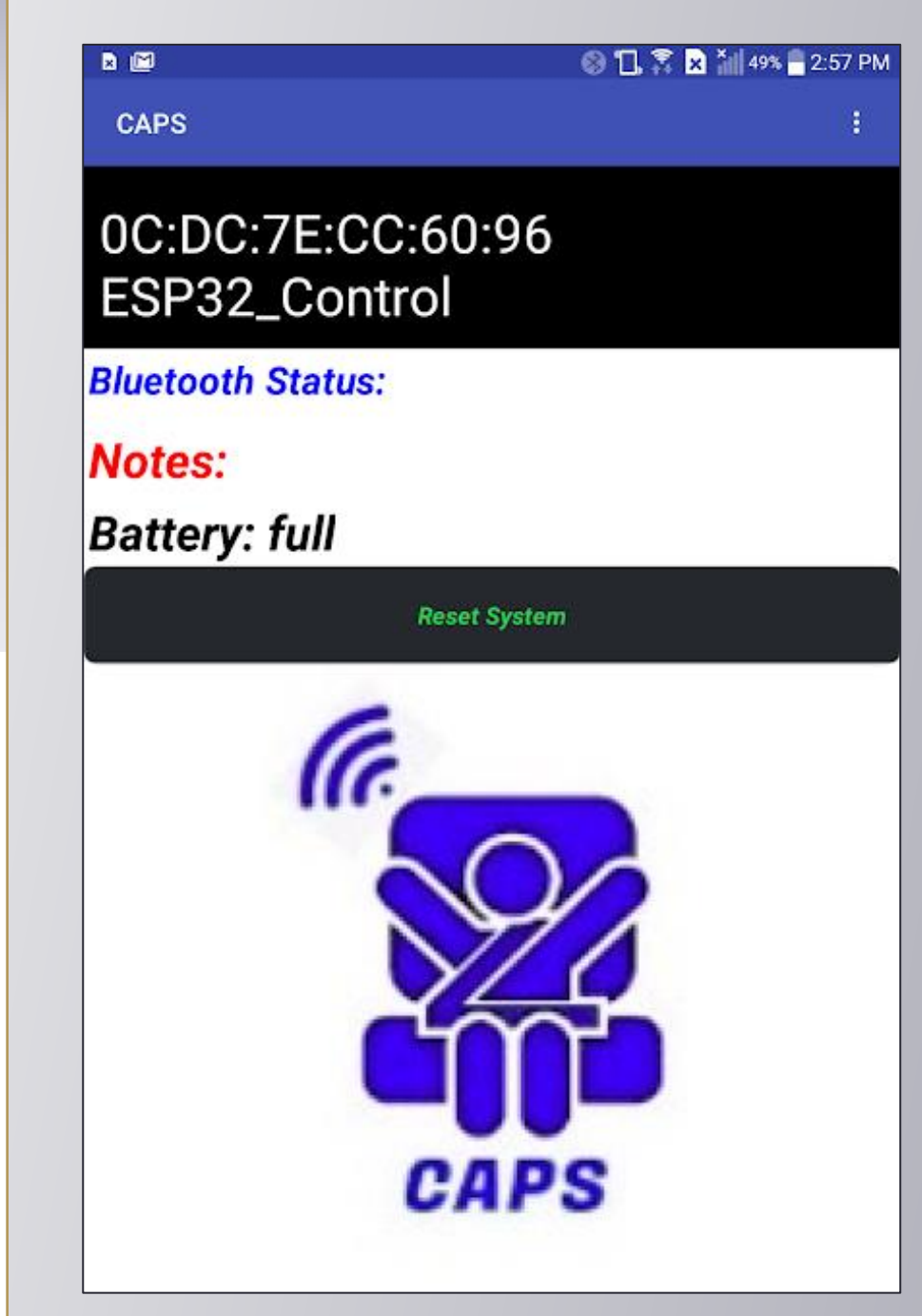


# E2.06 - Child Awareness and Protection System

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Sponsored by Texas State University



