

# AtEase SMART PAD AND GPS LOCATOR FOR CHILD CAR SEAT AND STROLLERS



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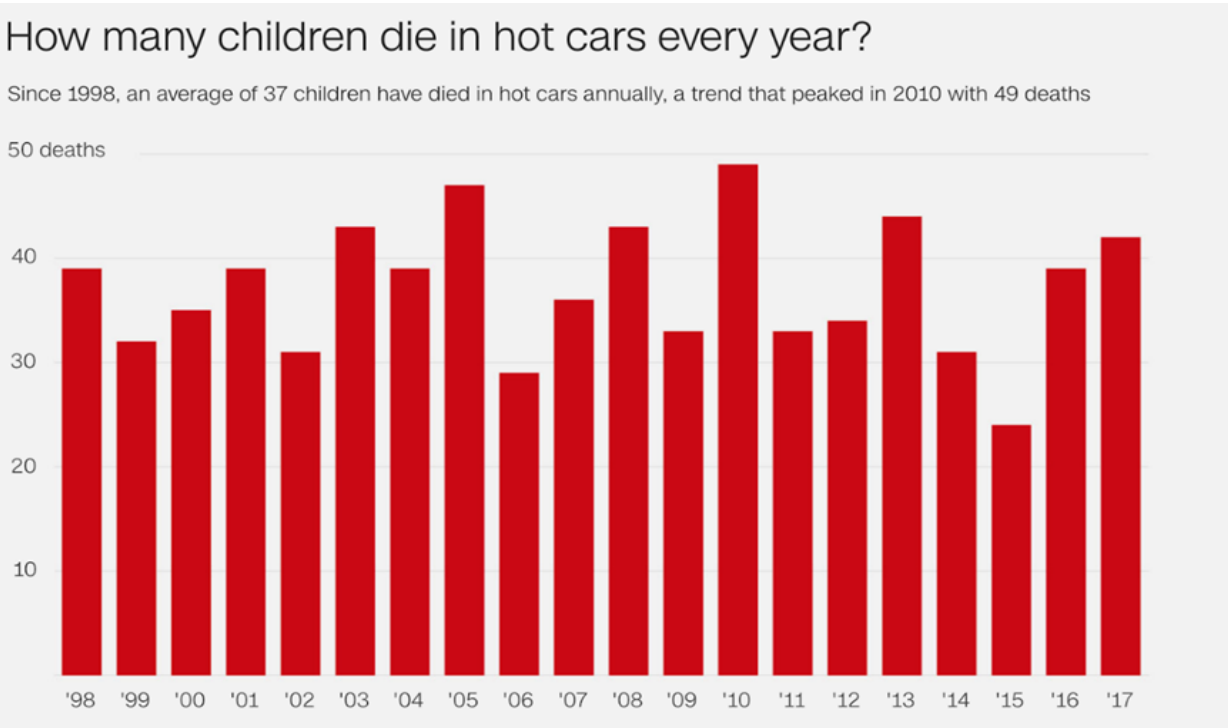


## OBJECTIVE

This project aims to design a portable smart pad mountable to standard car seats and strollers, which can detect multi-channel information on baby posture, wetness, temperature, Carbon Monoxide content in the vehicle and GPS location. The information is fed to an intelligent system able to send alarms or warnings on car audio or parents cell phones. In cases where a child is left unattended for an extended period of time, the smart pad is able to contact emergency staff and leave a voice recording explaining the situation and a GPS location.

