Pocket Protector

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Introduction/Motivation

The main motivation for this project is to discourage criminals from harming users by providing a specialized deterrent and emergency response system. The basic premise involves taking college campus call boxes and creating a wearable version for young adults.

The Pocket Protector is a pocket-sized system that comprises of a wearable, hardware assembly and an iPhone app. The group approximates the functional prototype costs $46.00.

The group aims to reduce the number of crimes committed against young adults and ensure that law enforcement can be contacted quickly and efficiently help victims of crimes that do occur.

Capabilities

- By using the hardware assembly with a single switch interrupt system, young adults are able to deter attackers, send GPS location, and call for emergency personnel instantaneously. This will increase the likelihood of authorities being contacted at the time of the attack and reduce authority response time.
- The purpose of the iPhone app is to provide a simple user interface to store emergency contact information and quickly access GPS and calling functions.

Active Mode	Inactive Mode
• Look for the switch interrupt • Flash LED • Sound alarm • Initiate app functions	• Look for the switch interrupt • Preserve battery life by sleeping all other functions

Encasement

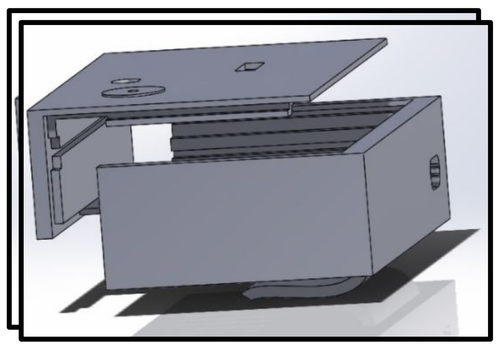

Figure 1. How the case fits together.

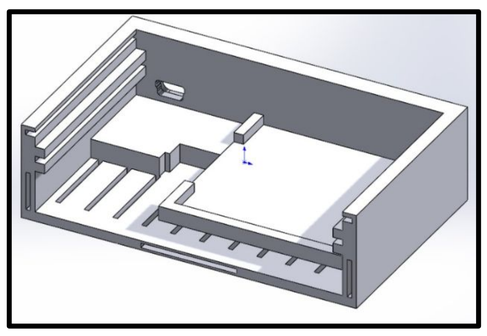

Figure 2. The internal layout of the case.

Hardware Code

- The initial setup assigns the I/O pins to the components, initializes variables, and establishes a continuous Bluetooth connection.
- Code then loops forever, waiting for an interrupt.
- Upon interrupt, switch-debouncing routine is called.
  - Uses time constant to avoid unintentional mode toggling
  - Conditionally calls mode toggling routine
- Upon entry to interrupt routine, the mode is toggled between active & inactive.

(mode capabilities described above)

Schematic Design

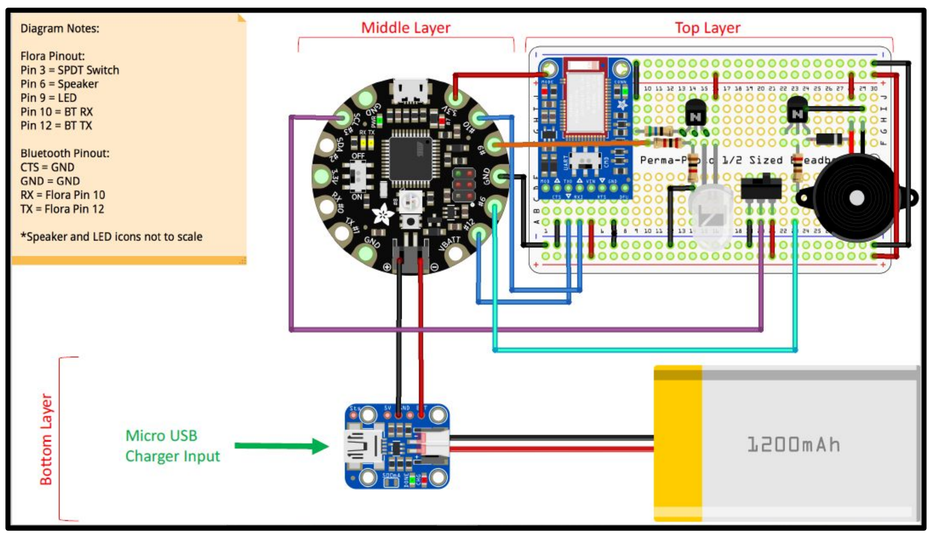

Figure 3. The Schematic of the Pocket Protector.

Hardware Design

Schematic Design

- Optimized to reduce circuit complexity
  - Speaker & LED current amplification done with BJTs and resistors, no op-amps or audio amps required
- Layered to reduce circuit footprint
- Rechargeable battery
- Switch debounced in software
  - Further reduces footprint
  - Avoids use analog RC filter

Case Design

- Compartmentalized to provide component stability
- 3D printed to reduce weight
- Designed around the components
  - No extra mounting hardware required
  - No disassembly required to recharge

iOS App Front End

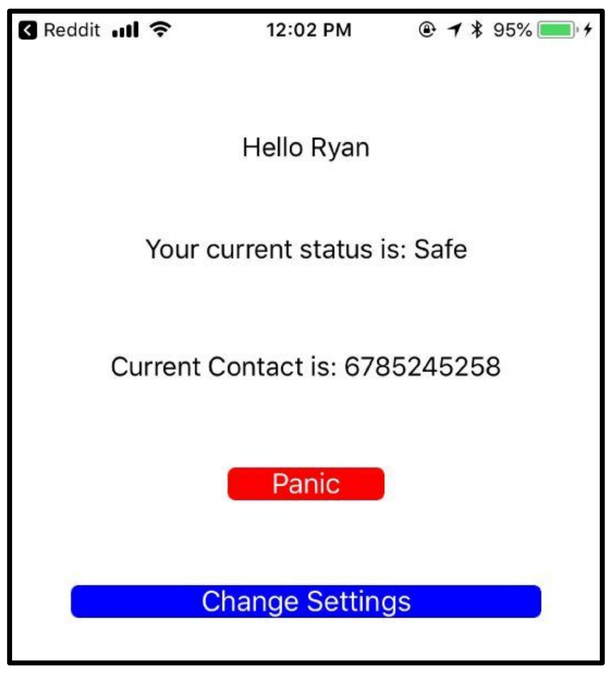

Figure 4. iOS App Home Screen.

iOS App Back End

- The app receives a boolean value via bluetooth in order to begin all panic functions. Bluetooth connectivity is maintained through a module once the app is opened.
- The app accesses GPS coordinates and sends the data to a 3rd party messaging service while the app is activated. The messaging service is accessible to the local authorities.
- When activated, a dialing option will appear in order to call an emergency contact that has been stored.
- Back end functionality utilized libraries and built in functions provided by the iOS service.
- Dialing and messaging work based on an interrupt that is generated when the boolean is received from the hardware assembly.

Conclusions/Future Work

- A portable safety device that has fully autonomous communication once enabled will require support from the cell phone manufacturer because of privacy constrictions.
- There is a need to make further adjustments to resolve high temperatures that occur after extended use.
- While the case is water resistant, there is a need for the Pocket Protector to be fully sealed from water damage while concurrently operating within an acceptable temperature range.
- Could allow user customization settings for alarm sounds & light patterns.