Introduction: I wrote an email to my congresswoman last spring to advocate for public land rights. I showed the email to my sister, a congressional intern at the time, and she said something to me that forever changed the track of my research. She saw the email and said, "We don't read those." At first, I was angry and flustered. What do you mean Congress does not read these emails? As a citizen, I have a constitutional right to contact my congressperson, so I expect them to listen. According to my sister, my email was being ignored. My confusion and frustration at her comment ignited an inquisition. I wanted to understand what was going on and why congresspeople were not reading emails sent by citizens. After a year's worth of research and multiple interviews with congressional staff and advocacy groups, I learned that it was not the content of my email that resulted in a lack of attention but the mode of my communication that prevented my voice from being heard. The email to my congresswoman was sent using an email tool provided by a non-profit organization advocating for public land rights. This tool is an API which creates emails provided by advocacy groups for citizens to send to their policymakers as part of a larger grassroots email campaign. This tool is ineffective at reaching congresspeople for a number of reasons, but the main issue lies within the design of these software tools and assumptions among citizens, advocacy groups, and policymakers on effective means of communication. Yet, advocacy groups continue to develop these emails and encourage citizens to use them to take action and write their congressperson. Using my research experience in human-computer interaction (HCI), my remaining graduate research will investigative digital methods of citizen-policymaker communication to understand how technology mediates political discourse between them.

Background: My research on technology and its influence on citizen-policymaker communication developed through a series of different HCI projects over the past five years. I began at the University of Maryland, Baltimore County (UMBC), where I was given a full scholarship by the Center for Women In Technology (CWIT) to pursue a bachelor's degree in Information Systems. During my first semester, the CWIT community introduced me to Dr. Amy Hurst who encouraged me to join her lab, the Prototyping and Design (PAD) Lab, to perform research in HCI and accessibility.

As an undergraduate researcher in Dr. Hurst's lab, I worked on multiple projects researching accessibility. My first independent research project forever changed my vision of research and its ability to have direct impact. A visually impaired graduate student was taking a class in design and web development and Dr. Hurst requested I design and build a set of educational tools to help the student. Using an iterative design process, I worked with the student to develop a set of laser cut and 3D-printed tactile tools based on class content. The student could feel the tactiles to understand basic web design concepts like typography, grid layouts, and color wheels. At the end of the project, the student was provided a final set of educational tools to help them with class preparation. Because of this project, I had an opportunity to use my design skills to create real impact on another student by providing equal access to educational content that would be hard to understand without assistive technology. I also identified opportunities for 3D-printing of educational tools and developed design considerations for future 3D-printed tactiles. These discoveries were presented in a peer-reviewed research poster at my first academic conference.

As I continued working in the PAD lab, I continued to investigate 3D-printing and education on a broader number of students in different domains. I first worked with Dr. Erin Buehler, a former PhD student, to investigate 3D printing in special education. During the semesters, I assisted Dr. Buehler and her research team to run a 3D-printing class that taught students in the university's special education program how to use and maintain a 3D-printer. I prepared class material,

assembled and maintained the 3D printers, and taught the students how to use the 3D modeling software. Our team demonstrated how 3D-printing could be used to provide technical employable skills to students in this program and develop recommendations for future educators within special education.

My largest and final endeavor in the PAD lab was a year-long project to teach 3D-printing to physical therapy students. As lead researcher, I developed a research project to investigate how 3D-printing could be integrated into physical therapy clinics to develop customizable and low-cost assistive technology for their patients. For example, 3D-printers can be used to augment crutches with customizable grips or replace broken crutch pieces with 3D-printed parts. Collaborating with two other undergraduate students, Dr. Erin Buehler, Dr. Amy Hurst, and professors at the University of Maryland School of Medicine, our research team developed a three-day class curriculum to educate 65 medical students on 3D-printing. We taught students how to 3D model, develop assistive technology designs, and potentially use 3D-printing in their future clinical practices. Through this study, we identified a series of opportunities and barriers to 3D-printing in physical therapy and developed recommendations for applications of 3D-printing in clinical settings.

During my time as an undergraduate researcher in the PAD lab I co-authored four peer reviewed published papers and one poster. I was lead author on my team's paper about 3D-printing and physical therapy. We received the best student paper award at ASSETS, a conference on computing and accessibility. Two of my unpublished posters won best undergraduate poster in my departmental research poster competition. Lastly, working in Dr. Hurst's lab helped me discover my passion for HCI research while impacting other's lives through technology and education.

