting populations of brook trout.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	2:30-2:55 pm
Capstone Student:	Neil O'Dell
Concentration:	Environment
Capstone Advisor:	Dr. Thomas Benzing
Project No.:	BSISAT-22-13S
Abstract Title:	Brook Trout Population Survey in Spy Run and Its Implications for the Effectiveness of Stream Liming

Capstone Abstract:

The purpose of this project is to determine whether or not liming the St. Mary's River has increased its aquatic health as measured by an indicator species, the eastern brook trout. A population survey using capture-recapture techniques was performed on Spy Run, a tributary to the St. Mary's River to examine whether the liming was effective. Based on baseline water quality data, the two streams had very similar water quality data. The brook trout where captured using a Smith-Root LR 24 Backpack Electrofisher. The specimens were marked by clipping their adipose fin using surgical scissors and they were returned to the stream.

After 16 weeks the trout were recaptured using similar methods. An estimate of the total trout population was calculated using the equation (T1*T2*T3)/R, where T= the shocking and capturing event, and R= the total number of recaptured samples between T(1-3). Based on this study, the trout population in a 0.23 mile section of Spy Run was determined to be 845 fish. Based on the similarity in baseline water quality data and population of healthy brook trout located in the stream, it was concluded that liming Spy Run to increase aquatic health was not necessary.

LOCATION: ISAT/CS ROOM 150 – BS ISAT PROGRAM

Presentation Time:	3:00-3:25 pm
Capstone Student:	Phillip Tan
Concentration:	Environment
Capstone Advisor:	Dr. Thomas Benzing
Project No.:	BSISAT-23-13S
Abstract Title:	Demonstration Model of a Brook Trout Tank to Promote Formation of the Center for Coldwaters Restoration in Waynesboro, Virginia

Capstone Abstract:

The city of Waynesboro is located on the South River in Augusta County, Virginia. As part of a plan to bring economic redevelopment to the city and restore the natural ecosystem in the South River, a committee within Waynesboro Downtown Development Incorporated (WDDI) developed a plan to create the Center for Coldwaters Restoration (CCR). The proposed center would include four integrated components - the trout hatchery, an interpretive center, a research center, and offices for state agencies involved in managing fisheries and water quality. The entire center is estimated to cost $6 million and, therefore, will require significant sources of outside support in order to be realized. For my senior project, I focused on designing a demonstration-scale prototype for the hatchery component of the center. In May 2012, WDDI received a grant for $25,000 to implement a first phase they are calling the Venture Project.

With grant-matching funds, a total of $50,000 became available to install a trout tank and interpretive displays in a 600 square foot storefront in the downtown area. The model is expected to be finished in April when it will be open to the public. In this project, I described in detail the different parts of the hatchery, maintaining the health of the brook trout, and the impact the hatchery would have on the South River ecosystem with an emphasis on meeting optimal water quality conditions. The tank we purchased holds 400 gallons of water and contains three different water treatment components: an aquaponics system, up-flow sand filter, and an ultraviolet filter. The plants being used for the aquaponics system are watercress which can also be harvested for personal or economical uses. The success of this prototype is vital for demonstrating the feasibility of the Center for Coldwaters Restoration.

LOCATION: ISAT/CS ROOM 337 – BS ISAT PROGRAM

Presentation Time:	9:00-9:40 am
Capstone Students:	James Boley, Calla Feucht, Amanda Jenkins
Concentration:	Energy, Environment, IKM, Telecommunications
Capstone Advisor:	Dr. Nicole Radziwill
Project No.:	BSISAT-25-13T
External Sponsor:	Starr Hill Brewery
Abstract Title:	Analysis of the Relationship between Beaver Creek Reservoir Water Quality and Starr Hill Brewery Product Quality

Capstone Abstract:

Craft breweries are quickly gaining popularity in the United States, largely due to the ability of these smaller breweries to create unique brews. The weakness of craft breweries lies in the inability to brew consistent product because of the small, non-standardized brewing processes. Starr Hill Brewery in Crozet, Virginia, while known for having a broad variety of distinct beers, suffers from inconsistencies in quality.

Both brewers and consumers of the product have noticed a lack of constancy in the flavor of the beers in different brewing seasons, noting an odd, metallic taste in the beers brewed in the fall and winter seasons.

This project strives to find a relationship between environmental and weather data and water quality data from the water used for brewing both before and after treatment as well as product quality data. The standard parameters that can have an effect on the quality of beer are pH, conductivity, hardness, chlorine content, and iron content. In order to obtain a comprehensive overview of the changes that the brewery water undergoes in processing, samples were taken from Beaver Creek Reservoir, from which Starr Hill pulls its water, as well as from different processing steps within the brewery. Recommendations based on the data analysis will be provided to help the brewery improve its product quality.

LOCATION: ISAT/CS ROOM 337 – BS ISAT PROGRAM

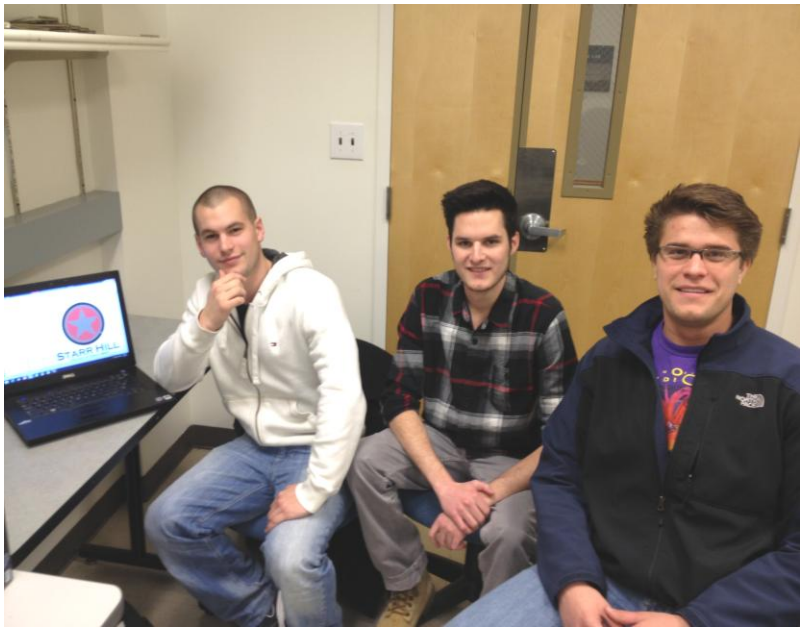
Presentation Time:	9:45-10:25 am
Capstone Students:	Hugh Blanchetti, Adam Hall, Kurt Valentiner
Concentration:	Engineering and Manufacturing, Information Knowledge Management
Capstone Advisor:	Dr. Nicole Radziwill
Project No.:	BSISAT-26-13T
Abstract Title:	Analyzing the Beer at the Starr Hill Brewery in order to improve quality, acquire a more accurate alcohol percent by volume, and assist in minimizing potential beer loss

Capstone Abstract:

The purpose of this capstone project is to classify a batch of beer as good or bad, using classifiers constructed using machine learning techniques. A batch is classified as good or bad depending on the where its statistics fall in the following brewing categories: volume loss (bbl), percent loss, final pH reading, final gravity reading, original gravity reading, terminal gravity reading, and percent of alcohol of the batch. This project used 2010 data from the Starr Hill Brewery, combining data from 6 different types of Starr Hill beers to serve as training data.

The procedure of this capstone project was to use Starr Hill data to create training sets and build the following 4 types of classifiers in "R": a logistics regression classifier, a neural network classifier, a support vector machine classifier, and a Bayesian classifier. The results of each classifier's performance were analyzed, and then a list of effectiveness of the classifiers was formulated based on the results. The effectiveness of the classifier was measured by how accurate it performed its analysis of classifying each batch of beer.

Results from the comparative performance assessment of the classifiers is presented, along with recommendations for how this might be used in a production environment.



LOCATION: ISAT/CS ROOM 337 – BS ISAT PROGRAM

Presentation Time:	10:30-10:55 am
Capstone Student:	Virginia Thai
Concentration:	Information Knowledge Management
Capstone Advisor:	Dr. Nicole Radziwill
Project No.:	BSISAT-27-13S
Abstract Title:	Predicting Emerging Trends in Technology Management using Text Mining

Capstone Abstract:

This project will utilize three of the leading scholarly journals in the field of Technology and Innovation Management (TIM) to find emerging trends in the discipline of technology management and possibly predict future trends. The data was collected for the past 10 years of the journals based on whether or not they met the criteria of an "article." The criteria was set that if the article did not have an abstract from the author that it was not considered an article. After collecting this data it was processed using the R statistical software. Using topic modeling, the topical focus of the articles was tracked to detect changes over time. With this information it is possible to do comparisons on the journals and see the relationship of those those topic changes to predict the up and coming topics based on the new emerging trends

LOCATION: ISAT/CS ROOM 337 – BS ISAT PROGRAM

Presentation Time:	11:00-11:25 am
Capstone Student:	Erich Lang
Concentration:	Information Knowledge Management
Capstone Advisor:	Dr. Morgan Benton
Project No.:	BSISAT-28-13S
External Sponsor:	USGS Patuxent Wildlife Research Center
Abstract Title:	Patuxent Breeding Bird Atlas Geolocator

Capstone Abstract:

The Patuxent Breeding Bird Atlas Geolocator, or Blockfinder, is a mobile website meant for field biologists working in association with the Patuxent Wildlife Research Center. These biologists are assigned an area in which they search for evidence of birds and breeding activity. The Blockfinder program will find the precise location of biologists in the field and inform them which area they are standing in. This will help biologists more accurately classify where the birds were spotted. The website will also inform the biologists which birds have been spotted in the area, letting them listen and watch for specific birds. The Blockfinder was written in HTML5 and JavaScript and utilizes the OpenLayers mapping API, the Geolocation API, and the Yahoo! Placefinder API.

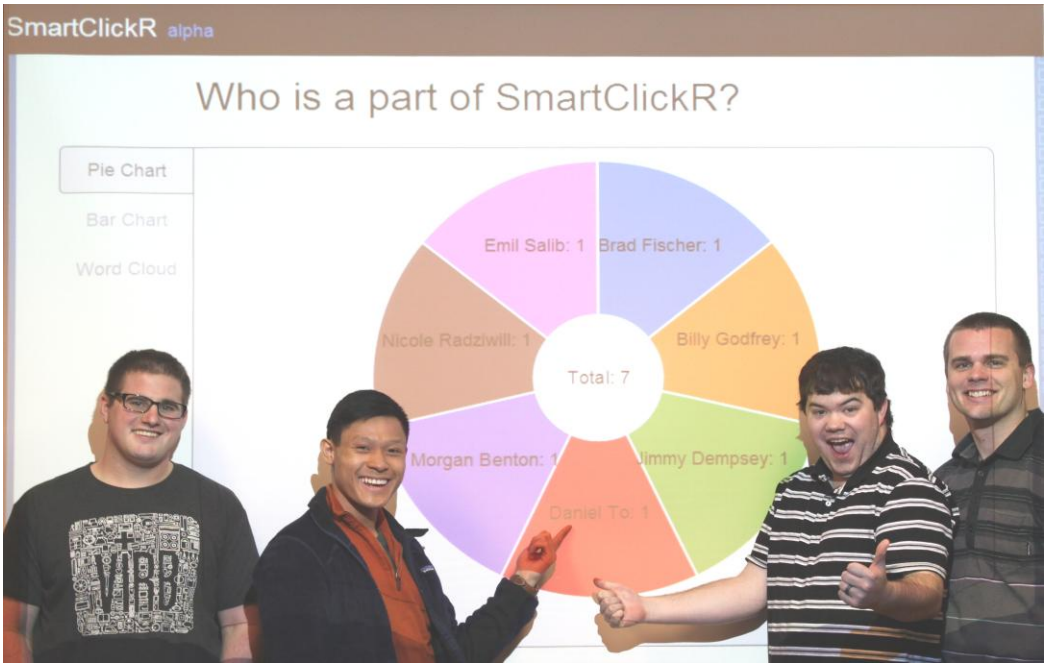
LOCATION: ISAT/CS ROOM 337 – BS ISAT PROGRAM

Presentation Time:	11:30-12:10 pm
Capstone Students:	James Dempsey, Bradley Fischer, Billy Godfrey, Daniel To
Concentration:	Information Knowledge Management
Capstone Advisor:	Dr. Morgan Benton
Project No.:	BSISAT-29-13T
Abstract Title:	SmartClickR

Capstone Abstract:

Modern audience response systems, frequently referred to as "clickers," have several problems. They require audience members to acquire costly, single-function devices (i.e. the clickers), have a reputation for buggy software, and have limited ability to do real-time data visualization and analysis. The near ubiquitous adoption of smartphones and advances in web-based toolkits for interactive application development and data visualization make it possible to solve these problems. SmartClickR is an end-to-end solution enabling presenters to interact with their smartphone-owning audience by asking them questions and displaying the results in real time. If you come to this presentation, be ready to participate on your smartphone or laptop.

SmartClickR was built on a custom-tailored hardware solution utilizing the following technologies: Linux, VirtualBox, DNS, port forwarding, Node.js, Express, Jade, MySQL, D3.js, Javascript, jQuery, CSS, and HTML5.



LOCATION: ISAT/CS ROOM 348 – BS ISAT PROGRAM

Presentation Time:	9:00-9:40 am
Capstone Students:	Nathan Brown, Daniel Fishman
Concentration:	Energy, Environment
Capstone Advisor:	Dr. Tony Chen
Project No.:	BSISAT-30-13T
External Sponsor:	JMU Dining Services and Facilities Management
Abstract Title:	Energy Analysis of JMU's East Campus Dining Hall

Capstone Abstract:

Excessive energy consumption among first-world nations is a rapidly increasing problem in the world. As the global economy feels the tension due to the limited sources of fossil fuels to generate energy, the demand for energy efficient buildings and automobiles increases. One US non-profit organization is "committed to a prosperous and sustainable future for our nation through cost-efficient and energy-saving green buildings." This organization is called the United States Green Building Council and has offered Leadership in Energy and Environmental Design (LEED) certifications since 2001. JMU's East Campus Dining Hall was awarded a silver LEED certification.

