Automotive UI System

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# Declaration of Joint Authorship

We, Asmaa Alzoubi, Akeem Abrahams, and Cedric Wambe, confirm that this work submitted is the joint work of our group and is expressed our own words. Any uses made within it of the works of any other author, in any form (ideas, equations, figures, texts, tables, programs), are properly acknowledged at the point of use. A list of the references used is included. The work breakdown is as follows: Each of us provided functioning, documented hardware for a sensor. Asmaa Alzoubi provided VMA340 Heart/Pulse Rate Sensor. Akeem Abrahams provided MAX30100 Pulse Oximetry Sensor. Cedric Wambe provided AMG8833 Thermal Camera. In the integration effort Akeem Abrahams is the lead for further development of our mobile application, Cedric Wambe is the lead for the Hardware, and Asmaa Alzoubi is the lead for connecting the two via the Database.

# Proposal

We have created a mobile application, worked with databases, completed a software engineering course, and prototyped a small embedded system with a custom PCB as well as an enclosure (3D printed/laser cut). Our Internet of Things (IoT) capstone project uses a distributed computing model of a smart phone application, a database accessible via the internet, an enterprise wireless (capable of storing certificates) connected embedded system prototype with a custom PCB as well as an enclosure (3D printed/laser cut), and are documented via this technical report targeting OACETT certification guidelines.

Intended project key component descriptions and part numbers  
Development platform:   
Sensor/Effector 1: VMA340 Heart/Pulse Rate Sensor  
Sensor/Effector 2: MAX30100 Pulse Oximetry Sensor  
Sensor/Effector 3: AMG8833 Thermal Camera

As of my part I am working with VMA340 Heart/Pulse Rate Sensor that measure the heart rates in the blood and is displayed in the app, I faced some issues that I had a big delay and the readings were not 100% accurate, I bought another sensor but was having same issue. I did all the trouble shooting steps and the PCB, the Raspberry Pi as well as the 10bit 8 channels analog to digital convert that uses SPI interface (MCP 3008) chip are functioning fine. So, it should be the python code that I am using an I am still working to fix that and made it as accurate as possible. I am getting the voltage from the raspberry pi 3.3v.

We will continue to develop skills to configure operating systems, networks, and embedded systems using these key components to create a system that will assist the patient and their health status readings in real-time. heart rate, temperature, and blood oxygen rate readings. All the readings will be sent and saved in the database and will be retrieved back to the mobile app using firebase over the network.

Our project description/specifications will be reviewed by, Dennis Kappen, ideally an employer in a position to potentially hire once we graduate. They will also ideally attend the ICT Capstone Expo to see the outcome and be eligible to apply for NSERC funded extension projects. This typically means that they are from a Canadian company that has been revenue generating for a minimum of two years and have a minimum of two full time employees.

The small physical prototypes that we build are to be small and safe enough to be brought to class every week as well as be worked on at home. In alignment with the space below the tray in the Humber North Campus Electronics Parts kit the overall project maximum dimensions are 12 13/16" x 6" x 2 7/8" = 32.5cm x 15.25cm x 7.25cm.

Keeping safety and Z462 in mind, the highest AC voltage that will be used is 16Vrms from a wall adapter from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will not exceed 20 Watts. We are working with prototypes and that prototypes are not to be left powered unattended despite the connectivity that we develop.

# Executive Summary

Our plan is to design a system that makes the paramedic’s and the patient’s life easier, in order for the user to use our system that includes three sensors, embedded system, a database over the network, and an android application, they need to have app downloaded on their phone, and have the sensors that will determine the temperature, heart rate, and the oxygen concentration in the blood, by putting their finger on the sensors. The results will be displayed in the app through the database and will be saved automatically. The paramedic will get the video call from the patient with all the rates displayed on the screen, as well as the location of the patient and the direction to go there. The paramedic will be more prepared and have a better idea on the senior that he is going to asset. For the patients they will have GPS tracking of the paramedic so they can be aware of the time of arrival and track the paramedic as well. After the paramedic arrives to the location the app will display the location of the closest hospital and the direction to that hospital as well. The hospital will get notified that there is an emergency on the road and will have all the readings and get better prepared. While the paramedic is assisting a patient, his status will turn to busy and after finishing will turn back to active.