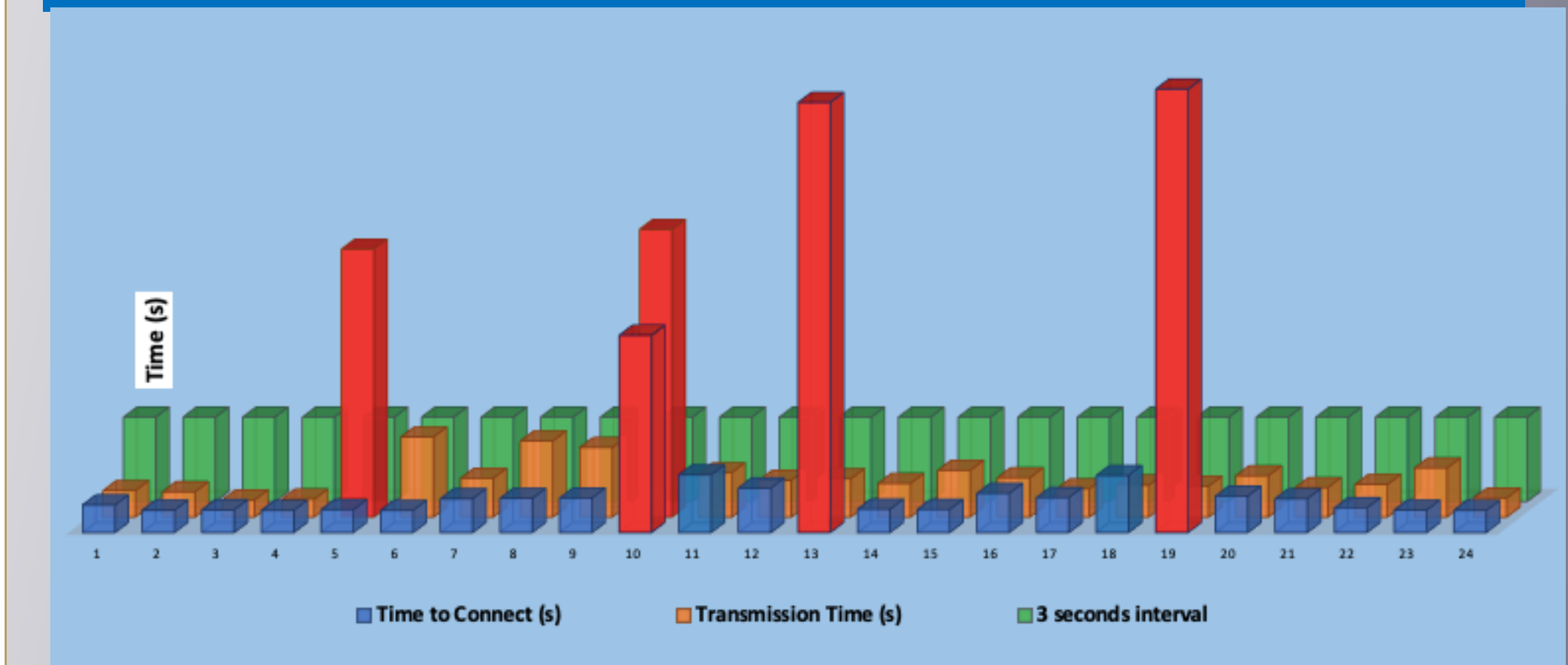
## (Stretch Goal) Application



- Android Application
- Emergency Notifications
  - Battery levels
  - Reset Button



