Human Factors Engineering for Mobile Health Applications

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***Abstract*—Childhood asthma has effectively doubled since 1980 and currently affects about 8% of the U.S. childhood population. Efficiently analyzing quality of air data, which would ultimately improve the information available to parents with children suffering from asthma, is Crucial to reduce the likelihood of a serious attack. In order to accomplish this task, the use of low-cost, wearable, environmental sensors contribute to construct a live "air-care" pollution map, while also Ensuring that data is processed and relayed in an easy to understand manner using graphs, charts, etc.**

Keywords: HiLCPS, Asthma, Human Factors, Sensors for Mobile Health, "Wizard of Oz" Experiment, Data Visualization.

Summary

Throughout the REU project, we want to create and test various sensor boxes which have the capabilities to produce ozone and particulate information. Ultimately, the information will be displayed in a user friendly application; therefore, understanding of data visualization methods to users becomes a large part of the research through the project.

Utilizing Human-in-the-Loop Cyber-Physical System (HiLCPS), the primary focus is to combine environmental data with physiological monitoring to both improve patient understanding of health risks and decrease likelihood of asthma attacks [4]. This crowd sourced live "air care" pollution map is constructed via sensors. Ultimately, the end state of the product would consist of a wearable device, such as a wristband to enable on the go monitoring and sharing of health data between health care provider and user.

Elsevier Inc. currently has a Health care and life sciences (HCLS) domains utilize web based technologies such as Yahoo! pipes, Dapper, Google Maps and Geocommons to construct geographic information which depicts an array of categories of public health [5]. For example, one mashup may correlate cancer data with water pollution data in a certain state of the United States.

While the HCLS is primarily web based, the HiLCPS would incorporate low cost sensors to communicate with a host platform to track and collect information from the sensors and transfer pollutant information to the server. The information should be presented with a consideration of both low and high numeracy users: using pictographs to communicate risk and benefit information to patients of different numeracy levels [1].

Since visual formats are powerful tools that can be designed to shape patient perceptions in ways that facilitate appropriate response [3], the importance of which type of display method to project to users becomes crucial. The usability should be smooth and very user friendly to offer a seamless transfer of data and provide the greatest generation of pollutant mapping for the public.

Towards the end of the REU project, we will report on the various visual formats used in a "Wizard of Oz" study, in which individuals interacted with a mock application demonstrating live air care mappings. Understanding which visualizations applicants respond to more efficiently is crucial for producing a proper user-friendly application.

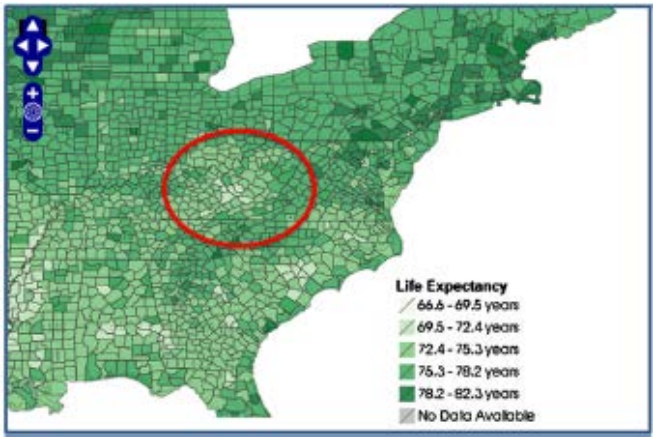

Figure 1: Data mashup depicting life expectancy.

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