Sociotechnical Thesis

My STS research project is about designing an information literacy education program, which is understandable and doable for untrained people, on how to identify fake news and conduct fact-checking with existing available resources. The authenticity of information has long been an outstanding concern. With the help of social media, distorted, inaccurate and false information spreads at such a fast speed that it has tremendous potential for creating significant real-world impacts within a short period of time. As a result, modern people are vulnerable to fake news more than ever. Therefore, it becomes important for people to learn how to detect the credibility of information they absorb with existing tools that are available to them.

To design the information literacy program, I examined works that analyze the spread of fake news and developed an actor network that describes how fake news propagates through social networks and eventually reaches every individual. Both human and non-human actors are involved in this complicated fake news network. Also, I studied existing digital literacy methods and combined them to form a systematic information literacy education program, which can be used to destabilize or even collapse the fake news network by putting limits on actors that play significant roles in the spread of fake news.

My technical thesis focuses on building a smart building assistance system that consists of sensor data analysis and deep neural network based prediction models. The proposed system predicts the physical features for current activity so that occupants feel comfortable and their levels of desire are satisfied based on their previous activities and the corresponding physical features. Meanwhile, the proposed system also saves energy as a by-product of offering more

comfort to occupants. Nowadays, smart buildings equipped with fully or partially automated systems to control the physical environments are becoming increasingly prevalent. The features of physical working environments in office buildings such as temperature and humidity are recognized as key features in ambient working environments. Moreover, buildings usually account for 30% to 40% of the total energy consumption and carbon dioxide emissions worldwide. Thus, smart building assistance systems that can automatically set proper indoor-environmental features are in desperate need. We collected one-year-long smart building datasets from different data sources and conducted experiments to figure out the activity-wise comfort levels and energy saving rates. The results from experiments showed that the proposed system is able to increase occupants' comfort level in office buildings by adaptively adjusting indoor environment features as well as contribute to energy saving by smartly reducing the workloads of control systems when offices are unoccupied.

In the future STS research, I plan to shift my focus from social media to traditional media to help people whose primary sources of information are not social media but newspaper and television. Regarding my technical thesis, I will work on improving the robustness of the proposed system and protecting activity data from being leaked and the system from being adversarially attacked.