## Wireless Communication

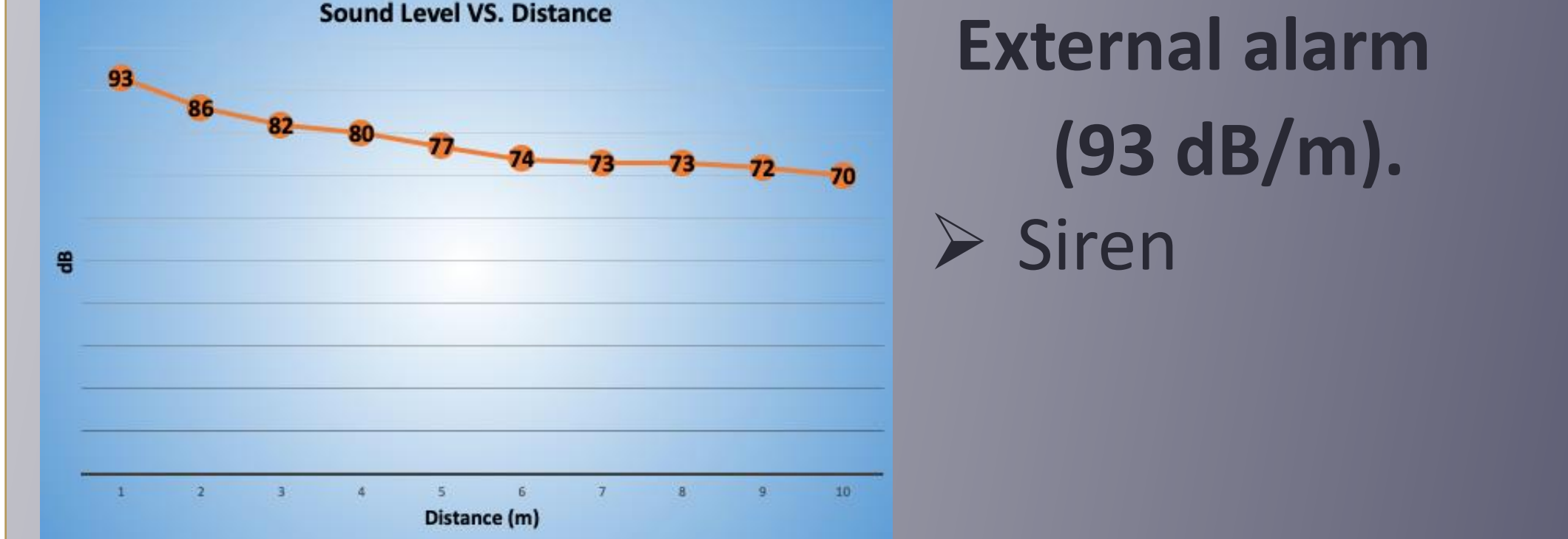


- Responsibilities:
- Wireless connection between internal and external Modules (Bluetooth 4.2 BR/EDR).
  - Range up to 10 meters.
  - Reconnection automatically in 3 second.

## External System

- Responsibilities: Alert the user if a child is left alone in a vehicle
- Modes (conserve power)
- Sleep mode (timing 22-24)
  - Active mode (timing 1-3)
  - Timer to wake
  - If the system fails to connect it will stay in active mode until a connection made

## External Alert



External alarm (93 dB/m).  
➤ Siren

## Team



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## Purpose

Prevent hot car deaths in children using low cost, sensor-based, multiple alert system

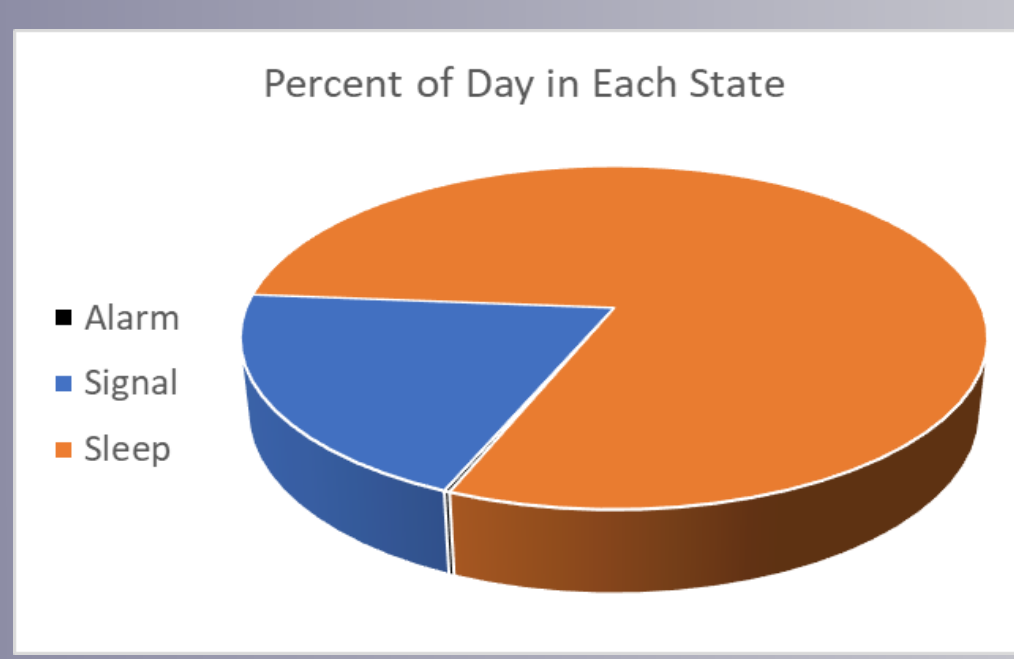
## Detection Unit

- Camera OV2640 (Child Verification)
- Eyes
  - Nose
  - Mouth
- child/Parent Detection
- PIR Sensors
  - Ultrasonic Sensor

