



PLBetter

Jake Bransford, Madeline Williams, Han Yu, Ryan Stanley
Integrated Engineering - University of British Columbia



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Introduction

What is a PLB?



A personal locator beacon (PLB) is an emergency assistance device that directly communicates an SOS call to search and rescue groups. It then tracks the user's location and forwards this information to the rescuers.

Limitations of Current Solutions

- None of the user's health statistics are passed to SAR
- No way to activate when incapacitated (i.e. unconscious or physically pinned)

Mission Statement

PLBetter aims to improve current market solutions by incorporating health statistics in distress messages, and increases accessibility via vocal activation.

This will be beneficial in situations where the user has experienced a significant health event such as hypothermia. PLBetter can automatically activate when it detects these situations, or can be manually activated using either voice commands or by a physical button press.

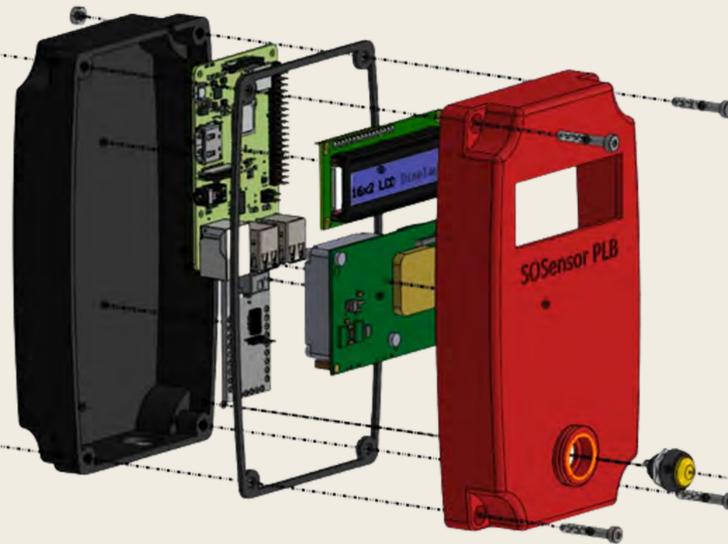


PLBetter Front View

Product Design

Mechanical Enclosure

Comprised of a number of sturdy and weatherproof materials, our PLB is perfectly suited to handle any environment you find yourself exploring:



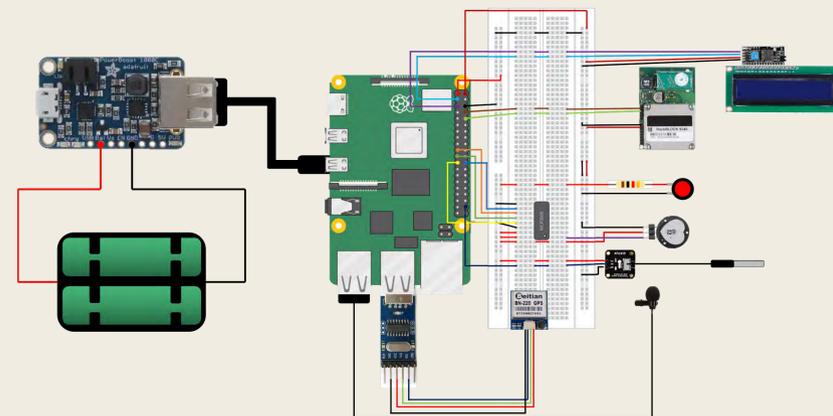
- Rigid ABS/PLA housing
- Durable EPDM/TPU custom gasket
- Black zinc oxide fasteners to ensure longevity
- Mounted internal circuitry suitable to impact tests
- Conformal coating of circuits to ensure redundancy in waterproofing
- Custom design to sit on shoulder, well within reach or voice command distance for emergencies



Smartwatch style wristband that houses temperature and heart rate sensor and microphone. Prototype currently is hardwired to PLB device.

Electrical

The schematic summarizes what components are used with the Raspberry Pi B3+ that provides the main functions of our device.



The schematics include:

- Battery
- Battery management system
- Raspberry Pi 3B+
- RockBlock Mk2 sat comm module
- 16x2 matrix display
- SOS activation button
- Heartrate sensor
- Temperature sensor
- GPS module
- Microphone

Software

Controlled by a Raspberry Pi 3 B+, core body temperature and heart rate statistics are actively monitored and ready to be transmitted over the Iridium satellite network upon activation. Onboard microphone passively listens for hot word activation command, "Emergency", using Porcupine by Picovoice software. User can cancel transmission by saying, "Cancel Emergency". The RockBlock Mk2 satellite module then sends an urgent email to the users' recipient list.

Explore With Confidence

Operation

Once activated, PLBetter sends out a message containing GPS coordinates, core body temperature, and heart rate to the designated email address. No cell service required. An example email output taken from nearby Garibaldi Lake is shown below.



SOS LAT 49.9183705844206 LON -123.03557472161641
20.562C 83BPM

Results

- Accurate location coordinates with GPS
- Successful transmission of SOS message over satellite network
- Accurate temperature and heart rate readings

Conclusion

Limitations

- Size and weight
- Long battery charge time
- Satellite and GPS connection issues when under overhead obstructions
- Heartrate sensor sensitivity variation due to pressure/vibrations

Future Improvements

- Size and weight reduction with custom electronic components
- Higher health statistic accuracy
- PCB implementation
- Incorporate more health statistics
- Waterproofing/wireless wrist band