The purpose of this study is to investigate the current efficiency efforts being made in the East Campus Dining Hall and to determine where additional action can be taken to make improvements. The program called eQUEST® will be used to run a simulation of the building's energy consumption over a year and will be used as a comparison to in-field data collected and statistical measurements. This project focuses specifically on the dining area of the building with an emphasis on heat transfer, internal energy gain, and fenestration. Taking the findings into account, this project will offer cost-effective suggestions for improved sustainability in hopes of stimulating awareness of JMU becoming a "greener" campus and inspiring students and staff to become part of the planet's energy solution.

LOCATION: ISAT/CS ROOM 348 – BS ISAT PROGRAM

Presentation Time:	11:35-12:00 pm
Capstone Student:	Zachary Hopf
Concentration:	Energy
Capstone Advisor:	Paul Goodall
Project No.:	BSISAT-31-13S
External Sponsor:	Micronic Technologies LLC
Abstract Title:	Technology Assessment and Company Survey for Small, Portable Water Treatment Devices

Capstone Abstract:

Water quality is a rising issue in third world countries, in the military, and in commercial and industrial applications. These issues all require small, portable water treatment devices that use minimal energy, produce little to no waste, and output a high quantity and quality of water that meets the EPA's primary or secondary water standards. Several water treatment technologies are on the market but vary in technology and types of applications. A study of several water treatment technologies was accomplished, along with a description of several companies attempting to develop and market these technologies for military, third world country, and commercial and industrial use. A technology assessment was then created to comparatively evaluate important factors and rank the company technologies relative to key performance parameters important to the target markets. A point system was fashioned to each characteristic and a weighted matrix created to identify the best products. This company assessment and technology survey was created to assist Micronic Technologies LLC comparison of its water treatment device to other companies' products in the market.

LOCATION: ISAT/CS ROOM 348 – BS ISAT PROGRAM

Presentation Time:	1:00-1:40 pm
Capstone Students:	Devin Galloway, Andrew Moore
Concentration:	Sustainable Energy Information Management, Telecommunications
Capstone Advisors:	Dr. Jonathan Miles, Dr. Emil Salib
Project No.:	BSISAT-32-13T
External Sponsor:	Virginia Center for Wind Energy
Abstract Title:	Remote Data Acquisition, Networking, and Databasing for a Wind-Solar Monitoring Center

Capstone Abstract:

The purpose of this project was to acquire data from multiple instruments and data loggers installed at the Small Wind Training and Testing Facility (SWTTF) at James Madison University and to integrate each set of data into a single organized and publicly-accessible web page. This effort required the application of various aspects of telecommunication and information knowledge management. Data types collected included wind speed, direction, and gusts; temperature; humidity; power output from the wind turbine and photovoltaic panels; and energy exchange with the grid. Data were integrated from four logging devices:

Outback Power™ Mate3, Met One Instruments CR1000, Honeywell Web-201, and Weatherbug® Station. The data were compiled into a WordPress© webpage using a MySQL server and XAMPP database. PHP was used to import the CSV data file containing wind data, and HTML and CSS were used to display the data in an online table. Real-time, daily, and monthly data from the Weatherbug® Station were embedded into a webpage using HTML. The Wordpress© webpage was organized so that each set of data acquired by the different data loggers could be selected and viewed from the link menu.

The data were also made available through a mobile application on both Android and iPhone platforms. The mobile development was accomplished by using the cross-platform Titanium Studio Mobile Application Development Environment. The website and mobile app will be used to archive and analyze data for future turbine testing at the SWTTF. Ongoing efforts are recommended that would allow utilization of SQL queries to analyze specific data sets and create tables and graphs.

LOCATION: ISAT/CS ROOM 348 – BS ISAT PROGRAM

Presentation Time:	1:45-2:25 pm
Capstone Students:	John Doran, Brendan Lewis, Kenneth McMullen, Matthew Morrissey
Concentration:	Energy
Capstone Advisors:	Dr. Jonathan Miles, Ms. Remy Pangle, Ms Taylor Moellers
Project No.:	BSISAT-33-13T
Abstract Title:	Wind for Schools Implemented at Grassfield and Luray High Schools, Virginia

Capstone Abstract:

Renewable energy technologies, in particular wind energy, represent a fast-growing sector within the power generation industry. Increasing demand for wind energy is promoting an expansion of opportunities for employment in renewable energy fields, and small wind systems are now even appearing at schools throughout the country where they not only supply clean power to facilities, but also opportunities for students at all levels to become acquainted with the technology. Wind for Schools, a program funded by the U.S. Department of Energy and supported in eleven states including Virginia, seeks out K-12 host schools wishing to install small wind turbines that provide a hands-on applied science and technology experiences while also supporting the opportunity to learn about the benefits and challenges associated with wind energy.

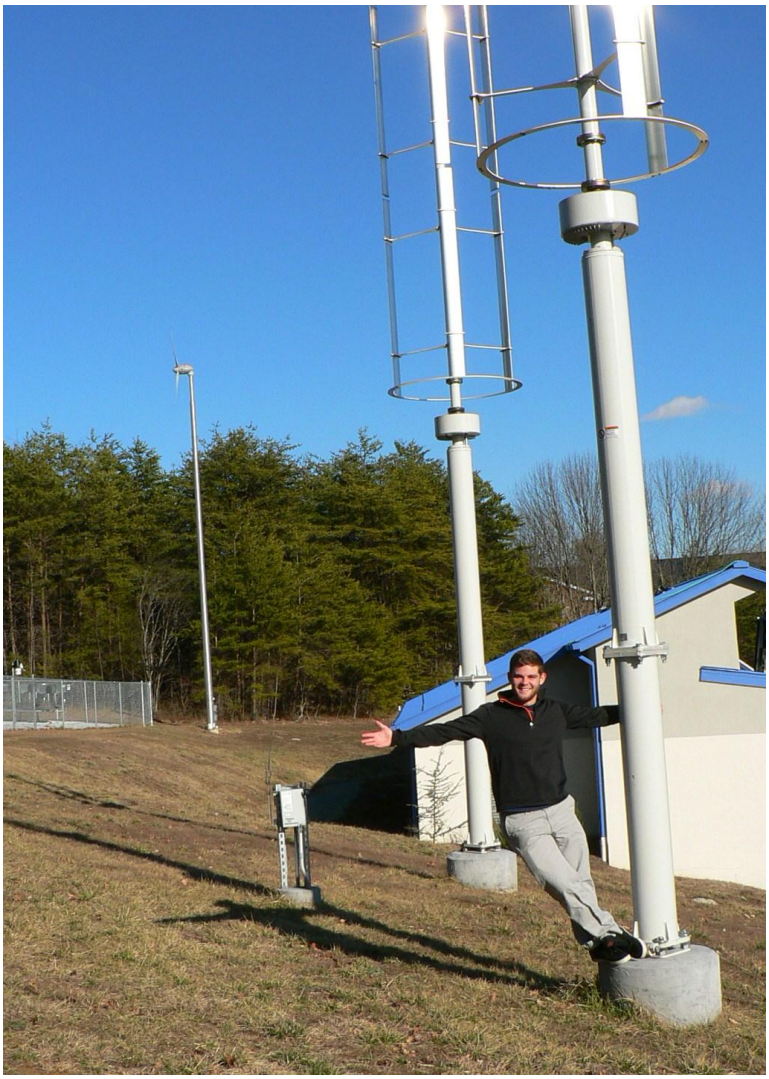
The partners on this project , working directly with the Virginia Wind for Schools program, assisted Grassfield High School in Chesapeake, Virginia and Luray High School in Luray, Virginia by conducting energy use analyses; siting analyses; wind resource assessments; economic estimates; and community engagement. They also addressed local issues; installation logistics; and social, economic, and environmental impacts. The wind turbines to be installed will eventually help to power football field concession stands at each school, and will provide students the opportunity to work with emerging wind technologies and analyze the data produced. These turbines will also raise awareness in the communities. Finally, the projects at Grassfield and Luray High Schools were compared and contrasted in order to highlight similarities and challenges associated with the projects.

LOCATION: ISAT/CS ROOM 348 – BS ISAT PROGRAM

Presentation Time:	2:30-2:55 pm
Capstone Students:	Blaine Loos (Honors Capstone)
Concentration:	Energy, Information Knowledge Management
Capstone Advisors:	Dr. Jonathan Miles, Ms. Remy Pangle, Ms Taylor Moellers
Project No.:	BSISAT-34-13S
Abstract Title:	Performance Analysis of Small-Scale Vertical and Horizontal Axis Wind Turbines at a School in Southwestern Virginia

Capstone Abstract:

The Leonard A. Gereau Center for Applied Technology and Career Exploration in Rocky Mount, VA is an affiliate school with the Virginia Wind for Schools program. At this school, there are three wind turbines: one Southwest Windpower Skystream 3.7 (generating capacity: 2.4 kW) horizontal axis wind turbine (HAWT), and two Windspire (generating capacity: 1.1 kW each, 2.2 kW total) vertical axis wind turbines (VAWTs). This project analyzes weather data from a WeatherBug station, along with turbine manufacturer's specifications, to predict expected electricity generation and compares these predictions to actual turbine outputs. The project studies the effects of turbulence and wind variations attributable to topography and natural and man-made obstacles at the site. The main objectives of this project are to provide insight into the advantages and disadvantages of these two wind energy technologies and to examine the effects of turbine siting on power generation and performance.



LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	9:00-9:40 am
Capstone Students:	Sarah Mello, Erica Mulford , Maryann Sniezek (Honors Capstone)
Concentration:	Environment, Natural Resource Sustainability
Capstone Advisors:	Dr. Wayne Teel, Dr. Jennifer Coffman
Project No.:	BSISAT-35-13T
Abstract Title:	Design, Implementation, and Analysis of Biochar Production at Hermitage Hill Farm & Stables

Capstone Abstract:

Research on biochar is still in its early years yet we know that its potential is immense. Pyrolysis is the process of slowly burning biomass at a very high temperature in the absence, or limitation, of oxygen. When organic matter undergoes pyrolysis, it creates a charcoal byproduct called biochar. The goal of our thesis was to design and construct a pyrolysis unit for the creation of biochar on Hermitage Hill Farm & Stables in Waynesboro, Virginia.

The owner, Mr. Craig Nargi, quickly accumulates large piles of horse manure/used-bedding mixture and he purchases large amounts of lime to spread on the fields in order to help neutralize the acidic soil caused by horse urine. In the summer of 2012, Mr. Nargi also added a hoop house to his property in the hopes to grow and sell his own vegetables and herbs.

The design of the pyrolysis unit at Hermitage Hill consisted of a 166 L pyrolysis chamber and a 327 L water tank. The pyrolysis unit was installed inside the greenhouse and the creation of biochar served four purposes: 1) The biochar was created from the manure/used-bedding mixture in order to help reduce agricultural waste on the farm, 2) The creation of biochar provided a substance that Mr. Nargi could add to his compost to help reduce ammonia released from the waste, 3) The biochar-compost mixture could then be spread on the fields to serve as a lime replacement and a soil nutrient enhancer, 4) The excess heat captured in the unit and water tank from the pyrolysis process was slowly released to the greenhouse to provide a sustainable way of heating the area during the winter.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	9:45-10:25 am
Capstone Students:	Samuel Frere, Daniel Warren (Honors Capstone)
Concentration:	Environment, Development of Sustainable Food Systems, Entrepreneurship
Capstone Advisors:	Dr. Wayne Teel, Dr. Jennifer Coffman
Project No.:	BSISAT-36-13T
External Sponsors:	Valley 25x25, Matchbox Realty, Casco Ice House, Harrisonburg Community Development Office, Venture Creation Class, A Bowl of Good Restaurant
Abstract Title:	The Creation of Sustainable Local Food Production Applications and their implementation in the Shenandoah Valley

Capstone Abstract:

The purpose of this thesis is immersion in and exploration of applications and methods for ecologically friendly agriculture relevant to Harrisonburg, VA. The investigation started with the design and maintenance of a garden for the local restaurant, A Bowl of Good, from December 2011 to September 2012. Management of this garden led to the creation of a Community Supported Agriculture (CSA) program from a 1/10 of an acre (rented) urban lot. The CSA, Collicello Gardens, required policy changes to allow residential urban horticulture businesses. In the first season of the CSA up to 1 bushel of produce was delivered weekly to fourteen families from June 2012-October 2012. Through the course of the growing season the CSA shared over 1000 pounds of produce with its members. Management of the CSA and horticultural field work yielded research questions concerning improvement of the efficiency and design of ecological horticulture in its application in the Shenandoah Valley. The research questions are being answered using space in the Biosciences building's greenhouse. The space houses a study of a novel hydroponic system using-poultry char and biochar as hydroponic media in conjunction with nutrients provided by vermicompost tea and mutualistic plant/fungi relationships with mycorrhizae. The space also permitted the study of effects of vermicompost and ratios of char on germination rates and growth rates in seedlings of several different plant varieties. Research and immersion in the local agricultural field has led to the design of an urban greenhouse, a novel aquaponics/hydroponics method, and a vermicomposting business plan. The designs are being scaled and studied by students in a venture creation class at JMU and this thesis team. The business is being implemented in the re-development of the CASCO ice house in downtown Harrisonburg. The team is currently seeking venture funding for start-up.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	10:30-11:10 am
Capstone Students:	Collin Sumpter, Tyler Wert
Concentration:	Environment
Capstone Advisor:	Dr. Wayne Teel
Project No.:	BSISAT-37-13T
External Sponsors:	US Environment Protection Agency (EPA)
Abstract Title:	Refining the Design and efficiency of Small-scale Biochar Production Systems located at Avalon Acres and Polyface Farm, Virginia

Capstone Abstract:

Biochar is a form of charcoal that is created through the pyrolysis process. Pyrolysis is achieved by burning biomass in the absence of oxygen, preventing the material from combusting and leaving most of the carbon behind. The most useful characteristics of biochar include its ability to sequester carbon for hundreds of years, to raise the pH of acidic soils, to retain water as well as nutrients, and to filter some pollutants. With the use of biochar, farmers can reduce chemical fertilizers needed, thus lowering our dependence on fossil fuels and reducing the amount of agricultural pollution in the surrounding watershed. Recent studies have also shown positive effects of feeding small amounts of biochar to livestock such as chickens or cattle.

