Thesis Project Portfolio

Communication Devices for Human Triage Robots

(Technical Report)

Federal Emergency Management Agency's Response to Hurricane Maria in Puerto Rico

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Natural disasters are commonplace in America – homes are damaged, lives are lost, and every second is crucial. For my technical project, my capstone group and I assisted Dr. Nicola Bezzo in his work to design and implement a team of robots that could traverse dangerous terrain after a disaster and report to nearby medics about victims. We created a compact communication system that can attach to the robots, allowing them to coordinate with other robots and on site medics regarding their search progress and discoveries. In order to better understand the history of natural disasters and the current effectiveness of response teams and systems, my STS research paper analyzed the network of parties involved with – and that ultimately caused – the poor response to Hurricane Maria, a catastrophic natural disaster in Puerto Rico. Although the research paper analyzes the system from a broader lens than my technical project, both focus on integral components to understanding the recovery efficiency of a community after a disaster.

The technical project was a device that could be connected to and disconnected from any given robot in the field. The project itself consisted of a PCB that connected to the robot and the software that was implemented through the board. The system utilized ZigBee – an antenna communication device – to communicate with the robots and medics. The software integrated the ZigBee with the robot; messages were sent to and from the PCB via a USB connection, and the software interpreted those messages from the host robot's sensors and sent replies. These replies were both navigation commands back to the host system and discovery messages to other device antennas.

The STS research paper focuses on the Federal Emergency Management Agency's response to Hurricane Maria in Puerto Rico. I argue that the catastrophic response to Hurricane Maria was due to the interaction between different types of actors or pieces of the system,

specifically how the underlying biases held by the continental United States perpetuated the misuse of the FEMA's Logistics Supply Chain Management System. This argument draws upon the framework of actor-network theory (ANT), developed by STS scholars Michel Callon, Bruno Latour, and John Law. ANT states that technical projects or systems can only be fully understood when all of the relationships between their components are considered (Cressman, 2009). In my paper, I discuss the various relationships between actors in the system and their influence.

These projects coordinated well, and although I did not work on them simultaneously, I believe that my technical project gave me new insight while researching the American response to Hurricane Maria. I was able to interpret the situation with a new lens – one that emphasizes how disasters are handled and how crucial response speed is. Because of these two projects, I have a deeper understanding of how both the larger and smaller components in a system can significantly impact its overall effect on the consumers.