G54MRT Coursework 2 Proposal

Title: Safely home

Student ID: 4336938
Date: 20/02/2019

Summary

Many students, from the age of 18, move out from the family house to study at the university and lead a more independent life. Very often, this includes partying over the week-end and going home very late, and sometimes alone. Many parents are hence worried for the safety of their children and want to be reassured they got home safely, but inebriated young adults usually forget to contact their parents when they safely get home. **Safely home** aims to solve that issue by using a detection system that will send a message to certain contacts when someone gets home. Before going to a party or simply going out, a person can activate the system (toggling a button on a simple interface), and the next time the presence of a person is detected (close to personal places like door room, bedside, etc), automatic messages are sent. Once messages are sent, the system goes back to a disabled mode until the user decides to activate again on another night.

This concept is not a surveillance system, it is entirely up to the user to activate or disactivate the sensing. If the student (assumed target user) simply does not want to be “surveilled”, one can just not activate the system when going out. To avoid parents (or other contacts) from worrying when they receive no messages, alerts such as “Alex has activated Safely Home for the night” or “Alex has just disactivated Safely Home” would be sent.

Technologies and sensor data

The prototype will use a **Raspberry Pi** combined with a **Grove Pi**, and two sensors to ensure the system is reliable:

- a **PIR motion** sensor; it could be set above a room door, next to a bed, etc,
- a **sound** (or loudness) sensor; it can be set anywhere in the room, to detect a spike in sound. This would be used in parallel with the motion sensor, the combination of the two will be necessary to declare the presence of someone.

Project plan

The first step of the project will be to compose the hardware together and be able to capture motion and sound, and use that data to analyse what values are of interest and the thresholds to look out for to detect someone, and figuring out the groundtruth data.

The testing will have to assess any way the system and sensors could fail. This includes external sounds and movements ; someone going in their room very quietly (sneaky) ; or any other source of noise and motion that would not be a person coming home. It will also be very important to test the sensing differences between a sound and loudness sensor, as well as differences between a motion and ultrasonic sensor, and which of those are more accurate and appropriate. Tests will also have to be made regarding different types of rooms and different types of sound.

These tests will then lead to the final phase of updgrading the software to implement accurate sensing and reduce the chances of failed detections.

Skills and competencies

Extensive programming skills (Msc Computer Science and Applied Mathematics) and significant experience in IT and Software Engineering, with experience in ubiquitous systems and IoT through projects like digitalization of ship containers (Edge Computing). Familiar with embedded technologies such as Raspberry Pi and Arduino. This experience will be used for every aspect of this coursework in developing scalable software and improving the quality of the system.