‘Connected IoT Device Monitoring via Network Traffic Analysis’ Summer Scholars Application

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28 February 2020

Abstract: In the era of IoT devices, it is no secret that these devices collect user data. The volume and velocity of network traffic sent from these devices are often unknown to the consumer. While tools such as Wireshark and Kismet exist, they are not designed for the average user; incorporating features designed for professionals. This project aims to create a 3rd party device that intercepts network packets transmitted from the given IoT device. Network traffic is used as a proxy for activity such as recording and transmitting. The problem being solved is a lack of clear interfaces designed for people to know what their IoT devices are doing. The information returned from the program is conveyed to the user through the aid of an ambient interface. The ambient interface, in this case, being an RGB smart light bulb. Using an ambient interface in this project is critical. The program automates a very abstract process and presents it to the user in a way that does not over inform them and cause them to lose attention. The goal of this research is to create a device designed for the average consumer. It also aims to make people more aware of times when they might be unknowingly surveilled. Simplifying data privacy and designing a product that would fit in any space are two central facets of this project.

Project Description: The long-term goal of this project is to write and publish a bonafide research paper centered around the 3rd party indicator I have designed. The theme of the paper will be centered around the design of the device. The research paper will be centered around 4 main research questions:

1. How can the design of this 3rd party indicator be configured in a way that most effectively conveys surveillance activity?
2. What is the perceived value of this ambient interface to the average consumer?

3. Does an increase in data privacy awareness lead to an increased deployment of IoT devices?
4. What investigative behaviors are associated with increased consumer awareness in regard to data privacy?

These questions aim to solve the overarching problem of people not having a sense of awareness when it comes to IoT devices and what data any given device is transmitting in both an active and passive state. In general, this problem stems from people not having clear interfaces into what their devices are doing. This is the motivation for my research. This project seeks to understand and make people more aware of when their privacy could be at risk from connected devices. Since the data sent from the vast majority of connected devices is heavily encrypted, network traffic is used as a proxy for activity such as recording and transmitting. The ambient indicator which I have developed will be used in a series of interviews designed to uncover how people react to the presence of such a device. The interviews will be conducted in a semi-structured fashion where participants will be given the opportunity to learn about the device and interact with it. After this phase of the interview process, participants will be asked about their interaction with the indicator in attempts to uncover the widespread impact. Through these interviews I hope to uncover the motivations behind purchasing IoT devices and at what cost do people value their privacy. Dr. Adam Lee will be my research advisor on this project. Furthermore, an additional budget for other research-related expenses is not needed.