## MOTIVATION

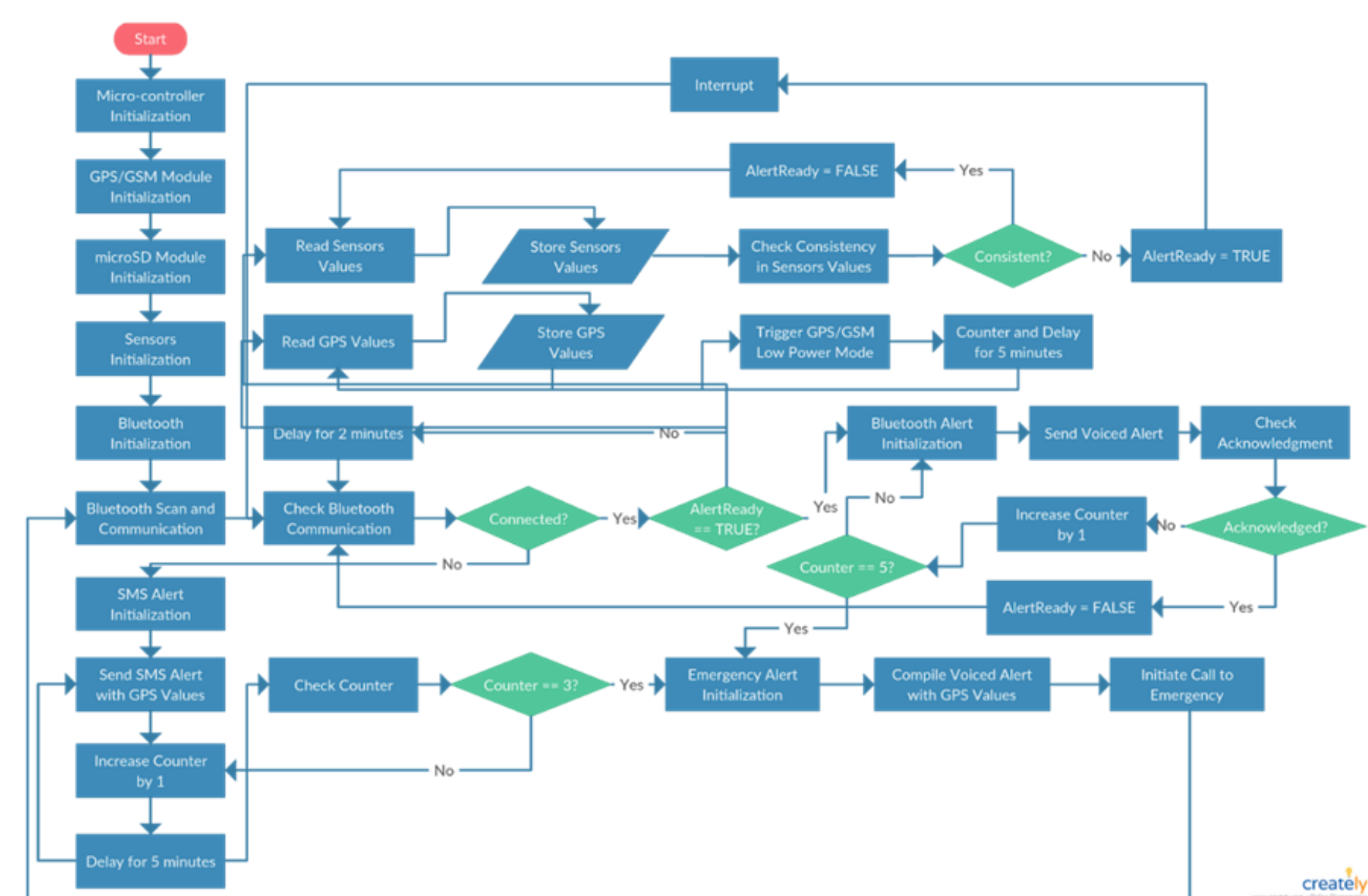
Infant/Toddler car seats and strollers are essential part of mobility and safety requirements for children when traveling. On long drives, it is important to continuously monitor the infant/toddler to make sure they are safe, comfortable, and securely fastened to the car seats. This is especially true during sleep when infant/toddler alter their posture, possibly leading to unsafe neck or spine positions. Furthermore, changes in temperature, abnormal carbon monoxide levels or wet diapers can result discomfort, irritation and even danger for the child. There have also been cases where babies were left unattended inside a vehicle, some have even resulted in tragedies. On average, 37 babies/ year die due to hot car deaths. Currently, there are only a few similar product on the market. However, they do not address the many issues of safety and comfort, nor do these devices have any clinical applications.