The first phase of our project focused on improving the efficiency of the system located at Avalon Acres and to complete the construction of the system at Polyface Farm. To improve the heat transfer efficiency at Avalon we constructed a protective structure and added insulation to both the door and around the chamber. The biochar unit at Polyface was completed by attaching the door and the water tank as well as constructing a chimney. The second phase of the project involved conducting experiments to determine the most effective process for producing biochar on a small scale farm. We were then able to bring the samples to the lab and analyze them using total gravimetric analysis, scanning electronic microscopy and lab tests to determine their structure and compare the amount of carbon before and after pyrolysis. The results we find can be used to assist other small farms in constructing their own biochar production systems or for future larger-scale biochar production systems.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	11:15-11:40 am
Capstone Student:	Logan Kendle
Concentration:	Environment
Capstone Advisor:	Dr. Wayne Teel
Project No.:	BSISAT-38-13s
External Sponsors:	US Environment Protection Agency (EPA) P3, People, Prosperity, and Planet Program
Abstract Title:	Redesigning a Bio-Char Production Chamber to decrease smoke loss, steel, and cost

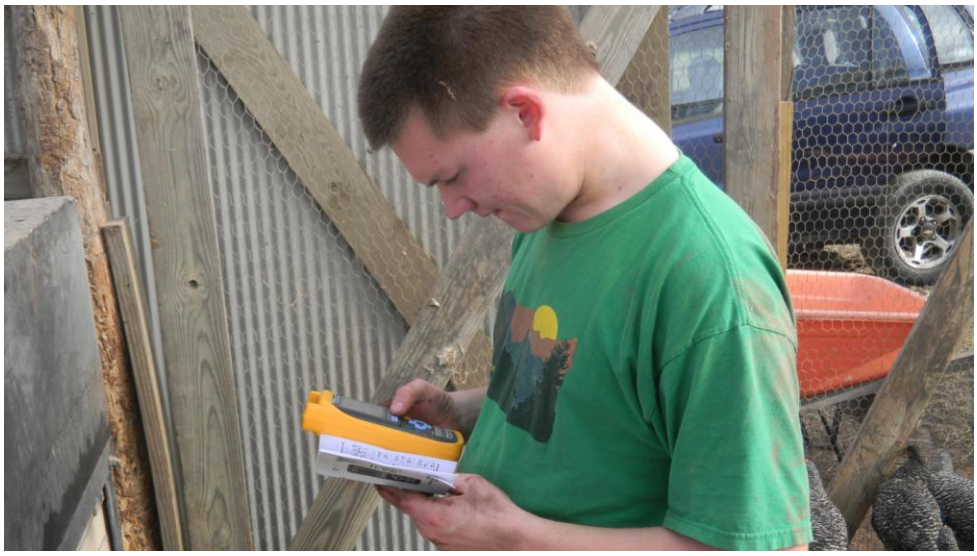
Capstone Abstract:

Working with a $15,000 grant from the Environmental Protection Agency's P3: People, Prosperity, and Planet program we have redesigned and built three biochar production chambers on Shenandoah Valley Farms. Bio-Char is the product of a pyrolysis reaction inside a low oxygen chamber surrounded by a larger burn chamber filled with fuel. Wood and other organic matter is pyrolyzed to create the black charcoal like materials that can be used as an agricultural supplement to reduce nutrient leaching, increase microorganism habitat, retain moisture, and sequester carbon into the soil. Previous ISAT Capstone teams have worked on these units since 2009 and this project focused on solving construction and design problems presented in previous years. Some of the changes made include new high heat ceramic insulation, modified heat absorption tank design, a new door locking mechanism, and new air infiltration method to increase oxygen flow. The goals of the project were to reduce smoke loss, increase the amount of heat going to the water tank, create a user friendly tight door latch, reduce the use of steel, reduce the fuel wood to pyrolysis wood ratio, and to change the way the door was insulated. All of these were in some way resolved, yet room was left for improvements to perfect the system. Using a program called Vectorworks Design software my project produced detailed plans on how to build a biochar unit for small farmers so they can build their own with a guide on materials needed to complete the project.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	1:00-1:25 pm
Capstone Student:	Jason McNabola
Concentration:	Energy
Capstone Advisor:	Dr. Wayne Teel
Project No.:	BSISAT-39-13S
Abstract Title:	Investigating Heat Capture Potential during Biochar Production

Capstone Abstract:



In recent years the scientific and agricultural communities have shown increasing interest in biochar. Biochar is a carbon rich, highly porous substance that is one of the byproducts created during the pyrolysis of biomass. Specifically, biochar has gained much attention for its potential to improve soil quality and mitigate climate change. However, the production of biochar is a process that requires more research and refinement before its potential can be fully realized. In this report, the focus will be on the tremendous amount of process heat released during pyrolysis of a small batch reactor system. By further investigating the thermal properties of the pyrolysis unit designed by Dr. Wayne Teel and many students, we hope to be able to more accurately and precisely estimate the heat storage and heat transfer capacity of the unit.

The specific heat of the brick used in the construction of the oven surrounding the pyrolysis chamber was determined using a calorimeter and energy balance analysis. Its value was calculated to be 0.66 J/g°. Individual burn events for the production of biochar (abbreviated “burn runs”) were conducted on multiple occasions at three separate farms. At each site, several data sets were recorded, including the weight and type of the feedstock, the temperature inside the pyrolysis chamber and oven, and the temperature change of a water tank sitting on top of the pyrolysis unit. One burn run at Hermitage Hill resulted in a temperature increase of 71.1°C.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	1:30-2:10 pm
Capstone Students:	Christopher Brown, Brett Spencer (Honors Capstone)
Concentration:	Environment, Applied Biotech
Capstone Advisors:	Dr. Wayne Teel, Dr. Joy Ferenbaugh
Project No.:	BSISAT-40-13T
External Sponsor:	Wildside Farms, Andrew Shaefer
Abstract Title:	Implementation of a Pyrolysis Camber adapted for use as a heat source for a Hoop House at Wildside Farms and production of Biochar as a for Soil Amendment

Capstone Abstract:

Two Senior ISAT students, Brett Spencer and Chris Brown set out to implement, operate, and analyze a medium sized batch yield biochar chamber in a hoop house on the locally owned Wildside Farm. The effort focused on achieving the production of biochar from various types of biomass through the process of pyrolysis.

The pyrolysis process was improved through design change in the door to reduce smoke loss from the biochar chamber and increase heat capture by the thermal mass of the unit. Biochar is the product of pyrolyzing biomass, or heating the biomass in an oxygen deprived environment. The biochar was used as a soil amendment in tests as well as stream remediation studies to analyze the potential benefits.

The parameters studied were the use of biochar as a carbon sink, as well as soil amendment to improve nutrient and water holding capacity. The pyrolysis unit itself was designed as a heat capture tool to extend the growing season of warm weather vegetables. The temperature effects of the heat capture were monitored in the air surrounding the chamber. Bio-Char has the potential to serve in a wide variety of sustainable agriculture applications.

LOCATION: ISAT/CS ROOM 350 – BS ISAT PROGRAM

Presentation Time:	2:15-2:55 pm
Capstone Students:	Cara DiFiore, Kofi Boafo
Concentration:	Environment, Energy
Capstone Advisor:	Dr. Wayne Teel
Project No.:	BSISAT-41-13T
Abstract Title:	The Design and Implementation of Top-Lit Updraft Stoves and the associated benefits of Biochar in Sub-Saharan Africa

Capstone Abstract:

In developing countries today, daily household cooking is done traditionally over open fires, usually occurring inside the home. These cooking methods adversely affect human health, causes safety hazards, and slow socio-economic development. By creating a Top-Lit Up-Draft stove (TLUD) which will ultimately produce biochar, technologies can further develop to help fight greenhouse gas emissions from inefficient burning of biomass and decrease time spent during the labor intensive process of gathering fuel for open-fire cooking. Our main goal is to develop a TLUD stove that is affordable, durable, and easy to operate and maintain while producing biochar from waste biomass such as corn cobs, coconut husks, broken wood branches, etc.

Biochar is a form of charcoal produced at high temperature, which is then used in agriculture to improve soil by increasing nutrient and water holding capacities. Through pyrolysis, the process of burning organic material in a low oxygen environment, TLUD stoves replace traditional wood fires with wood gas flames and more concentrated heat. The biochar created from the burning fuel while cooking meals can then be used to increase crop yield and sequester carbon. This project involved designing two distinct TLUD stoves and acquiring special training to weld the stoves personally. Experimenting with different types of waste biomass as fuels helped to further test the benefits of biochar. Through holistic systems thinking, this project will contribute to a sustainable solution to rural cooking problems and a potential economic market between rural and urban areas that can be implemented successfully in Sub-Saharan Africa.

LOCATION: HHS BUILDING - ROOM 1202 – BS ISAT PROGRAM

Presentation Time:	9:00-9:40 am
Capstone Students:	Christopher Diachok, Vincent Zampelli
Concentration:	Applied Biotech, Energy
Capstone Advisors:	Dr. Christie-Joy Hartman, Dr. Mary Handley
Project No.:	BSISAT-24-13T
Abstract Title:	Exploration of the effect of Microbial Fuel Cell Applications on Plant Growth

Capstone Abstract:

Plant-microbial fuel cells (P-MFCs) are a nascent renewable energy technology that researchers believe may be developed to generate electricity at sites such as green roofs and marshlands. In a P-MFC, the organic matter excreted from plant roots into soil is broken down by bacteria, the bacteria generate electrons, and the fuel cell utilizes the electrons to produce electricity. To date, research on P-MFCs has primarily focused on the fuel cell development, especially increasing power production, and few studies have looked at the effect, if any, on the plants. Specifically this undergraduate research project investigated three questions: Is the fuel cell operation reducing the plant's growth? Is the altered living environment affecting the growth of the plant? What are the implications of P-MFC's for society? We designed, constructed, and tested P-MFCs with a dwarf umbrella palm. We compared a fully operational P-MFC, a P-MFC that was not run, and a plant without the P-MFC components. The electricity production of the operating fuel cells was recorded to demonstrate the energy potential of P-MFCs. We will present the effect of the treatments on plant stem and leaf growth, wet weight, and dry mass. We examine the results in the social context including the scale and impact of potential P-MFC applications. We would like to thank Dr. Anne Henriksen, Dr. Tony Chen, Dr. Wayne Teel, and Mr. Joe Rudmin for their assistance with this project.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	10:00-10:40 am
Capstone Students:	Steven Jackman, Brenton Kiomall, Justin Kiomall
Concentration:	Energy, Environment
Capstone Advisor:	Dr. Karim Altaii
Project No.:	BSISAT-42-13T
External Sponsor:	Hotel and Club Punta Leona, Costa Rica
Abstract Title:	Hotel Punta Leona Energy Conservation Project

Capstone Abstract:

The purpose of this project was to observe areas of energy concerns at Punta Leona Resort in Costa Rica and to monitor these areas and determine how to reduce the energy consumption. These areas were monitored using electricity monitoring devices: The eMonitor and The Energy Detective (TED), which were installed in various parts of the resort to monitor overall electricity consumption. Individual devices were monitored for electricity consumption using the Kill A Watt® EZ. FLIR® infrared cameras were used to monitor areas of infiltration and thermal leakage. The results of this project were found to be both the identification and isolation of the highest energy consuming buildings. By use of these technologies, we found that the Selvamar hotel rooms, where guests sleep are not as thermally insulated as efficiently as they could be. This was a significant finding that resulted in a project to reduce thermal leakage in the Selvamar hotel rooms by more tightly sealing the envelope of each room. There were other energy projects that were installed at the resort. This included a PV charging station, solar ventilating fans and the use of electric bikes for guests and employees.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	10:45-11:10 am
Capstone Student:	Jessica Aquilino
Concentration:	Energy
Capstone Advisor:	Dr. Karim Altaii
Project No.:	BSISAT-43-13S
Abstract Title:	Energy Analysis

Capstone Abstract:

The objective of this project was to complete a domestic energy analysis and gain experience using several forms of equipment. Energy issues were examined in the homes of three JMU professors in order to help the faculty members improve the efficiency of their homes. The different technologies that were used consist of; a Retrotec Blower Door, FLIR E40 Infrared Thermal Imaging Camera, Solemetric SunEye, and the use of Solemetric software and PV Designer to complete analysis.

The Retrotec Blower Door was used to determine if the homes had any unwanted air infiltration. The FLIR was then used in combination with the blower door to enhance the visibility of this infiltration and determine where the leakage was occurring. The FLIR was also used to test for infiltration. SunEye readings were taken at all three homes and then a PV analysis was completed to provide the homeowners with a potential PV system that could be installed.

