Digital Interventions to Mitigate Misinformation on Social Media

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Project Budget:

$25,000

Abstract:

Building on results from pilot studies, an interdisciplinary problem-solving task force is ready to adopt more robust measurements (i.e., eye tracking and electroencephalogram device) to further understand how people perceive and react to misinformation warnings on various social media platforms. A group of faculty and students (interactive design, human-computer interaction, cybersecurity, and media literacy) seek seed funding to design and test misinformation warning mechanisms. Ultimately, this work aims to improve the misinformation mitigation solutions to help social media users with low media literacy and develop educational materials to enhance misinformation awareness and media literacy among citizens.

Project:

Misinformation on the Internet constitutes an imminent threat to citizens who are trying to stay informed about current events. Despite the advancement of misinformation warnings, their success has been unreliable because people tend to ignore the warnings after repeated exposure. One commonly accepted resolution in information security literature is to use constantly-changing graphic designs (i.e., polymorphic warnings) to combat reduced attention to warnings and subsequently lead to behavioral avoidance of misinformation. However, our pilot study found that social media users' decreased attention to warnings without changing appearances (i.e., static warnings) can still help them to remain vigilant to misinformation's harmful influence. In other words, even if social media users pay limited attention to the warning due to prior exposures, the warning can still help them to be immune to the misinformation.

Our research addresses cross-disciplinary inquiries and needs to reveal insights regarding how people perceive and react to misinformation warnings on social media. First, it has the potential to expand our understanding of the existing cybersecurity literature which relied on behavioral warning adherence (i.e., clicking on the warning) as the ultimate measure for effective warning design. In the context of misinformation, since the threat is not imminent as phishing and malware, we must further investigate when social media users do not take clear behavioral responses to the warning, to what extent they are still aware, and use the warning to assess the labeled misinformation. Second, human-computer interaction studies have been investigating the level of friction (i.e., to what extent the design is intrusive) in the warning design to balance the

warnings' ability to make users stop and think while still providing users with a pleasant consumption experience. Third, mass communication scholars and fact-checking organizations have long been investigating how to inform and educate social media users on misinformation, especially those who are less motivated and equipped to engage in fact-checking efforts themselves. They are facing the challenge to develop effective warnings that do not limit the freedom of speech while still managing to alert and inform citizens about misinformation.

Our pilot study is based on a series of qualitative interviews and observations of social media users who are exposed to misinformation warnings. We worked with students from the School of Media & Art Design (SMAD) to collect interview data that pinpointed crucial brain activities to explain human behaviors (e.g., ignoring misinformation warnings) and developed several proof-of-concept polymorphic and static security warnings. These findings were presented at a selective international cybersecurity conference and published in the proceedings in 2022.

Although our pilot study identified important patterns regarding social media users' perception and reaction to the warning, the self-reported qualitative data suffer from social desirability bias and generalization limitations. To pursue a more systematic examination of the phenomenon, we must synchronously use eye-tracking devices and neurophysiology devices (e.g., Electroencephalogram (EEG) captures granular neural signals) to measure the attention and brain activities leading to responses to the warnings. Subsequently, we plan to acquire software that will enable us to analyze the eye tracking and EEG data together. The quantitative studies will also position us to pursue additional funding such as Commonwealth Cyber Initiative and National Science Foundation grants to reinforce the efficacy of our inventions as a promising solution to combat online misinformation.

Moreover, this project carries educational values to set up an ideal platform for students from interactive design, journalism, and computer information systems to collaborate and engage in research activities with real-world implications. Students from interactive design and computer information systems will learn how to conduct robust empirical experiments with EEG and eye-tracking to understand human behaviors and thus design effective visual interfaces to mitigate misinformation. Journalism students will advance fact-checking skills and create effective intervention messages geared toward the social media environment. This project provides students in multiple disciplines with hands-on experience and collaborative learning opportunities.

These missions bear long-term impacts and significant merits that resonate with the strategic priorities of JMU, such as advancing civic learning and democratic engagement, developing educational programs in technology and emerging fields to serve the Commonwealth's Tech Talent Pipeline initiative, and creating interdisciplinary and transdisciplinary approaches to learning as pathways to innovation, knowledge creation, and problem-solving.

Project Budget Amount:	**$25,000**
Personnel:	$2,750
Equipment:	$15,350
Other:	$6,900

Additional information to explain or expand on budgetary needs:

Personnel: student research assistants for one semester $2,750
Equipment: $15,350 in total
iMotions EEG headset NeuroElectrics Enobio 20: $15,350
Other (Software):
iMotions EEG (electroencephalogram) research software suites https://imotions.com/platform/:
1. iMotions Module - Core (Foundational research software): $3,450
2. iMotions EEG research software: $3,450