FiAR: Augmented Reality Helmet for Firefighters

Joseph Osborne, Collin Green, Meta Novita, Christopher Hoang Nguyen
Professor Henry P. Lee
Department of Electrical Engineering and Computer Science

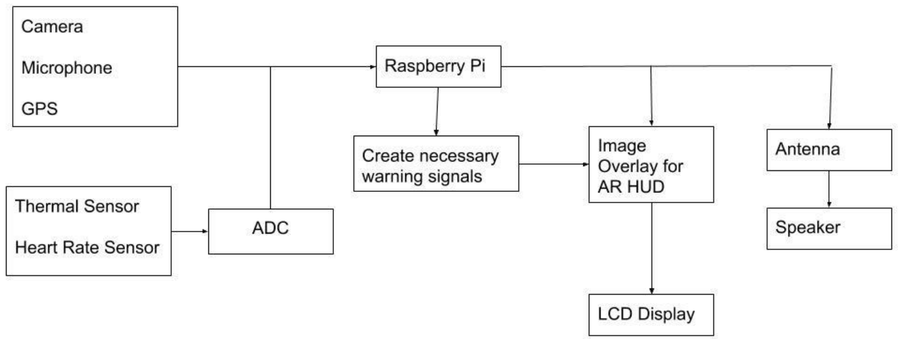
Background

- firefighter suits are only rated to 300° C or 572° F
- fires can easily go past the temperature rating such as cases of flashover (500° C or 1000° F)
- most firefighter injuries are caused by overexertion and strain during a fire

Project Goals

- provide firefighters a Heads Up Display (HUD) showing real-time temp data, heart rate, and heart rate of nearby firefighters
- limit exposure to fires that are too hot and unsafe
- minimize injuries by alerting firefighters to when they are pushing themselves too hard

Diagram



Hardware

- LCD display
- Raspberry Pi Camera V2-8
- Raspberry Pi (4GB)
- Heart rate sensor
- Amphenol Thermistor
- Adafruit Ultimate GPS Breakout
- Speaker and microphone
- Communications antenna
- Helmet and SCBA mask
- ADC
- Anker Powercore

Progress

- Configured thermistor and heart rate sensor
- Created AR HUD
- Implemented sensor data to AR HUD
- Tested AR HUD with sensor data
- Integrated hardware onto helmet
- Configured GPS and radio relay
- Implemented GPS and radio relay to AR HUD
- Tested AR HUD with sensor data, GPS, and radio relay

References

[1] Evarts, Ben. “NFPA Journal.” NFPA Journal - US Firefighter Injuries 2017, Nov, Dec 2018, 1 Nov. 2018. [Online]. Available: www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2018/November-December-2018/Features/US-Firefighter-Injuries-2017. [Accessed October 7, 2019]

[2] Madrzykowski, Daniel. *Fire Fighter Equipment Operational Environment: Evaluation of Thermal Conditions*. Fire Protection Research Foundation, Aug. 2017. [Online]. Available: ulfirefightersafety.org/docs/RFEvaluationThermalConditions.pdf. [Accessed October 7, 2019]

[3] “Firefighter.” Firefighter - an Overview | ScienceDirect Topics. [Online]. Available: https://www.sciencedirect.com/topics/engineering/firefighter. [Accessed October 7, 2019]

The Henry Samueli School of Engineering
University of California · Irvine