I also had the opportunity to perform research for the Johns Hopkins Applied Physics Lab (APL) during my last summer as an undergraduate. I worked on Sirius, an Intelligence Advanced Research Projects Activity (IARPA) funded project that studied the use of educational video games to help intelligence analysts mitigate cognitive biases. APL was hired as a third-party developer to determine the effectiveness of each game. APL brought in Subject Matter Experts (SMEs) in the field of cognitive biases and intelligence to play and evaluate the games. My job as an intern was two-fold. First, I assisted in the creation of the evaluation environment, and created surveys for SMEs to complete after playing each game. Second, I sat next to the SMEs during game-play and took observational notes on their reactions to each game. While I did not see the outcome of the project as a summer intern, the experience provided an opportunity to work on video game research and develop my skills in observations and surveys. It was also an opportunity to work on important government research helping intelligence analysts perform better with more control over inherent biases.

STEM Involvement: My undergraduate career as a CWIT scholar was surrounded by supporting women computer scientists and engineers. I continuously give back to the community by volunteering in women-in-STEM events like Girl Power at APL. I was also a guest speaker and a volunteer for three years at Bits and Bytes UMBC which is an overnight retreat for high school girls who are interested in engineering and computer science. I am also currently a mentor for a high school girl interested in computer science and a robot inspector for high school robotics competitions. I will continue mentoring and volunteering at women-in-STEM events to help other women pursue their passions in STEM fields.

Graduate Research: I knew I wanted to continue on to graduate school after my undergraduate education and conduct research in the field of HCI, but I wanted to shift my focus. After

researching accessible HCI, I moved to research in sustainable HCI to study the effects of technology on global sustainability. During my last year as an undergraduate, I combined my research in 3D-printing with my interest in sustainability to publish a peer-reviewed paper on the use of 3D-printing as a sustainable alternative to modern forms of manufacturing. The presentation of this paper was my first opportunity to meet the sustainable HCI community and my future mentor and advisor, Dr. Bill Tomlinson and Dr. Bonnie Nardi at the University of California, Irvine (UCI).

When I began my graduate career at UCI, Dr. Tomlinson and Dr. Nardi taught me to look beyond the typical research within sustainability and identify connections between technology and sustainability that are not immediately apparent. Conversations with Dr. Tomlinson and Dr. Nardi and my conversation with my sister about Congress sparked a link between political communication, sustainability, and technology. Part of building a more sustainable future will require the creation of large-scale policies that can enact significant change to the way our society uses resources. However, I have found basic digital communication issues which limit opportunities for policymakers and citizens to have quality dialogue on these important issues. If citizens are to engage in effective communication with policymakers, we first have to understand the technological channels where those discussions are taking place. As a first step in this research, I recently published a peer-reviewed paper called "*Political Realities of Digital Communication: The Limits of Value from Digital Messages to Members of the US Congress"* that outlines this issue within sustainable HCI.

As a continuation of my research, I spent the past summer working for the Congressional Management Foundation (CMF), a non-profit organization in Washington D.C. partnering with Congress to improve citizen-policymaker relationships. As a research assistant and data analyst for CMF, I assisted congressional offices in the analysis of constituent satisfaction surveys and telephone town hall reviews. Using this data, I helped congressional offices better understand the needs and feelings of their constituency and gain feedback on their work on Capitol Hill. During this internship, I also received a year-long grant from UCI's Center for Organizational Research (COR) to conduct interviews with advocacy personnel and congressional staff. I am currently in the process of reviewing those interviews and analyzing additional data provided by CMF to understand Congress's perceptions of their constituency and ICT needs within their offices.

Intellectual Merit: My research journey provided a diverse lens into the different applications of HCI. From accessibility, education, video games, sustainability, and policy, technology runs the gambit of influence. The experiences I gained by contributing knowledge to each area provided new opportunities to understand the connections and impacts of technology. As I continue my doctoral studies, I will use those research experiences to further my goals in the evaluation of citizen-policymaker communication.

Broader Impact: Starting from one student's education, to multiple classroom environments, and now to an entire nation, my research is growing in impact. My current research will impact the nation as I continue to investigate how technology mediates communication between policymakers and citizens, a vital component of everyone's lives in the United States. My research will provide new knowledge to ensure modern forms of communication through ICT meet the needs of our democracy and provide opportunities for citizens and policymakers to have quality dialogue on important policy issues that will impact the world.