## APPROACH

- Various sensors used to acquire information from child and environment
- Force sensitive resistor (FSR406) pressure sensors in a “T” arrangement placed along spine and head to track posture.
- Temperature/Humidity (DHT22) sensors placed under child and in the middle of pad to detect temperature and diaper wetness
- Gas Sensor (3SP\_CO) on pad monitors Carbon Monoxide levels in vehicle
- Microcontroller (ESP32 Feather) processes information from sensors, establishes safety thresholds and sends out warnings and alerts.
- Bluetooth module (FONA808) allows for wireless communication between microcontroller, vehicle audio system and parent’s cell phones, and emergency services.

### Flow of Program



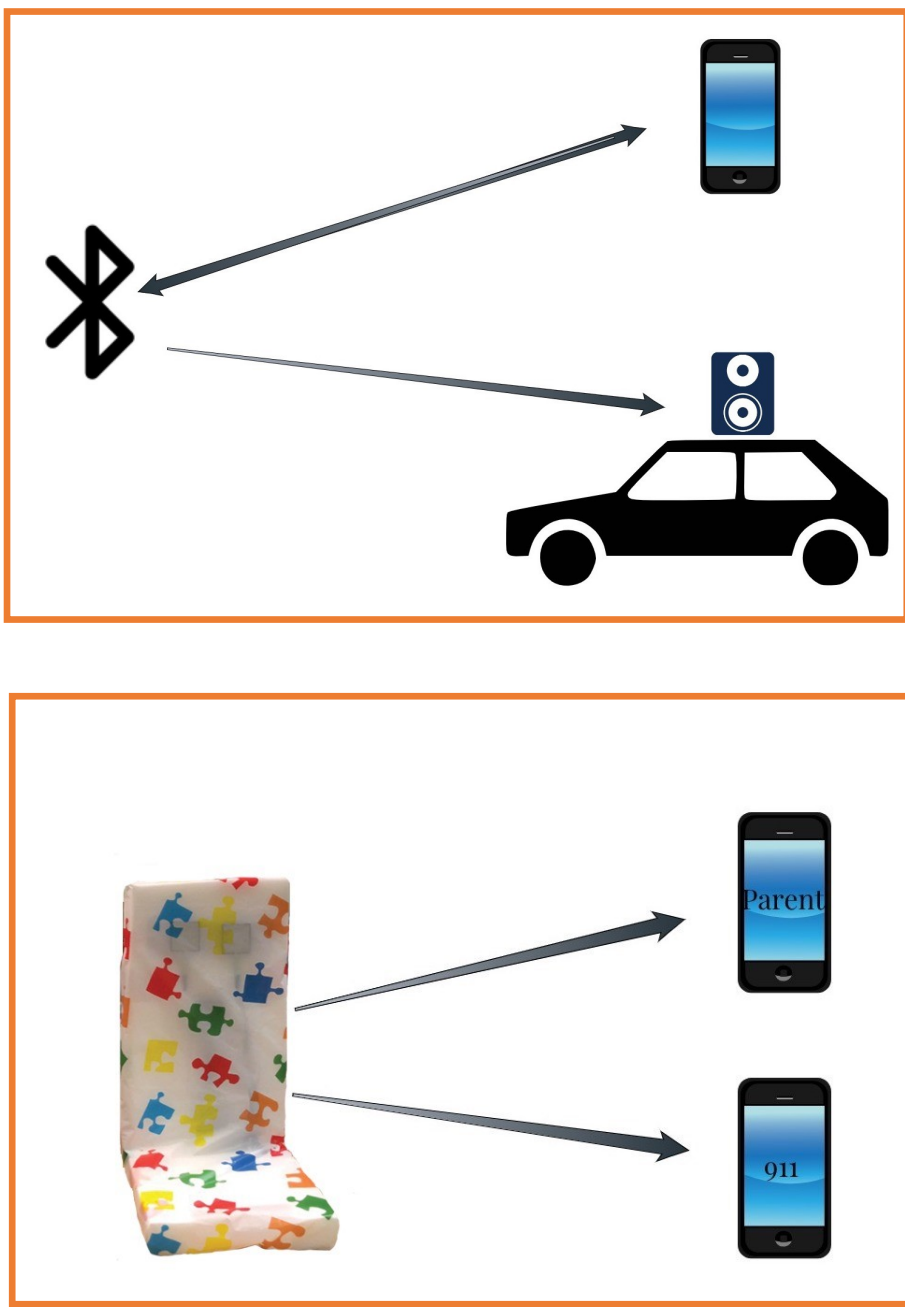
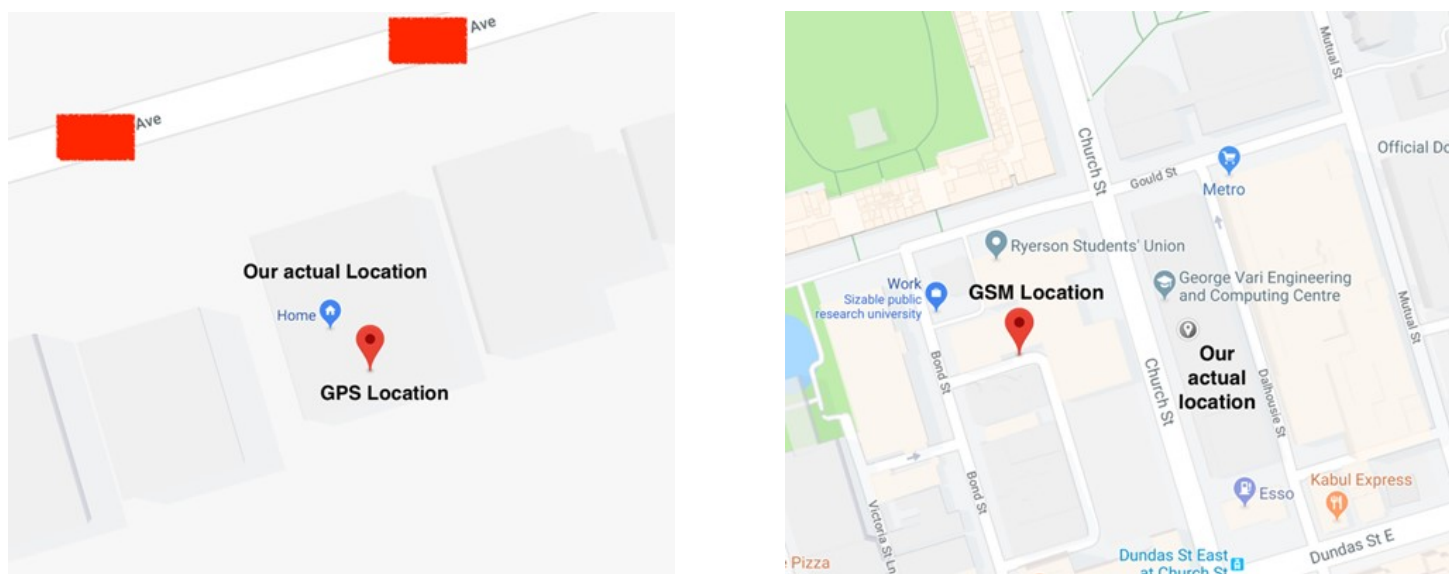
## RESULTS

- The battery life of the device is over 16h
- 16-bit audio is outputted to Bluetooth speakers
- 8-bit audio outputted on phone calls

TEST	TIME (s)
Detect Changes in Posture	2
Detect Presence of Wetness	45
Detect Temperature Changes	10
GSM/GPS/Bluetooth/SD Card initial set-up	32**
GPS/GSM signal acquire	8-10
SMS Text Message	10-13
Outgoing Phone call	5-15
Bluetooth audio output to speakers	4-8

\*\* Initial connections on consistently executed in 32 seconds and cannot be reduced

### GPS & GSM Location Acquisition Accuracy



## CLINICAL APPLICATIONS

AtEase Smart Pad has many relevant clinical applications including:

- ICU
- Palliative Care
- Elderly Care
- Care for children with medical complexities
- At home monitoring



### References:

[1] Willingham, A. (2018, July 20). More than 36 kids die in hot cars every year and July is usually the deadliest month. Retrieved from <https://www.cnn.com/2018/07/03/health/hot-car-deaths-child-charts-graphs-trnd/index.html>