# Vehicular Heatstroke & Hyperthermia Alerting System

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Introduction

Heatstroke and hyperthermia are two medical emergencies which occur when the human body is overheating/overcooling, usually as a result of the prolonged exposure to high/low temperature. This can happen in cars in closed environment. Although adults can realize this and get out of a car, the kids and pets do not have much options. We created a system to monitor such emergency in cars.
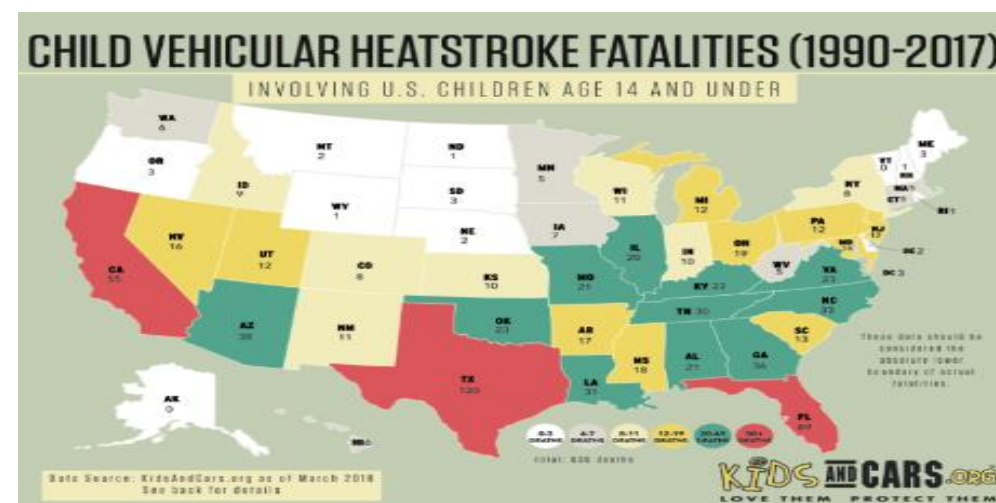

Statistics from www.kidsandcars.org

Studies of www.noheatstroke.org show that heatstroke can easily happen to children of age group 1 to 14, when they are most dependent on their parents and statistics show that, since 1998 an average of 37 children have died in hot cars due to heatstroke annually, a trend that peeked in 2010 with 49 deaths. This tragedy can occur anywhere, especially in extremely hot and cold regions.

System Overview

A. Vehicle Environment Monitoring & Data Acquisition.

B. Data Transmission using LoRa.

C. Data Retrieval from LoRa server & sending it to cloud.

D. Data Retrieval & Processing from cloud to user interface.

Process Overview

A. Vehicle Environment Monitoring & Data Acquisition

- The system is initiated when the motion sensor is triggered by the presence of a human/animal. The data from the temperature, humidity, air quality sensors is acquired which are needed to detect the physical condition of the car that the human/animal is exposed to.

B. Data Transmission using LoRa

- The data from the sensors is transmitted to the network server using the LoRa module.
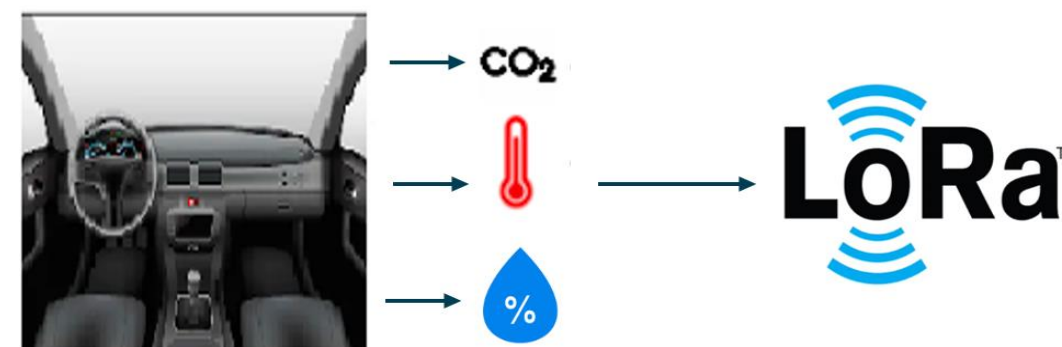
A. Data Acquisition & B. Data Transmission

C. Data Retrieval from LoRa server & sending it to cloud

- The data from the LoRa gateway is retrieved using HTTP protocol and is transferred to Google Firebase (cloud).