All the data analysis, observations, pictures, and recommendations were organized into a technical report that was provided to each professor.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	11:15-11:55 am
Capstone Students:	Josh Beazley, Tyler Peacock, Jeffrey Ralph, Abinezer Teklegiorgis
Concentration:	Information Knowledge Management, Telecommunications
Capstone Advisor:	Dr. Emil Salib
Project No.:	BSISAT-44-13T
Abstract Title:	Implementing Safety Features in James Madison University's Urban Transportation Methods

Capstone Abstract:

On a college campus where various alternative forms of urban transportation methods are used, safety is an utmost concern. At James Madison University (JMU) numerous safety features have already been implemented, such as closing off the majority of the main campus from vehicles and adding more bike lanes to increase the safety of pedestrians and bikers. However one of the more dangerous forms of transportation at JMU which is usually overlooked is longboarding. JMU is located in the Shenandoah Valley and therefore JMU's campus is very hilly. A longboard, unlike a bicycle, has no brakes on it; therefore to slow down or stop on a longboard takes very advanced braking skills which many novice longboarders have not mastered.

Without knowing these advanced braking methods, it is not uncommon for a student to gain too much speed on a hill and end up falling and hurting themselves. To increase the safety of longboards on JMU's campus, our team has created a hand controlled braking system for a longboard. The braking system will consist of microcontroller chips controlling two servo motors, which will apply the brakes to the wheels. The system will be wirelessly controlled using a hand held wiiMote controller. This braking system would allow longboarders to monitor and adjust their speed to ensure that they don't gain too much speed, lose control of their board, and ultimately prevent them from falling and hurting themselves.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	1:00-1:40 pm
Capstone Students:	Robert Kozlowski, Matthew Schumaker
Concentration:	Telecommunications, Networking & Security in Telecommunications
Capstone Advisor:	Dr. Emil Salib
Project No.:	BSISAT-45-13T
Abstract Title:	Transforming Disconnected Business Processes into a fully Integrated Platform through the use of Cloud Computing. A project in Customer Relationship Management

Capstone Abstract:

The purpose of this project is to develop an integration environment with a focus on a client-consultant relationship management. To accomplish this objective, there needs to be a real client with a real problem so that a real integrated solution can be developed. For this project, the client was a newly established, small investment management firm with the need for an information and customer relationship management tool. The challenge is to develop a configurable environment which is scalable to meet the needs of integrating additional data sources and the potential rapid growth in the complexity of business flows and customer base. What is most significant about this project is the approach of the students identifying and structuring the problem for a real client, selecting a scalable integration environment, and building an easily customizable solution that meet the current and future growth needs of small to midsize enterprises. A major focus of the project is to demonstrate how easily new sources of data and partner's applications could be integrated in support of updating current or creating new business flows. To meet the needs of the client, a prototype is under development using the Systems Development Life Cycle methodology as a guiding framework to manage the project and integrate the solution with the firm's existing business processes. The project was organized into the following stages: Planning and Scope Development, Requirements Gathering, and Development. At this point in the project, the testing is still in progress, as well as, the integration component. The final deliverable of this capstone project will be a comparison of two CRM platform configurations, Salesforce.com and SugarCRM, as well as, integration work that enables information exchange between Google Apps and Salesforce.com.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	1:45-2:10 pm
Capstone Student:	Jeffrey Davison, Jr.
Concentration:	Telecommunications
Capstone Advisor:	Dr. Emil Salib
Project No.:	BSISAT-46-13S
Abstract Title:	Remote Control Lawnmower intended for use by handicapped persons in their Pursuit to live more independently

Capstone Abstract:

Independence is a key aspect of everyone's lives and in some cases this is unachievable, disabled persons sometimes if possible choose to live self-sufficiently but there are still those everyday tasks that come along with being self-reliant such as lawn work. Under normal circumstances this job would need to be contracted out to a different individual with the ability to perform the said duty, this becomes costly and burdensome due to the fact that the disabled individual will in turn need to depend on the contractor to get the job done in a timely fashion and these contractors are not normally inexpensive.

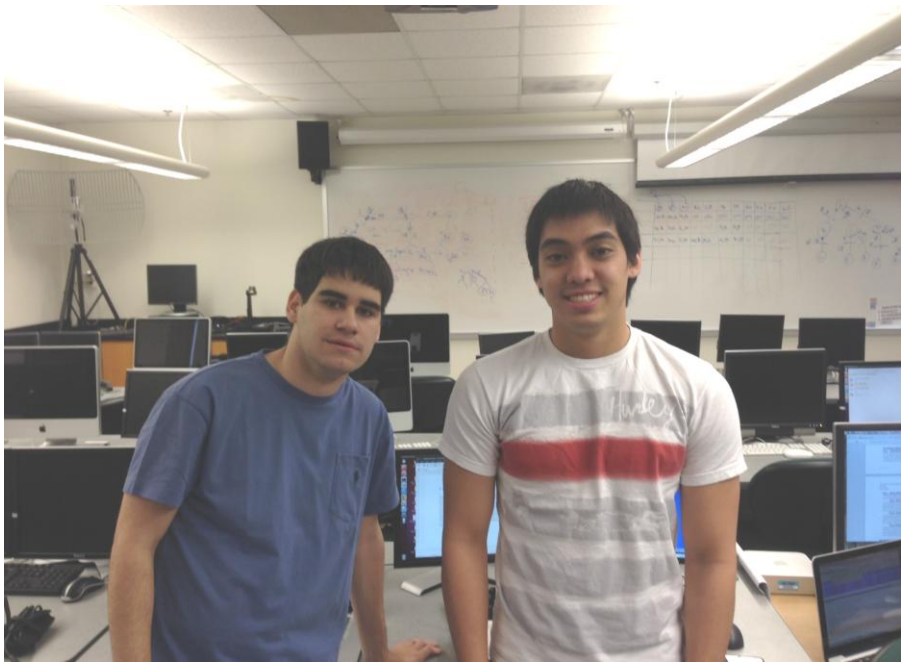
This is where my project could make that difference in the disabled persons pursuit to be self-sufficient, The remotely controlled lawnmower will be able to be wirelessly controlled from a safe distance of up to 100 yards away in direct sight and the gas mower engine will start wirelessly as well. The remote will control a pair of 24volt electric motors that engage a chain drive systems to control each of the rear wheels independently of one another meaning that the machine will be able to go forward, backwards, and in both the right and left directions while being controlled in the comfort of your home or outdoor space.

The drive terrain is powered by a Sabertooth 2X25 motor controller that converts the receivers pulse position modulation code into drive commands while the starting mechanism is controlled by an Arduino microcontroller with a relay shield that connects the wires momentarily to power the motor starter. A major factor in this capstone project is the safety of the end user and the surrounding people; this will be addressed in all aspects possible.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	2:15-2:55 pm
Capstone Students:	Alexander Goehring, Joshua Werner
Concentration:	Telecommunications
Capstone Advisor:	Dr. Emil Salib
Project No.:	BSISAT-47-13T
Abstract Title:	Mobile IPv6-IPSec

Capstone Abstract:



Cyber security is becoming an increasingly problematic issue because as the Internet continues to grow, the digital infrastructure of cyberspace becomes more penetrable and prone to cyber attacks. To address this issue, the purpose of this project is to explore Internet Protocol Version 6 (IPv6) with a focus on Internet Protocol security (Ipsec). IPsec will secure the data flow of packets between hosts and networks.

To accomplish this goal, we researched IPv6 and its associated security protocols, implementing them using StrongSwan and Racoon; open source software. IPv6 along with its security protocols are not currently prioritized in most undergraduate telecommunications programs. We replicated a virtualized Mobile IPv6 network through VMwareWorkstation that had mobile capabilities to simulate movement between home and foreign Local Area Networks (LANs).

In addition to this network, we employed both open source programs to establish secure connectivity between the nodes and verified this through Wireshark, an open source packet sniffer.

LOCATION: HHS BUILDING – ROOM 1210 – BS ISAT PROGRAM

Presentation Time:	3:00-3:25 pm
Capstone Student:	Andrew Hawley
Concentration:	Telecommunications
Capstone Advisor:	Dr. Emil Salib
Project No.:	BSISAT-48-13S
Abstract Title:	Mobile IPv6 Development

Capstone Abstract:

As new technology emerges in the world, there are many new features that are either incorporated through technology or created in regards to the technology. The IPv6 protocol deems a necessary switch to compensate for the boom of new IP addresses that are in demand. Regular IPv4 addresses are exhausted by the limited different outcomes due to a 32 bit field.

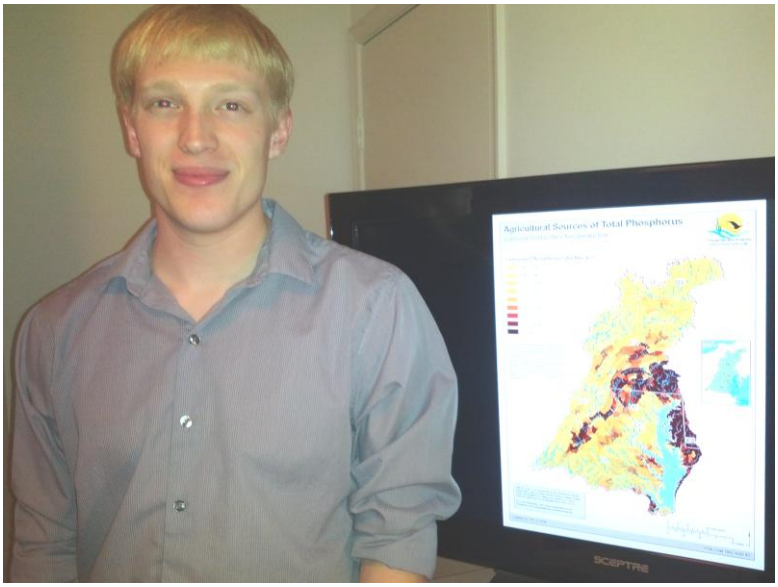
With the implementation of IPv6 the possible outcomes of different IP combinations are in the septillions. One of the biggest factors for this switch is the new smart phone devices that require IP addresses to access the world wide web(www). To fix the problems that are eminent, a model of mobile IPv6 within a smart phone is going to be created and tested. To ensure the best model is produced, a Google Nexus S smart phone will have a kernel that allows for mobile IPv6 development built off of the already popular Franco kernel. Virtual machines will be used to modify a current kernel, compile the kernel then successfully flash the new kernel onto the nexus. To show the benefits of this device a confirmation node will be contacted from the smartphone through a series of routers: one being the access router and the other being the home agent.

This procedure will produce a seamless transition where no data will be lost. This prototype will allow us to portray the benefits of Mobile IPv6 such as wider channels and more IP addresses.

LOCATION: HHS BUILDING – ROOM 2207 – BS ISAT PROGRAM

Presentation Time:	9:00-9:25 am
Capstone Student:	James Sheats
Capstone Advisor:	Dr. Jeffrey Tang
Concentration:	Environment
Project No.:	BSISAT-50-13S
External Sponsor:	Valley 25x'25
Capstone Title:	Assessing the Practicality of Implementing a Nutrient Trading Program in the Shenandoah Valley

Capstone Abstract:



This project analyzes the history of Chesapeake Bay pollution management and the effect of agriculture on water quality to determine the practicality of establishing a nutrient trading program including nonpoint sources in the Shenandoah Valley. A major concern is nutrient runoff from various agricultural operations, especially those involving livestock. Rockingham County is one of the largest turkey producers in the nation and is the most productive chicken and dairy county in the Commonwealth. In order to manage excess nutrients from these operations, some states, including Virginia, are looking into nutrient trading programs. Research on the history and fundamental principles of nutrient trading programs as well as survey feedback from farmers, organizations and other stakeholders is a critical component in illuminating perspectives essential to the success or failure of a trading program. This analysis will have direct implications on the success of the Chesapeake Bay TMDL, principally pertaining to the inclusion of nonpoint sources in tackling their contribution of pollution to the Bay.

LOCATION: HHS BUILDING – ROOM 2207 - BS ISAT PROGRAM

Presentation Time:	9:30-9:55 am
Capstone Student:	Elizabeth-Claire Dyer
Capstone Advisors:	Dr. Jeffrey Tang, Dr. Mary Handley
Concentration:	Environment, Social Context of Technology and Science
Project No.:	BSISAT-51-13S
Capstone Title:	Embodied Energy of Various Food Products

Capstone Abstract:

It is estimated that 15 to 20 percent of total energy used in the United States is consumed in the food sector. This project looks at energy embodied in various food products using a life cycle analysis (LCA) methodology. Identifying LCA steps in the food processes allows consumers to see what type of food products and preparation methods are the most energy efficient. Life cycle steps include agricultural production, transportation, processing, packaging, retail, household energy, and waste.

The comparisons highlight the energy consumption of various stages in the life cycle. Comparisons include: meat versus vegetarian products, level of processing used, style of preparation, scale of production, and distance traveled.

