IoT and Special Needs Users

Loic Niragire

TIM-7010 Computer Networks & Mobile Computing

Dr. Phillip Davis

PART A

The position argued in this paper is for a data complementary approach to software engineering requirement gathering. Traditional methods are insufficient for special needs users as they rely heavily on user's active involvement throughout the process. The authors propose that supplementing these conventional methods with contextual data obtained from IoT devices could increase the comprehensiveness of gathered data (Ferati, Kurti, Vogel, & Raufi, 2016). The primary reason for backing up their position is that IoT devices are becoming so pervasive in our everyday lives. Hence generated IoT data could enrich traditional requirement gathering methods with a unique view into user's daily activities, therefore shortening software delivery time.

I agree that IoT gathered data can provide a richer insight into users' daily activities, which can significantly supplement formal requirement gathering methods with contextual data. The value of context information in software requirement gathering has long been recognized. Various techniques such as software cinema, paper-based prototypes, and contextual design strive to bring users into the actual context by simulating the problem situation (Maalej, Happel, & Rashid, 2009). One of the main challenges of these techniques deals with the actual process of collecting contextual data. A problem that IoT devices are well suited to address, assuming we have proper tools to analyze the vast amount of generated data.

IoT data can further improve software quality by generating widespread use case scenarios. Poor software quality often results from a lack of better testing throughout the development process. Requirements frequently change either during development or postdelivery as users try the product. However, agile methodologies have made a significant stride by favoring a progressive continuous client engagement and frequent software delivery. What remains a challenge for applications designed for disabled users is the limited direct access to the users (Ferati, Kurti, Vogel, & Raufi, 2016). Therefore, resulting in insufficient feedback needed to improve the overall software quality. IoT data can fulfill this gap by supplying use case scenarios extracted from gathered data during the development process. More importantly, IoT data are more likely to cover edge cases that would otherwise be impossible to foresee using formal requirement gathering methods.

The paper could be improved by discussing sampling techniques and tools useful in assessing generated IoT data. Extracting meanings or addressing specific questions from raw IoT data is difficult without advanced knowledge in statistics and big data processing. Large organizations such as Google or Apple can perform this type of data mining as they are equipped with dedicated departments for big data processing. What is the minimum expertise required for mid to small-size organizations to benefit from IoT data in this regard? Are there open-source tools that can be leveraged for mining this set of data? On the other hand, this work can be expanded to generating use case scenarios for ongoing development.

PART B - Improved shopping experience for the visually impaired

In this section, I propose a new way that IoT devices can help visually impaired individuals with improved shopping experiences. This proposal is restricted to individuals using a white cane for navigation. The specific challenge addressed is the lack of essential background information for a pleasing experience when assisting these individuals. The lack of proper context information regarding the person's likes and dislikes. Resulting in a sub-optimal customer service experience for both the customer and the vendor. Suppose John Doe is visually impaired who lives alone. Furthermore, he wants to buy a new shirt for an upcoming company event, so he goes to the mall for a quick shopping.

The first essential improvement I propose is a system to recognize the presence of a visually impaired individual upon entrance through sensor data. This can be accomplished by scanning specialized white canes used by these individuals to pass through the doorway. Upon receipt of such signal, the system would communicate, context-aware, individual's preferences to the store. For instance, in our case, this could be as simple as sending a message to the store that John Doe just entered the store and that he is interested in a redshirt.

Multiple sub-problems would need to be addressed before realizing the proposed system. Although, for the most part, the technology required to accomplish most of these sub-problems already exists. A white cane sensory detection system first needs to be established. This system would be responsible for scanning and tracking each scanned device throughout the shopping area. Privacy matters need to be taking into consideration in the design of such a system.

The second challenge to realizing the system outlined above is a virtual assistant. This agent's role is to interface with the outside world. Using the example given above where John Doe is shopping for a redshirt. It would be the responsibility of this virtual assistant to determine the best shopping options for the item in question. Once a specific location has been agreed upon, the virtual assistant would interface with pre-determined systems upon store entrance. It is through this interface that messages between the agent and the store are communicated. This agent delivers a unique experience to the user by enabling personalized customer service.

The second important role that the virtual assistant plays in this system is interfacing with white canes. Specifically, a given white cane is uniquely identifiable, but it does not handle or carry, personal data. In other words, a sensor may detect a white cane, but it may not determine the owner. The virtual assistant manages the link between a white cane and its owner. When a scan signal is received by the virtual assistant, the assistant is responsible for acknowledging the signal and initiating message exchange. Likewise, the assistant can also choose not to engage, and no personal data would be exposed.

References

Ferati, M., Kurti, A., Vogel, B., & Raufi, B. (2016). Augmenting requirements gathering for people with special needs using IoT: a position paper. Proceedings of the 9th international Workshop on Cooperative and Human Aspects of Software Engineering (pp. 48-51). ACM.

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