ECE 598 - 007
How to Make (Almost) Anything Interactive

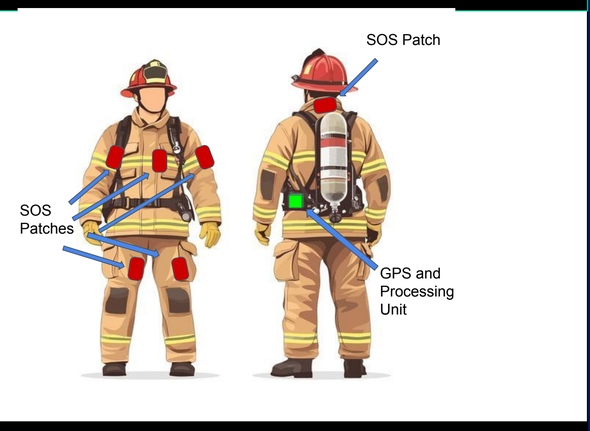
Firepatch

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Why does it matter?

- Firefighters work in extreme heat and zero visibility.
- Jackets today give no temp, SOS, or location awareness.
- Wildfires are increasing: 61,000 fires, 8.8M acres burned (2024).
- They need real-time temperature + SOS + GPS for safety.





How do you fabricate?

- K-type thermocouple for temperature sensing
- AD8495 thermocouple amplifier for signal conditioning
- ESP32 and NEO-6M GPS module
- Stainless-steel snaps for continuity loops
- Welding-blanket
- Soldered + stitched wiring inside the jacket