LOCATION: HHS BUILDING – ROOM 2207 - BS ISAT PROGRAM

Presentation Time:	10:00-10:25 am
Capstone Student:	Fanuel Haile
Capstone Advisor:	Dr. Jeffrey Tang
Concentration:	Sustainability
Project No.:	BSISAT-52-13S
Capstone Title:	Electricity-powered transportation at James Madison University: Exploring options and transforming culture

Capstone Abstract:

The goal of this project is to expose staff and faculty members to electric bikes or e-bikes and collect qualitative data (surveys that contain personal opinions with users experience with the e-bike) along with quantitative data (e-bike energy use compared to a Toyota Prius). E-bikes are an environmentally-friendly alternative to driving. E-bikes have an electric motor that provides an electric assist based on user's discretion, allowing the user to tackle various terrains by replacing mechanical energy (energy produced by user pedaling to move bike forward) with electrical energy (energy from electric motor which does work for user to move bike forward). This project started with two e-bikes that were distributed to different departments on campus. Survey questions were designed specifically to target departments were using the bikes in order to obtain the qualitative and quantitative data needed. The information from the survey will allow for an overall assessment of how beneficial e-bikes are, how much people liked or didn't like e-bikes, and how much energy the e-bikes used, compared to the energy required for a Prius to travel the same distance. This data will provide some insight for JMU administrators who may pursue funding to start an e-bike library at JMU.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	9:45-10:25 am
Capstone Students:	Erica Nordgren, Kyle Schwizer
Capstone Advisor:	Dr. Amy Goodall
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS02-13T
Abstract Title:	Increasing Biodiversity through a Native Species Garden at a Local Elementary School

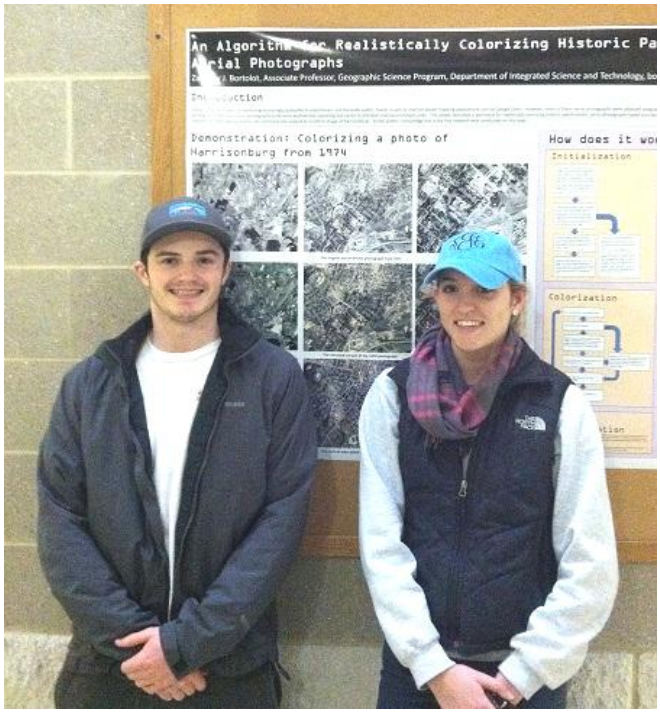
Capstone Abstract:

Urban gardens provide a space for recreation, aesthetics, science learning, and a sense of peace. Simultaneously, gardens can provide habitat for a diversity of bird, insect, and small mammal species. Our study is a part of a longer-term project designed to support a native plant species/vegetable garden at W.H. Keister Elementary School (Keister Elementary) in the city of Harrisonburg, VA. The purpose of the native species garden is to provide a study site for children's learning about the local natural ecosystem and its biodiversity. The garden can also be used as a monitoring site for surveys of butterflies and birds. In this study we addressed the butterfly biodiversity of the existing native plant species and assessed the garden as a citizen science monitoring site for use by children. We monitored butterfly species in the Keister Garden during late summer and fall 2012, keeping track of species use, abundance, and temporal patterns. We compared butterfly species presence at the Keister Garden to the expected butterfly species composition in the Harrisonburg region. We also worked with the Keister Elementary principal and teachers to determine which butterfly species the children would like to see in the garden. We present the results of our butterfly monitoring and discuss the student's interests in species. We propose an expansion and further management of the flower garden based on our survey results, assessment of literature, and the desires of Keister Elementary children to learn about life cycles of butterfly species.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	10:30-11:10 am
Capstone Students:	Samantha Jones, Charles Ross
Capstone Advisors:	Dr. Amy Goodall, Dr. Zachary Bortolot
Concentration:	Environmental Conservation, Sustainability and Development (ECSD), Applied Geographic Information Science (AGIS)
Project No.:	GS03-13T
Abstract Title:	Nature Trail Placement for W. H. Keister Elementary School, Harrisonburg, VA

Capstone Abstract:



W.H. Keister Elementary School located in Harrisonburg, Virginia desires to revitalize a nature trail through a forest patch on the school property. A trail currently exists but is problematic for use by children due to safety issues presented by thick vegetation and proximity to a floodplain. The school would like to modify the trail or build a new trail so that the forest patch can offer opportunities for learning about forest species and encourage children from the adjacent neighborhoods to safely walk to school. We designed this study to provide recommendations for the spatial placement of a nature trail that makes a connection between the school and local neighborhoods, is safe for children, and lends itself to education about the forest ecosystem of this region. The recommendations also consider keeping students active and engaged during their walk between their homes and school. We prepared our recommendations for trail placement by conducting a spatial analysis of the Keister Elementary property. We used GPS and remote sensing methods to create maps of the forest, existing trails, and areas in the forest that appear to encourage crime. We produced a vegetation stand map for the forested portion of the property by interpreting aerial imagery. The stands we identified were ranked according to their quality in native vegetation, biodiversity, aesthetics, and potential for crime. We conducted field assessments to assign these quality rankings with assistance from students in core geography classes and then computed overall quality scores through a spatial analysis using ArcGIS. We recommend the placement of the new trail based on the rankings, or where a trail would best serve the children in terms of safety, learning, and connection to their residential area.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	11:15-11:40am
Capstone Student:	Benjamin Mardiney
Capstone Advisor:	Dr. Amy Goodall
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS15-13S
External Sponsor:	Principal, Ms. Anne Kitner, W.H. Keister Elementary School, VA
Abstract Title:	Winter Avian Biodiversity at the W.H. Keister Elementary School Forest

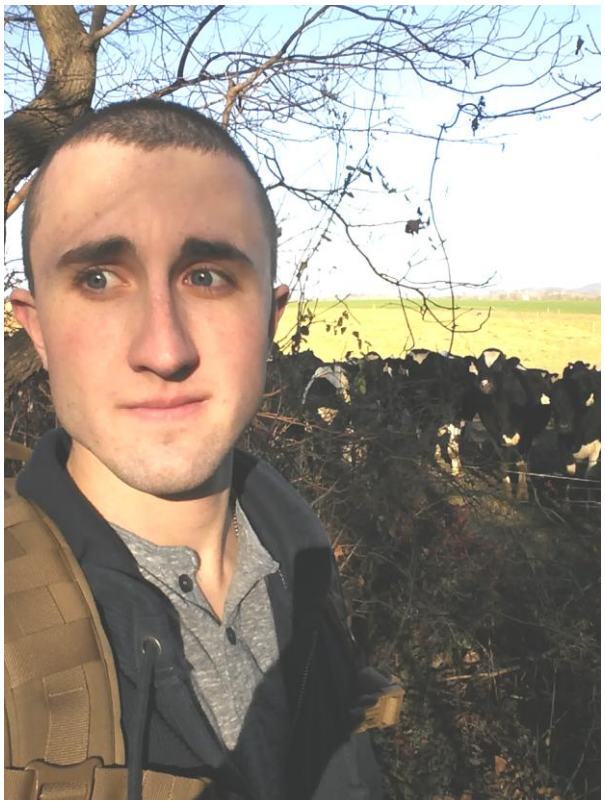
Capstone Abstract:

High biodiversity is essential for the health and long term survival of a forest stand. Bird population diversity provides an accurate measure of the health of most ecosystems and is a large factor in the overall biodiversity of a forest stand. The goal of this study was to create forest management recommendations for increasing winter avian biodiversity in the forest patch at W.H. Kiester Elementary School in Harrisonburg, VA. In order to assess the current winter avian community, point count and spot mapping survey methods were used during the time period from October 15 to March 30, 2013 to determine bird species richness and relative abundance. Results of these assessments were compared to assessments conducted in other forest patches within Harrisonburg, VA. A project was given to the principal and teachers at the elementary school so that students could discuss which birds they have seen in the forest and which birds they would like to see. The results of the avian survey and discussions with the principal and teachers were used to build forest management recommendations. Results indicate that the forest patch at W.H. Kiester Elementary can become known as an enjoyable public birding site.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	1:35-2:00 pm
Capstone Student:	Scott Senter
Capstone Advisor:	Dr. Zachary Bortolot
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS04-13S
Abstract Title:	Mapping the Aesthetic Beauty of Forests using LiDAR Data

Capstone Abstract:



A number of studies have studied people's perceptions about what makes a forest beautiful. With today's technology it is possible to map those perceptions across a large forested area. This project attempts to map the aesthetic beauty of the Paul State Forest using LiDAR data. To do this, four digital photographs were taken at the centers of 24 randomly placed 10m radius plots. These photographs were taken with the camera pointed in the four cardinal directions. Next 24 undergraduate students examined the photographs and rated each plot's beauty on a scale of 1 to 5. LiDAR-derived metrics for each plot were obtained using the US Forest Service's FUSION software and stepwise multiple linear regression was used to develop an equation for predicting the scenic beauty score based on the metrics. Finally the forest was divided up into square cells, the metrics were calculated for each cell, and the equation was used to predict the aesthetic beauty of each cell. The resulting map provided interesting insights into to Paul State Forest. It was found that areas along the border of the forest were perceived as most beautiful. The map may be especially helpful for forest managers, hikers, photographers and land owners.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	2:05-2:50 pm
Capstone Students:	Molly Marcucilli, Emma Sacks
Capstone Advisor:	Dr. Carol Nash
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS07-13T
Abstract Title:	Native Gardening at the JMU Farm: A Small-scale Intervention Ecology Model

Capstone Abstract:

The James Madison University Farm, located on the North River approximately ten miles east of Harrisonburg, has been owned by the University for 84 years. During that time, the 31-acre property has transitioned from long-term agricultural (crop/pasture) land use to a 25-acre planted white pine/loblolly pine forest and 5-acre mowed lawn. Approximately one acre remains in riparian hardwood forest. Aesthetically beautiful, the Farm currently supports limited biodiversity due to the largely monocultural landscape.

The purpose of this capstone project is to design and implement a small native garden that, while only 625-square feet in area, will create a model for the use of native plants to increase biodiversity and promote a forward-looking intervention ecology alternative for ornamental landscaping. The garden extends from the forest edge where some native species have held on despite significant intrusions from invasive plants. With the assistance of the Virginia Native Plant Society, we selected a variety of perennial ground covers, plants, and shrubs native to the Ridge and Valley region of Virginia (USDA Hardiness Zone 6B) to create a layered shade garden. These plants all possess specific traits that make them uniquely adapted to the area's climate and soils, and all have been selected based on their high wildlife value. Over time, we hope that the garden will become the nucleus for a native ecosystem at the Farm. Planting a native garden is a relatively small project but an important step in promoting sustainable gardening at JMU. We also hope to encourage future projects on the JMU Farm and recognize its potential to serve as an outdoor classroom. We should take pride in our regional identity and when gardening and consider plants native to the area before choosing exotic ornamentals, because even small ecological contributions such as this project can improve overall ecological function by introducing native habitats in an otherwise fragmented landscape.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	2:55-3:35 pm
Capstone Students:	Dilan Abdullah, Erin Knight, Lauren Frigm
Capstone Advisor:	Dr. Carol Nash
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS16-13T
Abstract Title:	Baseline Study of the East Campus Hillside Meadow, James Madison University

Capstone Abstract:

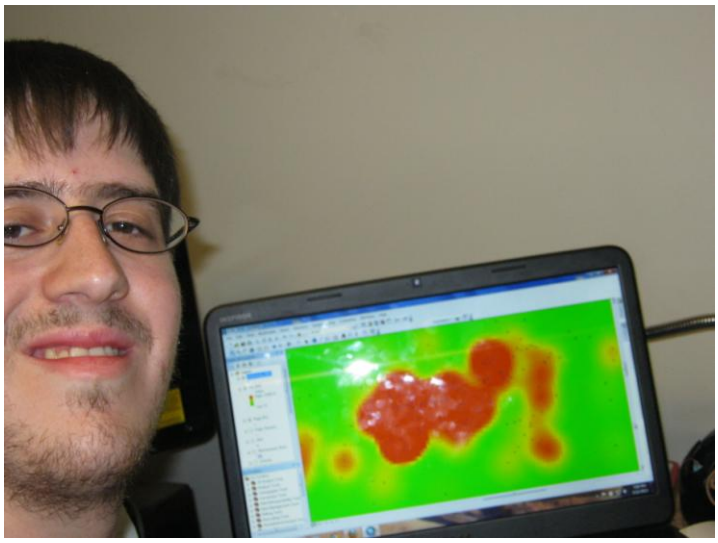
College campuses are becoming more attuned to alternative landscaping strategies that increase biodiversity by naturalizing areas previously maintained as lawns. One example of such a re-naturalization effort is the James Madison University (JMU) East Campus Hillside Project. Planted in June 2011 on 7.5 acres of mowed lawn, the goal of this project was to create an early successional meadow dominated by native grasses and wildflowers. The Hillside project falls within the realm of intervention ecology, a forward-looking approach that takes into consideration past land use and manages to improve ecosystem services, particularly biodiversity. Our study was designed to create a baseline of meadow development two years into the project. To facilitate plant identification, we created a keyed guide that will remain available for campus use. Once the guide was completed, we focused on analyzing the vegetation distribution currently found within the project area (to determine how well the target species are established). Transects at 28-foot intervals were delineated across the meadow and identified plants mapped with survey-grade GPS at ten-foot intervals along each transect. Invasive plant species were also noted. An Excel database containing the transect survey results was created and the GPS features imported into ArcGIS for spatial analysis. The results were evaluated through two different forms of analysis: direct comparison with similar projects (Mary Baldwin College and Luther College) and attribute analysis of meadow composition. Based on this research and our field studies, we have found that the Hillside Meadow Project meets many of the goals established at the outset; however, the target species are being out-competed in some areas by invasives, and without a proper management plan, these could threaten the success of the project. The comparative studies, in particular, point to the need for sustained maintenance that could be performed by students from many disciplines and used as an important educational tool. Recommendations for such maintenance are addressed.

