Developing a Smart Automated Medication Dispenser to Assist Patients with Cognitive and/or Motor Impairment

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1. Introduction

There are several diseases and conditions that can cause the decline in a person's cognitive and/or motor abilities. This potentially impacts their quality of life (QoL) and can take away some aspects of their independence. One key area to help alleviate the symptoms of these conditions is adhering to a medication schedule.

Combining the possible burden of these conditions with an active medication schedule can sometimes be difficult, and a way to assist a person with adhering to their medication schedule would be beneficial as it is proven to help combat these conditions and improve their QoL.

2. Objectives

Build a prototype hardware for the medication dispensing pillbox

Build a prototype software to allow the medication schedules to be set up and the pillbox be programmed

Along with this, evaluation will need to be completed in a non-consumer, in-house development environment to ensure the end product would be fit for purpose.

3. Methodology

A positivism philosophy will be used as there are existing software engineering and electronics theories and principles, so will be utilised and built upon to achieve the end product.

Deductive strategy. An experiment will be performed to ensure the product works correctly via in-house testing.

Approaches. The 3 approaches to be used will be a literature review, a case study and software/hardware development.

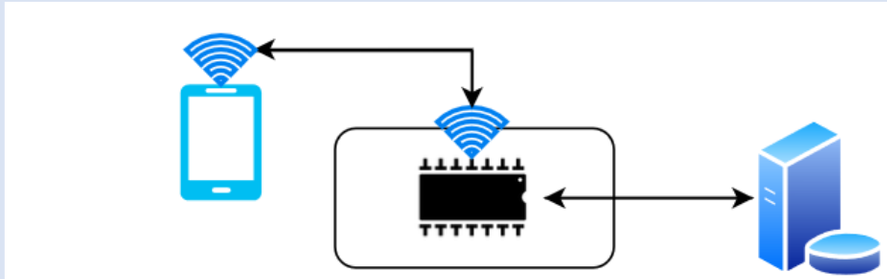
4. Development

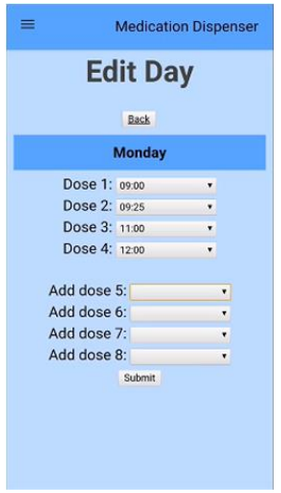
By combining an ESP32 (and related modules) with the knowledge of the Internet of Things (IoT) gained from Smart and Connected Devices, Web Development and Programming modules, it was possible to develop a prototype software that allows users to connect to the ESP32, see their medication schedule, edit their medication schedule, and see a log of their medication adherence.

The ESP32 hosts the web service for the user to connect to and interfaces with an SQL server via a PHP web service.

This software correctly identifies when the user requires a medication dose and calls the Dispense() method correctly, alerting the user via an alarm from a piezo buzzer and a simple LED.

Unfortunately due to the COVID-19 pandemic, the hardware was not able to be completed fully.



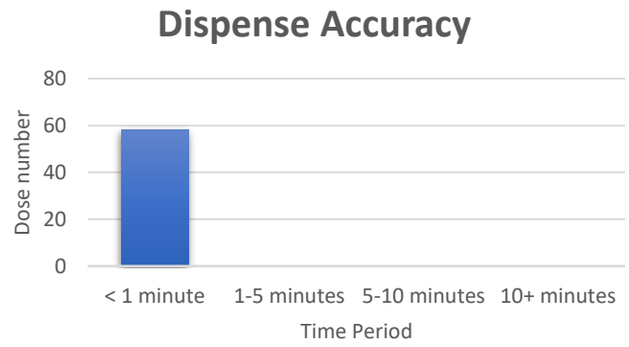


5. Testing and Results

As a feature driven development methodology was followed, each feature had extensive testing carried out and all (within reasonable control) were found to work correctly.

The dispensing method is called with 100% accuracy over the course of a 7-day period within 1 minute of the user dose time.

A cognitive walkthrough highlighted areas which required resolving, and after changes were made it was deemed to be appropriate in terms of usability.



6. Conclusion

The project was believed to have been completed successfully as all of the software requirements were met.

Unfortunately due to the COVID-19 pandemic, it was not possible to complete the hardware fully. However, some requirements were met such as an alarm system in the form of a piezo buzzer and LED, with a push button to allow the user to disable the alert.

It is believed that without this hurdle the project would have been at 100% completion.