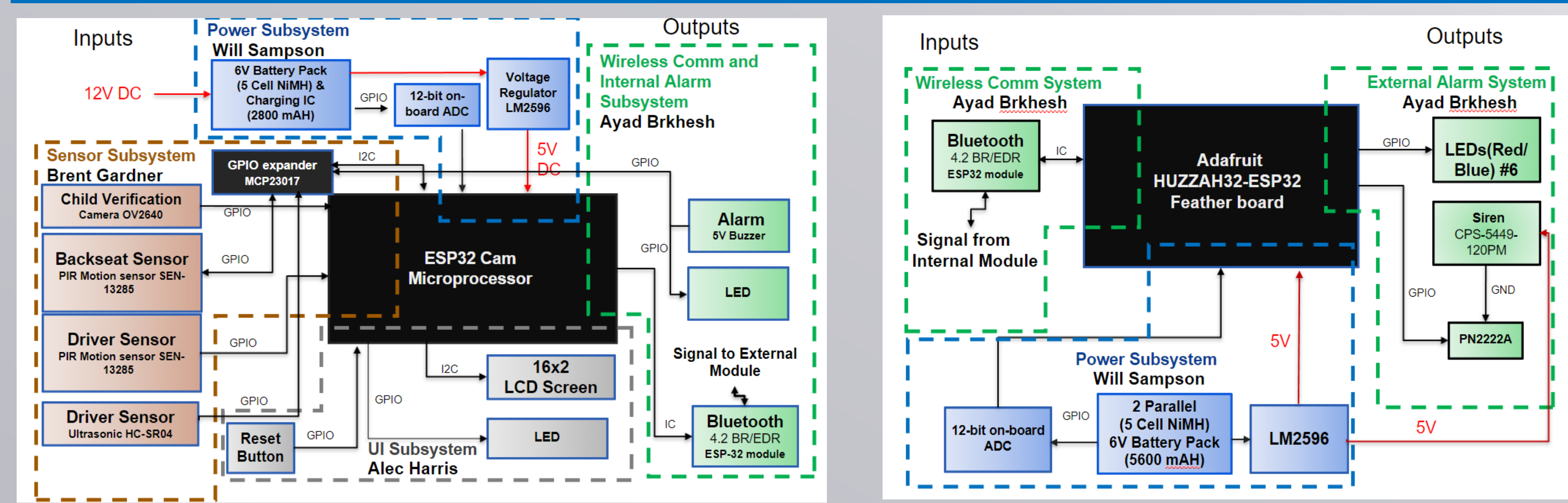
## Power

Time in signal state	2 Parallel 2300 mAh Packs	2 Parallel 2000 mAh Packs	3 Parallel 2000 mAh Packs
-20%	4600 (5.69)	5600 (6.93)	8400 (10.4)
-8%	4600 (10.19)	5600 (12.45)	8400 (16.67)
-4%	4600 (14.91)	5600 (17.67)	8400 (24.5)