LOCATION: HHS BUILDING – ROOM 1202 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	3:40-4:05 pm
Capstone Student:	Sean Haugh (Honors Capstone)
Capstone Advisor:	Dr. Helmut Kraenzle
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS06-13S
External Sponsor:	Page County GIS Department
Abstract Title:	GIS Analysis to Support Emergency Managers

Capstone Abstract:

Emergency Management is a field that is benefiting greatly from the emergence of new technologies. The most significant of these technologies is Geographic Information Systems or GIS. GIS is allowing first responders, emergency mangers and others to deliver much needed assistance more effectively and efficiently. This increased productivity will benefit both the emergency crews and the citizens. The emergency crews will benefit by being able to respond more quickly by identifying the best routes to an emergency scene and by knowing where important resources are located. The citizens will benefit through more efficient use of responders and a better response time from the emergency responders. This project has resulted in the creation of a GIS to analyze data in support of emergency managers in Page County, Virginia. This GIS involved a significant number of data layers and analyses. The GIS used emergency responses, for 2005 to 2010, as the base data layer upon which analyses for time of day, day of week, and location were completed. These analyses can provide a better understanding of emergency calls for Page County. The project will provide a better understanding of emerging technologies for emergency managers. These new technologies include mobile applications and GIS. I created a GIS and investigated the impact of mobile applications on emergency management. These technologies are pushing emergency management forward and constantly improving the field. This project could be implemented as a piece for a more substantial Emergency Management system. The Emergency Management system could then be used throughout individual counties or even the entire Commonwealth of Virginia. This project can give a good starting point for a larger GIS that will utilize a number of the data layers and analyses created in this project. This project can also help Page County to improve their distribution of emergency services.

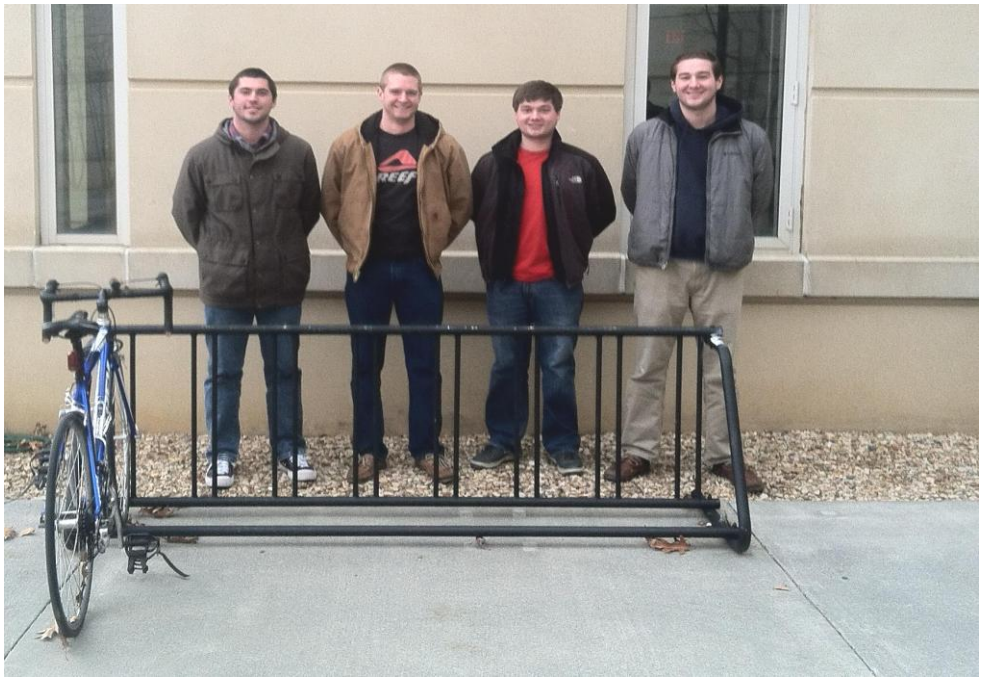


LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	9:00-9:40 am
Capstone Students:	Austin Madden, Michael McLaughlin, Ryan McNabola, Philip Welsh
Capstone Advisor:	Dr. Henry Way
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS08-13T
Abstract Title:	Improving “Bikeability” and “Walkability” in Harrisonburg, VA

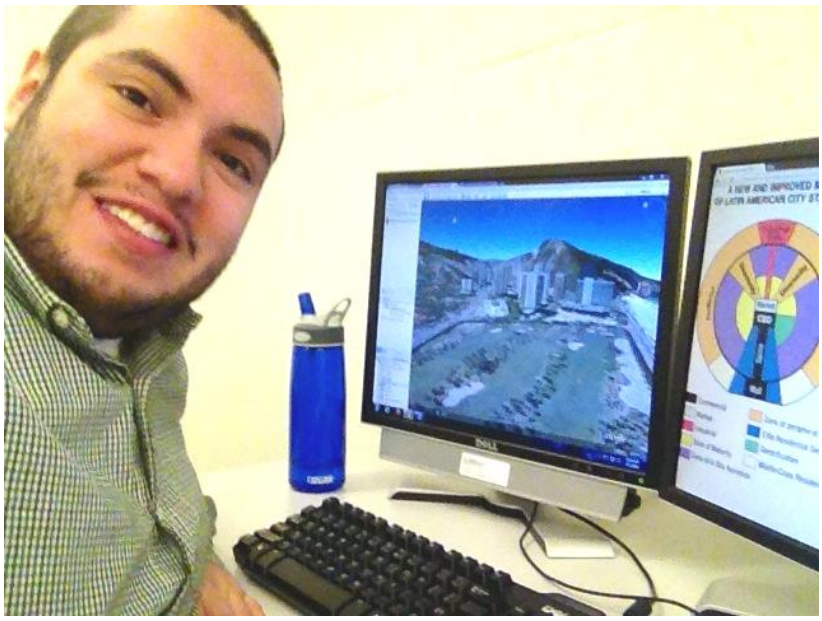
Capstone Abstract:

The aim of this project is to improve the pedestrian and bicycle accessibility of James Madison University. Our main focus is on routes between student off-campus housing and JMU’s campus, as part of the broader effort to improve the urban sustainability of Harrisonburg. We have gathered data on existing bicycle infrastructure relevant to the students of JMU and their perceptions of Harrisonburg’s alternative transportation. We used this information to focus our efforts and develop a preliminary plan to improve the future of sustainable transportation for JMU students. A portion of this project was producing static maps for Harrisonburg’s department of Public Works and publishing a map pamphlet for JMU students containing route information relevant to biking and walking in Harrisonburg. The current priorities of Harrisonburg’s transportation development program were also assessed and re-evaluated based on what would most efficiently improve bike facilities and sidewalks for JMU student use.



LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	9:45-10:10 am
Capstone Student:	Jonathan Rivas (Honors Capstone)
Capstone Advisor:	Dr. Henry Way
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS09-13S
Abstract Title:	Landscapes: Social Division in Urban Areas



Capstone Abstract:

In 2008, for the first time in human history, more than half of the world's population now lives in urban areas. Worldwide, urbanization is expected to continue to increase rapidly. Latin America is the developing world's most urbanized region, with over 75% of its population currently residing in towns and cities. For this reason, it is imperative to understand the future trends of Latin American cities. Problems such as informal settlements or slums are significant challenges for large Latin American cities. Due to increasing population in these cities, the numbers of impoverished people who live in slums are growing.

This research looks at how landscape can be used as a study of socio-economic patterns of major Latin American cities. In addition, this study aims to determine in which ways the current Latin American city model, as updated by Larry Ford in 1996, reflects the actual socio-economic situation of a Latin American city today. The data for this research is largely drawn from census-tract data, aerial images, and land use maps.

Conclusions that are drawn from this research are essential into further understanding future spatial development of cities in Latin America.

LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	10:15-10:55 am
Capstone Students:	Meghan Mooney, Thomas J. Kirk (Honors Capstone)
Capstone Advisor:	Dr. Henry Way
Concentration:	Environmental Conservation, Sustainability and Development (ECSD) Applied Geographic Information Science (AGIS)
Project No.:	GS10-13T
Abstract Title:	Re-Imagining the City: A Study in the Application of an Urban Ecosystem Model

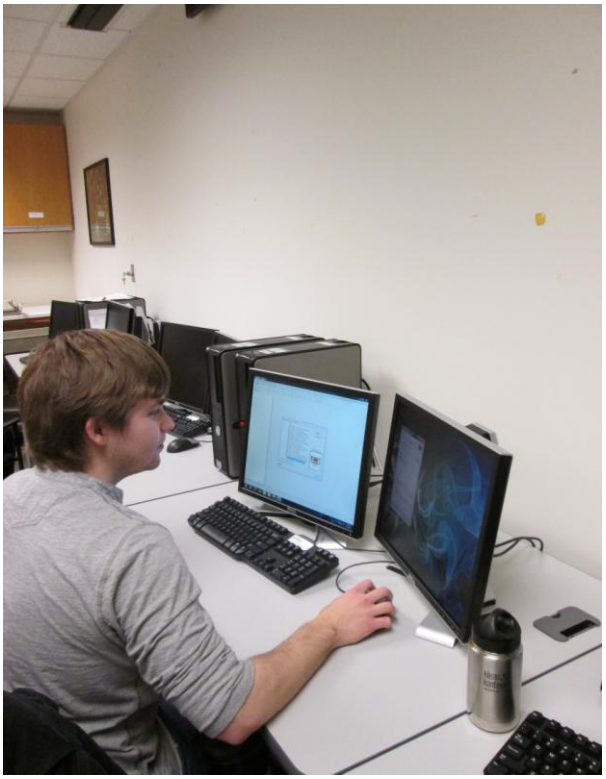
Capstone Abstract:

Our project presents an analytical urban ecological model for assessing the human and environmental sustainability of urban areas. Despite housing over half of humanity, there are fundamental flaws in how humans view their contemporary urban environment. In this model, we challenge the binary perspective of the distinction between "nature" and the city. Our holistic model is a qualitative, multi-scaled, conceptual model that illustrates the interactions of a city by examining the city through a physical geographic lens. By using scale appropriate metrics, the model can be applied across multiple scales within or between cities. To test the model's validity, we applied the model to different scales, the whole-city scale and the site-specific scale. The whole-city scale is the broadest way to approach human-physical systems within the city, while the site-specific focuses in on those detailed processes and interactions that cannot be accurately identified citywide. To test both approaches, we used various field studies, remote sensing, and geospatial techniques for each scale appropriate metric. For the city scale test, we weighted and overlaid each metric analysis in order to allot locations within the city with an appropriate sustainability rating. For the site-specific test, we used the best and worst locations to further test the model's cogency by using site-specific metrics to validate or invalidate the site's allocated sustainability rating. Overall, the urban ecology model provides an integrative and transformative way to study urban geography and sustainability because it incorporates both the human and physical spheres into one dynamic system that re-imagines the city.

LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	11:00-11:25 am
Capstone Student:	Kyle Smith (Honors Capstone)
Capstone Advisor:	Dr. Henry Way
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS05-13S
External Sponsor:	Engineer Research and Development Center – Topographic Engineering Center
Abstract Title:	Characterizing Criminogenic Environments with Remote Sensing

Capstone Abstract:



Situated in the theoretical framework of environmental criminology, this research employs remote sensing to identify spatial relationships between patterns of criminal activity and different types of land cover in cities. In crime analysis, satellite imagery and aerial photography generally provide situational context and a synoptic view of the spaces of crime, but remote sensing data and techniques have the potential to generate quantitative information. The methodology extracts meaningful, spatial statistics with image enhancement techniques to inform crime analysis. The research restricts the geographic extent to Virginia for consistency purposes, and a subset of state cities serves as the sample for the experiment. After assessing the rigor and validity of the developed methodology, the practical applications of the research are considered in depth.

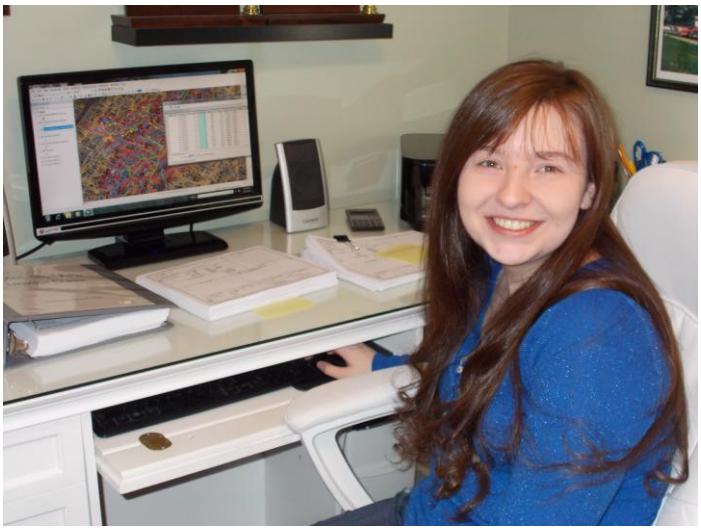
The presentation summarizes the crime rates and the distribution of crime events in Harrisonburg, Virginia as a subset of the broader sample of Virginia cities. Images of the original data for Harrisonburg and the results of the enhancement techniques appear during the presentation. The presentation describes the results of the crime analysis in a conclusions section, and a research summary section critically examines the value of remote sensing to environmental criminology and the rigor of the methods implemented throughout the research process.

LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	11:30-11:55 am
Capstone Student:	Jessica Wright
Capstone Advisors:	Dr. Maria Papadakis, Dr. James Wilson
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS11-13S
External Sponsor:	Virginia Department of Conservation and Recreation: Ms. Nesha McRae
Abstract Title:	Livestock Exclusion Fencing and Septic Tank Pump-out Program in the Linville Creek Watershed

Capstone Abstract:

The Linville Creek Watershed is just one of the many watersheds located in the beautiful Shenandoah Valley that is in need of a TMDL implementation plan created by the Virginia Department for Conservation and Recreation in order to clean up the Chesapeake Bay. A part of the VADCR's TMDL implementation planning process is the development and analysis of livestock exclusion fencing in selected sub-watersheds. Another part of the VADCR's TMDL implementation planning process is the development and analysis of a septic tank program for older homes. This project investigates in detail how many fencing systems would be needed in the Linville Creek watershed; the cost estimates for each system based on typical component costs, and possibly develop a mailing list for the landowners who should be targeted with fencing outreach materials. This project also investigates how many older homes located in this particular watershed are in need of a septic tank pump-out program and possibly develop a mailing list for the landowners who should be targeted with this program.



LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	1:00-1:40 pm
Capstone Students:	David Delano, Jarrod A. Genesevich
Capstone Advisor:	Dr. Mary Tacy
Concentration:	Environmental Conservation, Sustainability and Development (ECSD) Applied Geographic Information Science (AGIS)
Project No.:	GS12-13T
Abstract Title:	Coastal Impact of Hurricanes on the Outer Banks Barrier Islands, NC

Capstone Abstract:

Hurricanes are powerful drivers of change that erode shorelines, move barrier islands, cause migration of ecosystems, and disrupt human habitation at large scales. In order to investigate these geographic events we have conducted a case study of how hurricanes have impacted the coastal system of the Outer Banks Barrier Islands off the coast of North Carolina.

The temporal extent of our study is from 2000 through 2012. By identifying major hurricanes that have affected the region during this time frame we have determined the specific impacts that these tropical storms have on a barrier island system. We have also established which storm characteristics play a major part in determining how much destruction takes place during these dramatic geographic events. By conducting a field investigation through beach observation we have documented coastal erosion and beach modification stretching from Oregon Inlet through Pea Island to Rodanthe.

This was achieved by visiting the region before and after the 2012 hurricane season. The two trips consisted of collecting ground photographs of vulnerable geographic features to identify the extent of coastal change over the course of one hurricane season. Due to the late season hurricane Sandy, which impacted the Outer Banks from October 28th through the 29th of 2012, we were able to document the severity of a category 2 hurricane that stayed offshore, but brought a 4-6 ft. storm surge to the barrier islands.

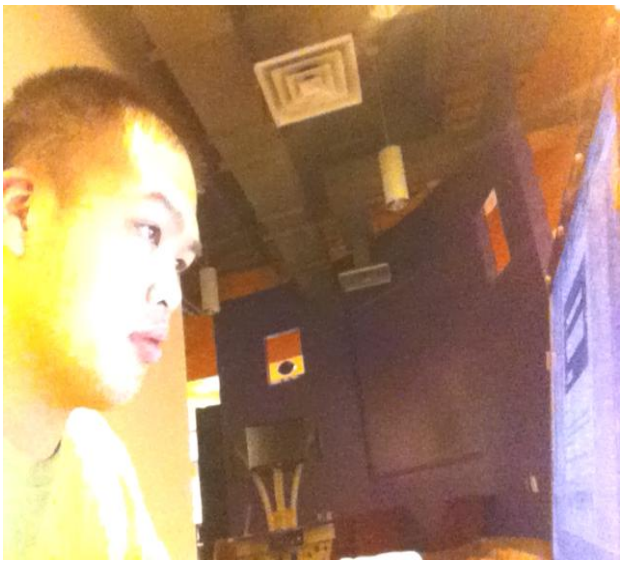
We utilized GOES satellite imagery collected after Sandy had passed to help identify areas where change was evident in the 13.6 mile stretch of beach we were studying. Overall our results depicted significant change to the North Carolina barrier island system consisting of new shallow inlets, flood-tide deltas, and over-wash fans on the top of the barrier and into the back-barrier estuaries.

LOCATION: HHS BUILDING – ROOM 1208 – GEOGRAPHIC SCIENCE PROGRAM

Presentation Time:	1:45-2:10 pm
Capstone Student:	Bryan Huan Vu
Capstone Advisor:	Dr. Mary Tacy
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS13-13S
Abstract Title:	Development Plan for Nan Boukan (Chic Kata), Haiti

Capstone Abstract:

Haiti is ranked 158th out of 187 countries based on the Human Development Index (HDI) which incorporates three variables: education, life expectancy, and gross domestic product. Nan Boukan, a small village on the coast of La Gonave Island, Haiti, is one of the poorest places in all of Haiti. The village consists of 31 households with approximately 160 people. The daily per capita income has been calculated to be $0.24., enough to give the average household one full meal every two to three days. The purpose of this senior capstone project is to create a developmental plan for Nan Boukan using the UN Millennium Development Goals as a template. To formulate a development plan specific to Nan Boukan, socioeconomic data that had been collected in the field over the last three years and recent input from the village governing "committee" were evaluated to gain insight into which dimensions of village life were most in need of focus. In addition, research was conducted on official Millennium Development Villages in other parts of the world to determine what has worked, and what has not worked, in these experimental situations. As a result, the development plan created recommends a focus on child nutrition, the education and health of women, and sustainable use of natural resources as a source of income.



LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	Alex Smith
Capstone Advisor:	Dr. Jennifer Coffman
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS20-13S
External Sponsor:	City of Harrisonburg Public Works
Abstract Title:	The Monetization of Food Scraps: A Study of Harrisonburg's Waste System

Capstone Abstract:

Waste management is a complex system that incurs numerous environmental, social, and fiscal costs. Unlike "nature", the human dominated sphere has yet to effectively recycle its post-consumption materials, resources, and energy. Instead there is a mostly linear flow of materials typically ending in a landfill. This results from a combination of short-sighted product design, lack of collaboration between different stakeholder groups, and an overall lack of valuing the things "thrown away." Americans on average produce 7 lbs. of waste per day, making it the largest physical thing we create (E. Humes, 2012).

The goal of this project was to gain an understanding of Harrisonburg's waste management system, and to evaluate how to more effectively utilize waste resources through sustainable integration of different system components. For hands-on experimentation, this study focused on the relationship between food scrap recycling of MSW (Municipal Solid Waste) in residential areas. Part of the study was conducted with the help of Public Works. Over a six-week period, the food scrap waste of 37 downtown households was weighed and then was used to calculate the average household waste production. The project then analyzed how the recycling of these scraps and other materials could positively affect other systems in Harrisonburg, including the overall energy recovery efficiency in the Waste to Energy plant on East Campus.

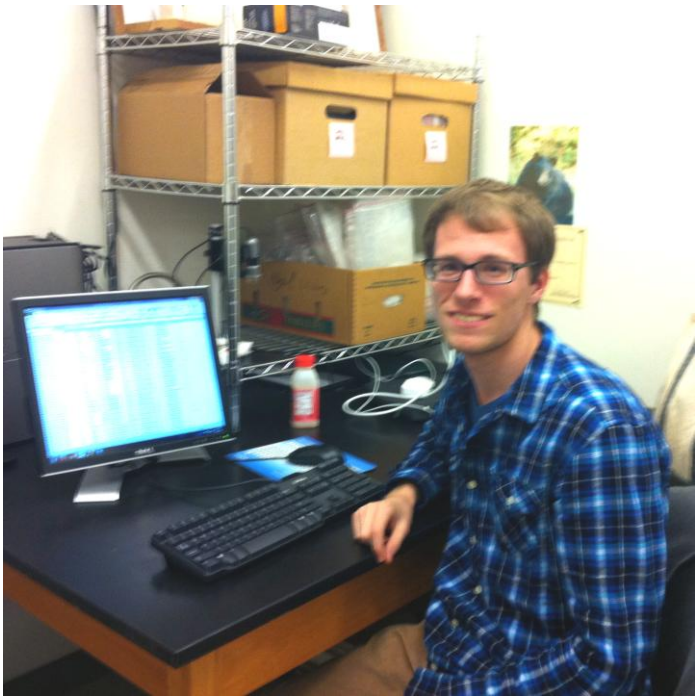
LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	Ryan Housley
Capstone Advisor:	Dr. Amy Goodall
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS14-13S
Abstract Title:	Spatial Analysis of Stray Cats and Dogs of Rockingham County, Virginia

Capstone Abstract:

Recent research suggests that feral, stray, and pet cats are a significant contributor to biodiversity decline in the United States. Regardless of their impact, people still allow their house cats to spend time outside and the population of stray and feral cats is increasing in many locations. SPCA (Society for the Protection of Cruelty to Animals) shelters are increasingly handling the intake of cats and the controversial issue of euthanasia. In order to study these issues, the Rockingham/Harrisonburg SPCA, the Shenandoah Valley Spay/Neuter Clinic, and researchers at JMU are interested in developing methods for assessing populations of stray animals in the Rockingham County area. The goal of this project was to provide recommendations on how to collect spatial data of stray animals. I used a database that included information about 2,000 cats and dogs taken into the Harrisonburg SPCA shelter between January 1 and December 30, 2012. Using ArcGIS software, I mapped and analyzed the spatial and temporal trends of the stray cat and dog populations in Rockingham County. This presentation summarizes general trends in stray animals of the city and surrounding county and makes recommendations for the collection of accurate spatial information that minimizes data collection efforts by police and animal clinics. Also included are recommendations for studies of the impacts of stray cats on biodiversity in several areas in Harrisonburg.



LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	Alexander Pope
Capstone Advisor:	Dr. Amy Goodall
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS17-13S
Abstract Title:	Designing a Disabilities Garden

Capstone Abstract:

The objective of this working project is to make recommendations about designing a garden at W.H. Keister Elementary School for people with disabilities. People with disabilities can receive many benefits from gardening. People who have disabilities can show surprising results of decreasing stress and improving motor skills through gardening. Interacting with plants can give people a different sense of place in life and can often avoid negative thoughts. Gardeners with disabilities often feel a change of dependency because of the independent functioning gardening can give. Also, people who use wheelchairs can work in a garden as one of their main sources of exercise. The garden at the school is going to be accessible to people who use wheelchairs, impaired vision, or other impaired senses. The design plan for the garden is to have a five senses theme. For example, the garden would have plants with certain textures for sense of touch and structures that create sounds. This presentation summarizes the design of the garden and recommendations for implementation.

LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Students:	Cameron J. Morton, Jack W. Taylor
Capstone Advisors:	Dr. Amy Goodall, Dr. Henry Way
Concentration:	Environmental Conservation, Sustainability and Development (ECSD), Applied Geographic Information Science (AGIS)
Project No.:	GS01-13T
Abstract Title:	Harrisonburg in the Appalachian Trail Community

Capstone Abstract:

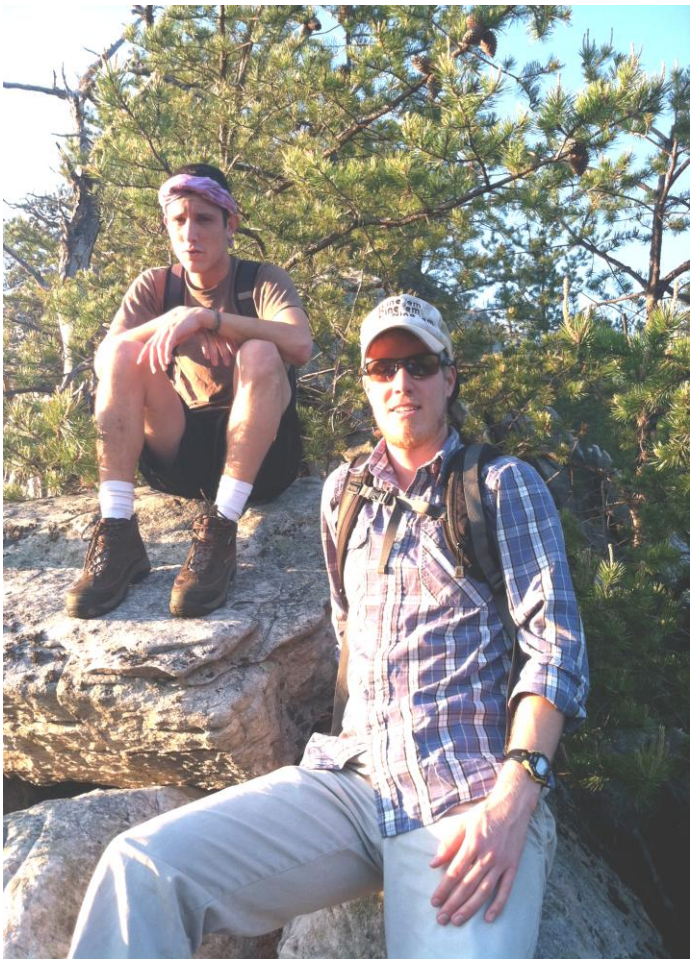
The Appalachian Trail (AT) is an approximately 2,100 mile-long human-made trail that stretches from Georgia to Maine through the Appalachian Mountains. Geographic literature indicates that seeking and consolidating data (testimonials) from hikers on the AT is an integral piece needed for maintaining; managing and altering trail environments to best fit the users of the trail. However, little is known about the importance of hikers perceptions about Appalachian Trial Communities. The objective of our study was to understand what makes Harrisonburg, Virginia a practical component of the ATC, since Harrisonburg is one of 22 communities along the AT officially recognized as a member of Appalachian Trail Communities. We conducted a 120-mile hike of the AT northbound from Harrisonburg's closest access point. While hiking, we interviewed other hikers. Our interviews provided insight to what brings people to the AT and what amenities hikers look for in Appalachian Trial Communities. Our research suggests that due to an exceptional distance from the AT in relation to other Appalachian Trial communities, many hikers are unable to visit Harrisonburg either unknowingly or due to time/distance constraints. We have explored why hikers may not travel this far from the trail and what could potentially be done to attract hikers to visit Harrisonburg from the AT.

LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Students:	Peter Markano, Taylor Burks
Capstone Advisor:	Dr. Jack Gentile
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS19-13T
Abstract Title:	Evaluating Sociological Behavior Associated with Campsite Conditions in Ramsey's Draft Wilderness

Capstone Abstract:



This study examined whether the condition of four campsites in and around the Ramsey's Draft Wilderness was made better or worse than the state it was left in after being used by campers. Four campsites were monitored over the course of seven weeks in September and October. Each site was examined seven times. Data was compiled based on presence of trash, fire pit condition/size, and general level of observable anthropogenic use. After the seven weeks the sites were returned to the condition required by the study. Two sites were cleaned up and left in good condition, and maintained throughout the study, and two sites were left in disarray to see if users would leave the sites as they were found. The results support the hypothesis that campers generally leave the site in the same condition they find it in. Sites in good condition were left in same or better condition than found 86% of the time. Sites in poor condition were left in same or worse condition every time upon weekly visits. The results show that the need for education and participation in no-trace camping techniques is necessary to sustain wilderness integrity.

LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	Dino Ribaudo
Capstone Advisor:	Dr. Jack Gentile
Concentration:	Applied Geographic Information Science (AGIS)
Project No.:	GS18-13S
Abstract Title:	Land-use Planning and Water Resource Management: A Creative Endeavor of Las Vegas, Nevada

Capstone Abstract:

The American Southwest epitomized the scope and complexity of the world's water crisis. Today, the Colorado River is a stressed river, which could present chaos to over 30 million people who live in the region. Las Vegas's current plan to overcome the deficit of water and power is to connect Southern Nevada to the eastern part of the state via a 300 mile underground water pipeline. This unclaimed ground water will have an estimated pull of as much as 800,000 acre-feet of water, or just about double the allocation from Lake Mead. The controversy has reached its peak as Nevada's state engineer voted in favor of Southern Nevada Water Authority (SNWA) gaining rights to build the pipeline. Opponents say that pumping the aquifer beneath the Great Basin would turn a sparse but beautiful desert landscape into a giant dust bowl. They argue that it would kill plants and wildlife and recreate disaster of California's Owens Valley (American Spectator). It is a classic urban vs. rural conflict, as Las Vegas's gambling and resorts continue to be the states largest industry. The construction of an underground water pipeline to Southern Nevada may prove to be catastrophic not only to Nevadans, but the whole Southwest region. This study is aimed at determining the impacts of climate change on both water supply and demand, while investigating how long the available water resource can sustain the water demand in the Las Vegas Valley.

LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	P. Matthew DiMarco
Capstone Advisor:	Dr. Maria Papadakis
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS21-13S
Abstract Title:	GIS Projects for Human Expansion and Black Death

Capstone Abstract:

Human Dimensions of Global Change is a geography class that focused on the evolution of humankind of the course of history, from the Human Expansion to the Neolithic Revolution to the Industrial Revolution and further. The Human Expansion is one of the first and most impressive feats as a species that humanity experienced as humans gradually expanded their habitat to all sides of the earth, overcoming many harsh climates, impossible land/sea barriers, and natural disasters. Beginning in Africa, the expansion moved into the Middle East, Asia, Europe, and later Australia and Siberia. Since the Human Expansion, no event has caused more mass casualties than the Black Death that hit Europe in 1346. Its spread was largely due to trade and but also from a way of urbanized life that put people in closer proximity to each other than ever before. The death toll of the Black Death can be attributed as a major factor leading to the fall of feudalism, among many other things. The purpose of this research will be to depict and explore the Human Expansion while utilizing the geospatial program ArcGIS.

From this, two GIS activities will be created for Human Dimensions of Global Change geography to add to the curriculum as class projects.

LOCATION: ISAT/CS BUILDING – ROOM 259 – GEOGRAPHIC SCIENCE PROGRAM

POSTER PRESENTATION 12 noon – 1:30 pm

Capstone Student:	Ryan Sabo
Capstone Advisor:	Dr. Maria Papadakis
Concentration:	Environmental Conservation, Sustainability and Development (ECSD)
Project No.:	GS22-13S
Abstract Title:	Red Fish in the Gulf of Mexico

Capstone Abstract:

The red fish is a species of fish in the drum family, also known as the red drum, which lives from Massachusetts to the Florida peninsula into the Gulf of Mexico down the Tupxen, Mexico. This particular species has been subject to a history of over fishing especially throughout the Gulf of Mexico from both recreational and commercial fishermen. This study investigates the historical population numbers within the Gulf to help better understand the nature of the population demographics of this species over time, along with a whole economy that had relied on it in the coastal communities. Cultural changes and food trends were the ultimate causation of the over harvesting of red fish. It is a worthwhile study because it is a good demonstration of the "tragedy of the commons" which can help shed light on past mistakes so our culture does not repeat them as well as giving a good sense of repopulation methods.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	11:05-11:30 am
Capstone Students:	Caitlyn Chalfant, Molly Picard (Honors Capstone)
Capstone Advisors:	Dr. Michael Deaton, Dr. Ronald Raab, Dr. Jeffrey Tang, Dr. Timothy Walton
Project No.:	IA03-13T
Capstone Title:	Weapons of Mass Destruction and America: Assessing the Risk of a Possible Future Scenario and its implications

Capstone Abstract:

A risk assessment has been performed to provide an understanding of the United States (US) potential risk from an attack utilizing Weapons of Mass Destruction (WMD). By conducting a threat and vulnerability analysis, the use of a WMD has been explored from both the viewpoint of an aggressor, which for this project will be defined as a person or group who would possibly use a WMD against the United States, and from the US domestic security outlook. By using these techniques, we have gained an understanding of the motivations and capabilities of different aggressors, why an aggressor may launch a WMD attack, and how they may acquire the necessary materials, intelligence, and technology needed to launch such an attack. Additionally, we have examined the US's current preparedness and ability to respond to and recover from a WMD attack in order to identify and better understand areas of weakness in the US's domestic security in dealing with a WMD incident. The third part of this project assessed that the United States' overall risk concerning a WMD incident is moderate.

While there is a lack of evidence indicating an imminent WMD threat, the US's overall preparedness is deficient and aggressors actively explore the use of WMD technologies. Furthermore, the risk assessment identifies which form of WMD presents the greatest risk by comparing two primary factors: the Ease of Acquiring the Necessary materials; and the Degree of Expertise Required to produce the weapon. Utilizing this analysis, a scenario of a WMD incident was developed in order to demonstrate what a WMD attack in the US might look like. Finally, an opportunity analysis was conducted to highlight specific areas of weakness that could be exploited by potential aggressors and how the US might mitigate these security gaps.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	11:35-12:00 pm
Capstone Students:	Rebecca Montalvo, Elisabeth Sill, Amanda Windsor
Capstone Advisors:	Dr. Michael Deaton, Dr. Noel Hendrickson, Dr. Jeffrey Tang
Project No.:	IA05-13T
Capstone Title:	Future Scenarios for Afghanistan in 2024

Capstone Abstract:

This capstone project assesses the current state of Afghanistan and develops possible futures scenarios for the country in 2024 assuming that the United States pulls out the majority of its forces by 2014. Our goal is to identify indicators for these scenarios and potential threats and opportunities for the U.S. to provide policy makers with a valuable assessment for developing a foreign policy strategy for Afghanistan. The future of Afghanistan and its impact on other countries in the region and abroad could have an impact on our national security. Therefore, an assessment that aids in developing foreign policy for Afghanistan allows the U.S. to better protect its interests in the region.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

-1:00 - 1:05 pm Introduction to Intelligence Analysis Capstone Project

-3:30 – 3:40 pm Capstone Conclusion

-3:40 – 4:15 pm Capstone: Discussion plus Q&A

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Presentation Time:	1:10-1:30 pm
Capstone Students:	Michael Craig, Ryan Platt
Capstone Advisor:	Dr. Jeffrey Tang
Project No.:	IA06-13T
Capstone Title:	The Russian Cyber Threat

Capstone Abstract:

The goal of our capstone project is to provide evidence that a cyber attack from Russian cyber criminals is a current undervalued threat that will require more attention from U.S. policy makers in the near future. In order to effectively address our topic, we utilized a counterfactual reasoning approach by generating a series of possible scenarios that may occur in the near future relating to Russian cyber terrorism. After thorough research of the Russian threat, we developed several alternative scenarios ranging from highly likely to remotely likely in order to assess their possibility of occurrence. By utilizing this approach we can hope to gain an understanding of the strategy that would be used in such an attack as well as the source. By analyzing potential events that could come to play we can also recommend possible solutions or methods that could potentially counter this type of attacks and help address this impending threat.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	1:35-1:55 pm
Capstone Students:	Patrick Hoge, Varun Pande, Brandon Prosser
Capstone Advisor:	Dr. Jeffrey Tang
Project No.:	IA07-13T
Capstone Title:	Space Weaponization

Capstone Abstract:

Space weaponization is an increasing threat to United States national security and will be a large source of concern for U.S. policymakers by 2023. Space weaponization is currently a level playing field without any state clearly dominating. Additionally, all assets in space are extremely vulnerable due to the lack of any real defense in place. There are multiple scenarios that could play out regarding this situation; among these are situations which involve physically or electronically disabling a U.S. government satellite. This paper will seek to identify the most plausible scenarios, uncover future implications, and detail opportunities for the U.S. to act.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	2:00-2:25 pm
Capstone Students:	Blake Bowman, Thomas Calhoun, Paul Labate, Kyle Pratt
Capstone Advisor:	Dr. Jeffrey Tang
Project No.:	IA01-13T
Capstone Title:	Implications of Developments in the South China Sea through 2023

Capstone Abstract:

Due to the recently increasing frequency of incidents in the South China Sea, the threat horizon of this issue has escalated as of late. Because of this recent escalation, the South China Sea had not previously garnered the attention that it deserves now and in the next ten years.

We believe that the South China Sea is a largely underappreciated issue because it does not pose a direct threat to United States physical security. However, because of the possibility of the United States being drawn into a conflict due to alliances and commitments in the region, this issue deserves increased U.S. attention. The South China Sea dispute is important to U.S. interests because of the vast energy resources, key shipping lanes, and strategic islands that make the region a highly contentious issue.

This capstone makes use of the analytic tools studied in the Intelligence Analysis program to examine developments in the South China Sea and their implications for the United States.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	2:30-2:55 pm
Capstone Students:	John Copenhaver, Michael Hinkle, Daniel McNamara
Capstone Advisor:	Dr. Jeffrey Tang
Project No.:	IA02-13T
Capstone Title:	Strategic Outlook for the Arctic Region through 2023

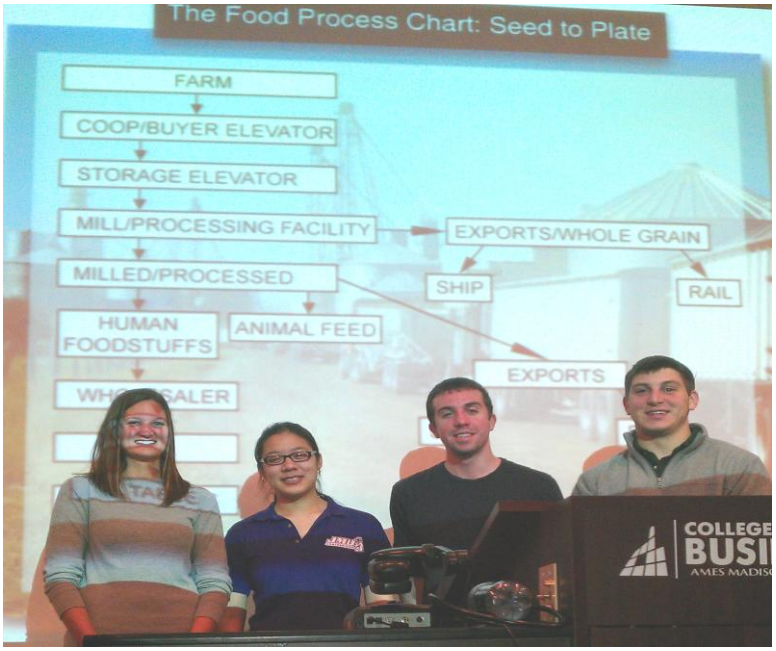
Capstone Abstract:

The Arctic region holds immense potential for the future of U.S. national security. This is due to the vast untapped energy and mineral deposits found in the Arctic coupled with future economic benefits stemming from potential availability of shipping lanes from the accelerated Arctic ice melt. These variables along with political and military factors will be incorporated into a strategic assessment of the Arctic region from a U.S perspective. Our group will also analyze Russian ambitions through the use of red team analysis in order to better understand the U.S.'s largest competitor in the Arctic. Finally we will be assessing potential counterfactual scenarios that the U.S. should be aware of over the next 10 years.

LOCATION: HHS BUILDING – ROOM 1301 – INTELLIGENCE ANALYSIS PROGRAM

Presentation Time:	3:00-3:30 pm
Capstone Students:	Jason Delaney, Brian Donohoe, Kathleen Rickard, Jennifer Sun
Capstone Advisor:	Dr. Jeffrey Tang
Project No.:	IA04-13T
Capstone Title:	Agro-Terrorism: Why You Should Care

Capstone Abstract:



Agro-terrorism is recognized as the deliberate introduction of a chemical or disease agent, either against livestock or into the food chain, for the purpose of undermining stability and/or generating fear. Furthermore, agro-terrorism presents an attractive target, for the agriculture industry has traditionally been unmatched in revenue and scope. Of all the United States infrastructure sectors, however, contemporary entities such as the Government Accountability Office have recognized the agricultural sector to be one of the least protected. Since the 9/11 terrorist attacks, the United States has spent billions of dollars to make the country safer from another catastrophic event, however, little of that revenue and attention have been directed toward preventing, coping with, and recovering from an agro-attack. The principles surrounding agricultural terrorism neither appeal nor conform to traditional terrorist ideals that generally seek to produce high profile events that would attract media attention. Killing crops or livestock would not have the same terrorizing effect as lethal attacks against the public; however, the unique and plausible threat of agro-terrorism illustrates the ability of an organization or individual to render severe economic damage, social unrest, and the eventual loss of confidence in government. As the agricultural industry has become more centralized and more intensive, the impact of a targeted agro-terrorist attack on a single entity directly renders other entities vulnerable as the multifaceted agricultural process is comprised of multiple entry points that are difficult and expensive to secure. Given its ease of execution and potential to elicit a highly 'favorable' cost-benefit ratio, agro-terrorism may be perfectly suited to low-cost but highly disruptive attacks, and should be further examined by the United States in order to maintain national security and domestic interests.