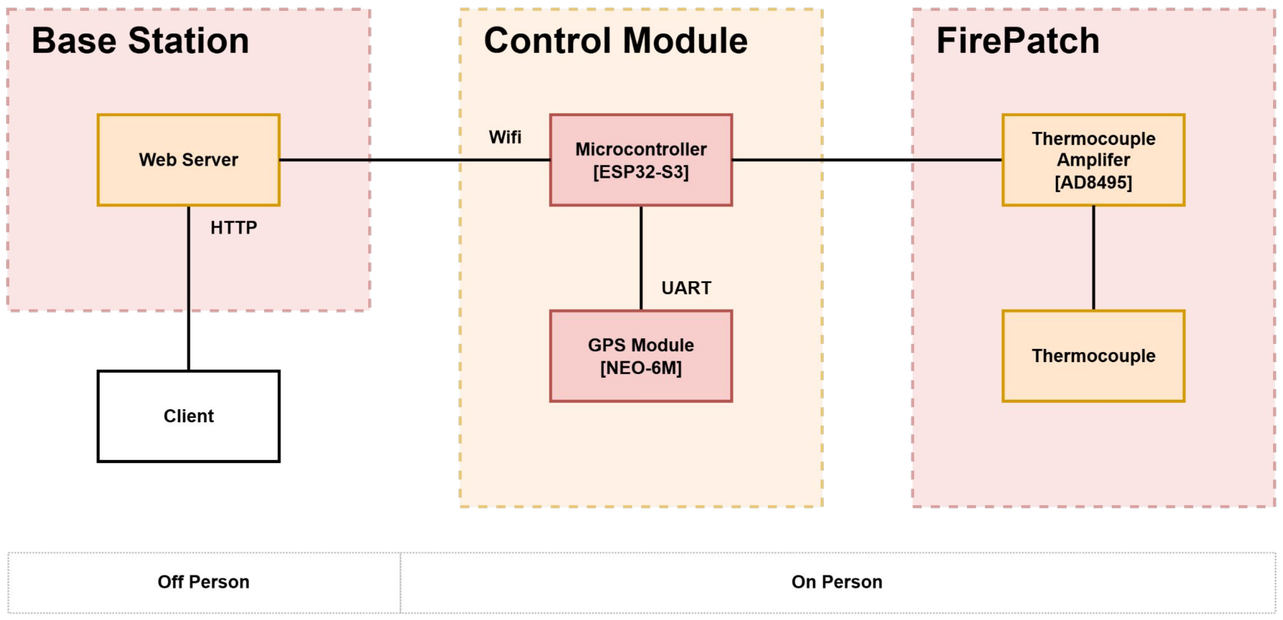

SOS Patch

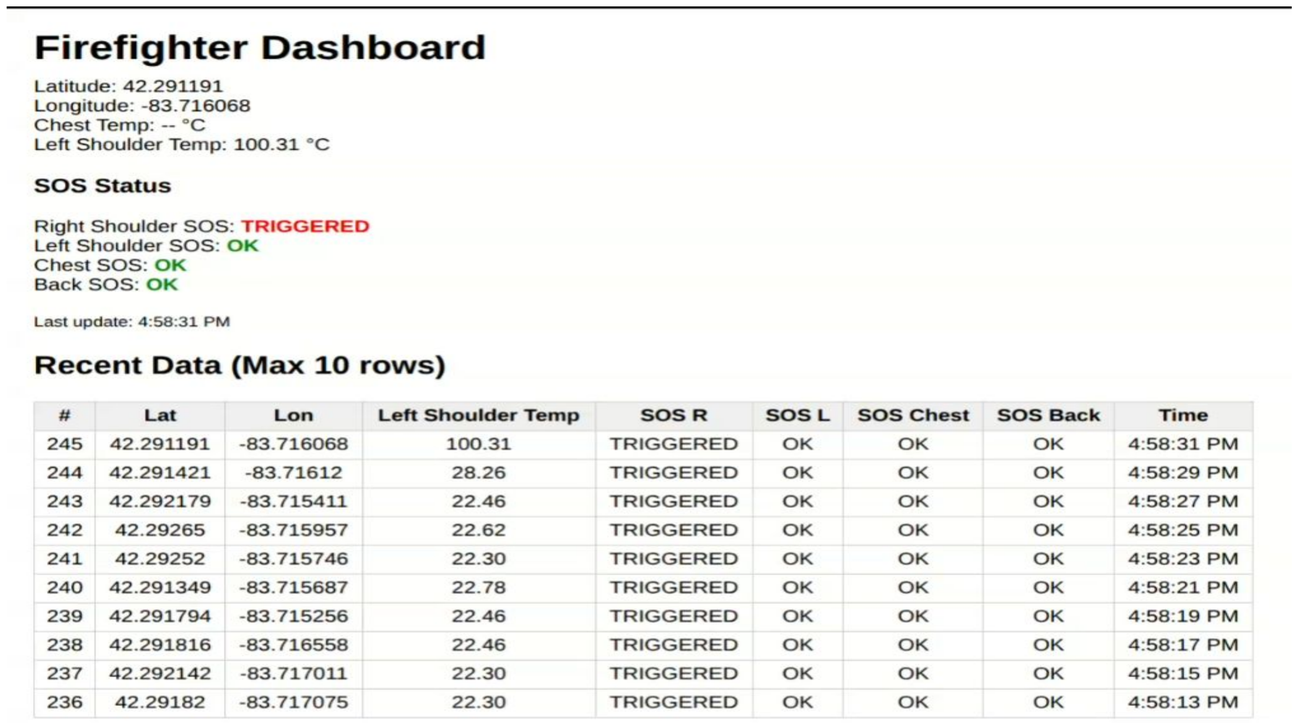

Patch Internal Circuitary


Thermocouple Circuitary

How does your interactive system work

- Six patches across the body: temperature-sensing patches + snap-based SOS patches
- Temperature patches send continuous thermocouple readings to the ESP32
- SOS patches trigger alerts when their continuity loop is broken
- GPS module provides live firefighter location
- ESP32 broadcasts temperature, SOS, and GPS data over ad-hoc Wi-Fi
- Base station receives the data and updates the dashboard in real time





#	Lat	Lon	Left Shoulder Temp	SOS R	SOS L	SOS Chest	SOS Back	Time
245	42.291191	-83.716068	100.31	TRIGGERED	OK	OK	OK	4:58:31 PM
244	42.291421	-83.71612	28.26	TRIGGERED	OK	OK	OK	4:58:29 PM
243	42.292179	-83.715411	22.46	TRIGGERED	OK	OK	OK	4:58:27 PM
242	42.29265	-83.715957	22.62	TRIGGERED	OK	OK	OK	4:58:25 PM
241	42.29252	-83.715746	22.30	TRIGGERED	OK	OK	OK	4:58:23 PM
240	42.291349	-83.715687	22.78	TRIGGERED	OK	OK	OK	4:58:21 PM
239	42.291794	-83.715256	22.46	TRIGGERED	OK	OK	OK	4:58:19 PM
238	42.291816	-83.716558	22.46	TRIGGERED	OK	OK	OK	4:58:17 PM
237	42.292142	-83.717011	22.30	TRIGGERED	OK	OK	OK	4:58:15 PM
236	42.29182	-83.717075	22.30	TRIGGERED	OK	OK	OK	4:58:13 PM

- **Further work / Improvements**
- Brass Snaps
- Custom PCB
- Stitched wiring
- Conformal Coating for water infiltration
- Improved Dashboard
- Wideband localization, to allow better indoor tracking
- Visual feedback system for firefighters

You can add your link down here to your project