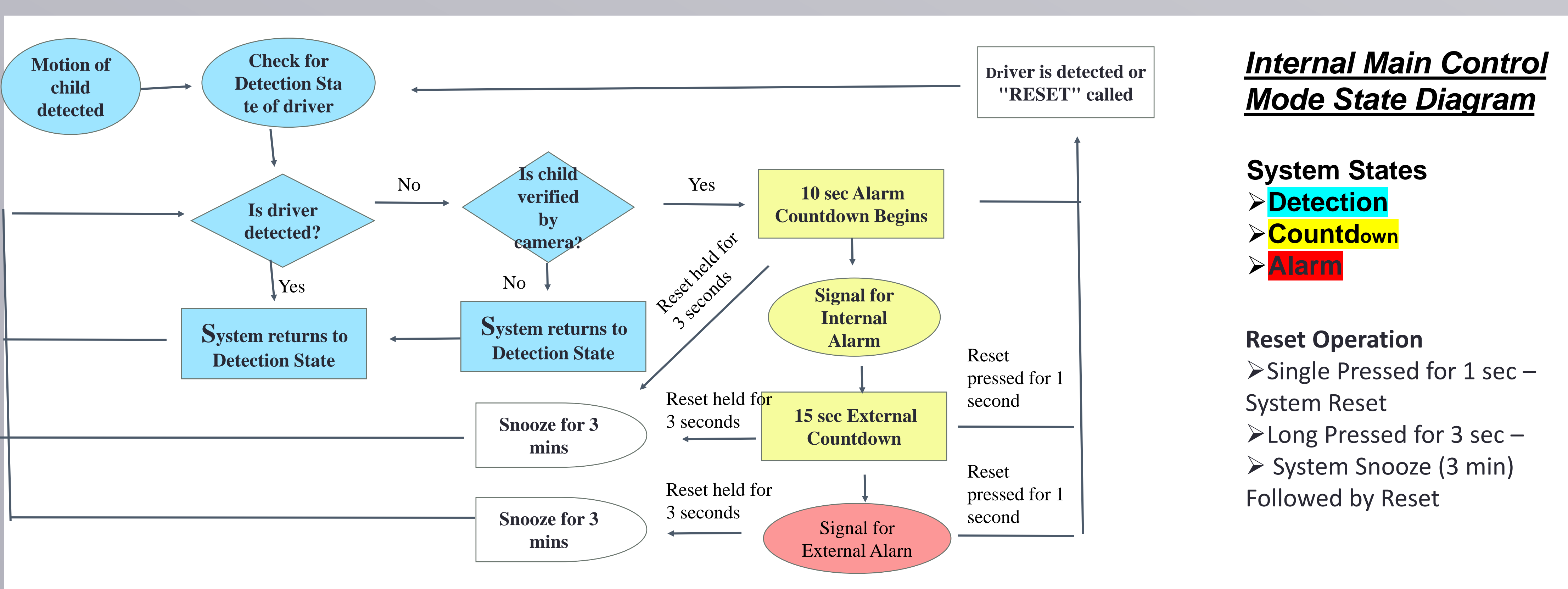
Actual Voltage (V)	Reported Voltage (V)	LCD Battery Status
5.4	5.32	L
5.5	5.48	L
5.6	5.55	L
5.7	5.70	L
5.8	5.83	M
5.9	5.87	M
6.0	5.85	M
6.1	5.96	M
6.2	6.14	M
6.3	6.32	M
6.4	6.45	M
6.5	6.58	F
6.6	6.70	F
6.7	6.79	F
6.8	7.02	F
6.9	7.20	F
7.0	7.20	F
7.1	7.20	F
7.2	7.20	F



## Internal Module - Block Diagrams - External Module



## System States and Operations



- Internal Main Control Mode State Diagram**
- System States
- Detection
  - Countdown
  - Alarm
- Reset Operation
- Single Pressed for 1 sec – System Reset
  - Long Pressed for 3 sec – System Snooze (3 min) Followed by Reset

## Requirements and Testing

Requirement	Measured results
<b>Internal Device</b>	
Internal Battery: 2hr Op w/ 80% recharge in 15 mins	Internal operates 7hrs but charging circuit has failed its operation testing by not supplying a current through the circuit <b>FAIL</b>
Withstand High Temp	All components withstand less than or equal to 150 F in a vehicle <b>PASS</b>
Battery Gauge w/ 3 levels & low battery alert	ADC provides 3 different battery voltage levels and low battery chirp <b>PASS</b>
Child / Driver high sensitivity detection	Child and Driver presence detected by PIR and Ultrasonic Sensors (50 cm) while being confirmed by face detection camera (0° - 45° side view) <b>PASS</b>
Medium Interior Alarm after 10 sec and High-Level alarm after 15 sec	Countdown State generates interior alarm and signals for exterior alarm <b>PASS</b>
Reset and Snooze Function	Reset Function returns system to Detection State, Snooze Function can be called and lasts 3 mins <b>PASS</b>
Interior Alarm equal to Kitchen timer	Interior Alarm = 60dB (Compared to a kitchen alarm) <b>PASS</b>
400 grams	The internal module does not have a secure method of attachment to driver headrest. Weighs 381 grams <b>PASS</b>
<b>External Device</b>	
Wireless Communication	Bluetooth initial connection and signaling happens in 3 seconds or less, up to 10m distance <b>PASS</b>
External Battery: 30-day operation	Module last for 18 days. This failure was caused by the misinformation on ESP32 CAM sleep current draws reported by the product specification <b>FAIL</b>
Exterior Alarm equal to fire alarm	Exterior alarm = 90dB (Comparable to a fire alarm.) <b>PASS</b>
Test Operation in three vehicles	Operation works identically in all vehicles (No Sync needed) <b>PASS</b>
Attach to outside of vehicle/400 grams	The external module does not have magnets, so it is unable to attach to outside of car. It will be placed into the engine bay. Weighs 828 grams <b>FAIL</b>

## Acknowledgements

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