D. Data Retrieval & Processing from cloud to user interface

- The data is transmitted and stored to the google firebase and it is retrieved at the webpage using the HTTP protocol to give the real time data to the user.

- The real-time raw data from the sensor that is stored in the Firebase is processed to obtain the temperature, humidity and air quality inside the car.

- Based on the threshold values the web application triggers an alert to the user if the values exceed the threshold, thus making the vehicular environment unsafe.

Data Retrieval & Processing from cloud to user interface

System Architecture
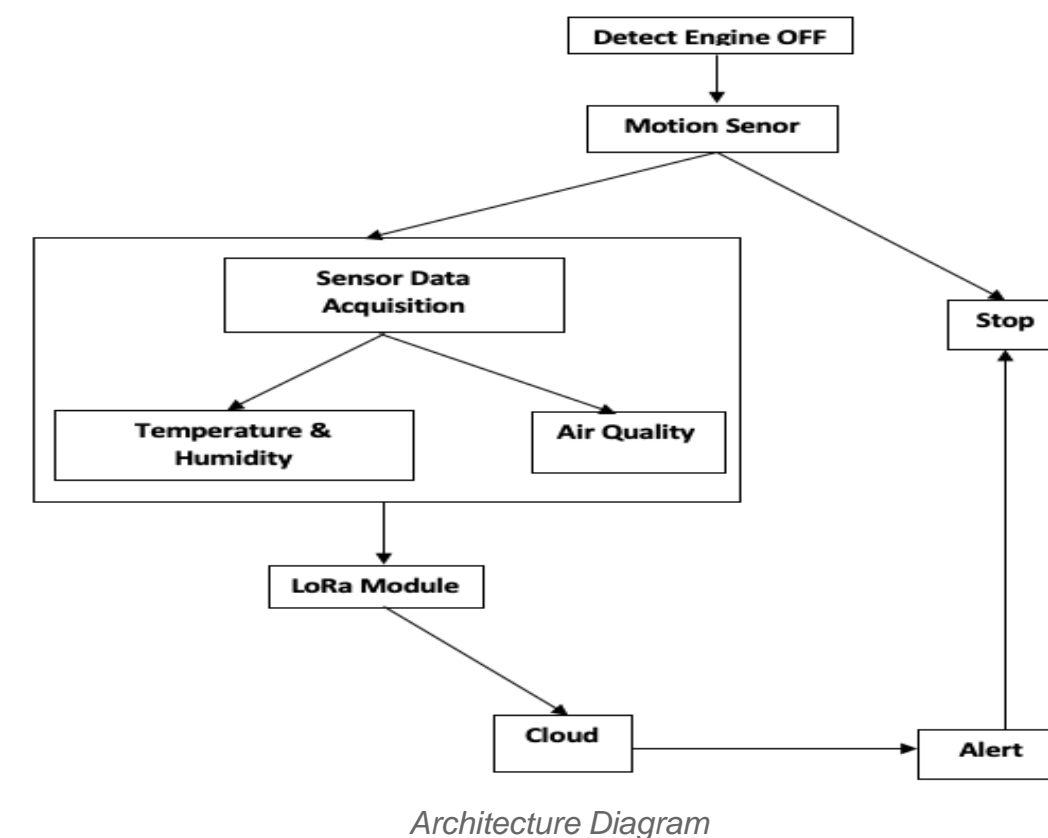
Architecture Diagram

Results

The data can be monitored using the web app and the alerts are triggered using the threshold values of humidity temperature and air quality


Conclusion

Our system monitors the vehicular environment and allows the user to asses the situation using the web app and thus save the lives of children and Pet animals using the concept of Internet of Things. Although the death numbers are very less, having a system to prevent it would be very appreciable.

Future Improvements

This idea can be integrated to the smart cars and automated cars as an additional feature, where instead of an alerting system, the car can itself analyze and assess the situation without human intervention.

System Test Bed
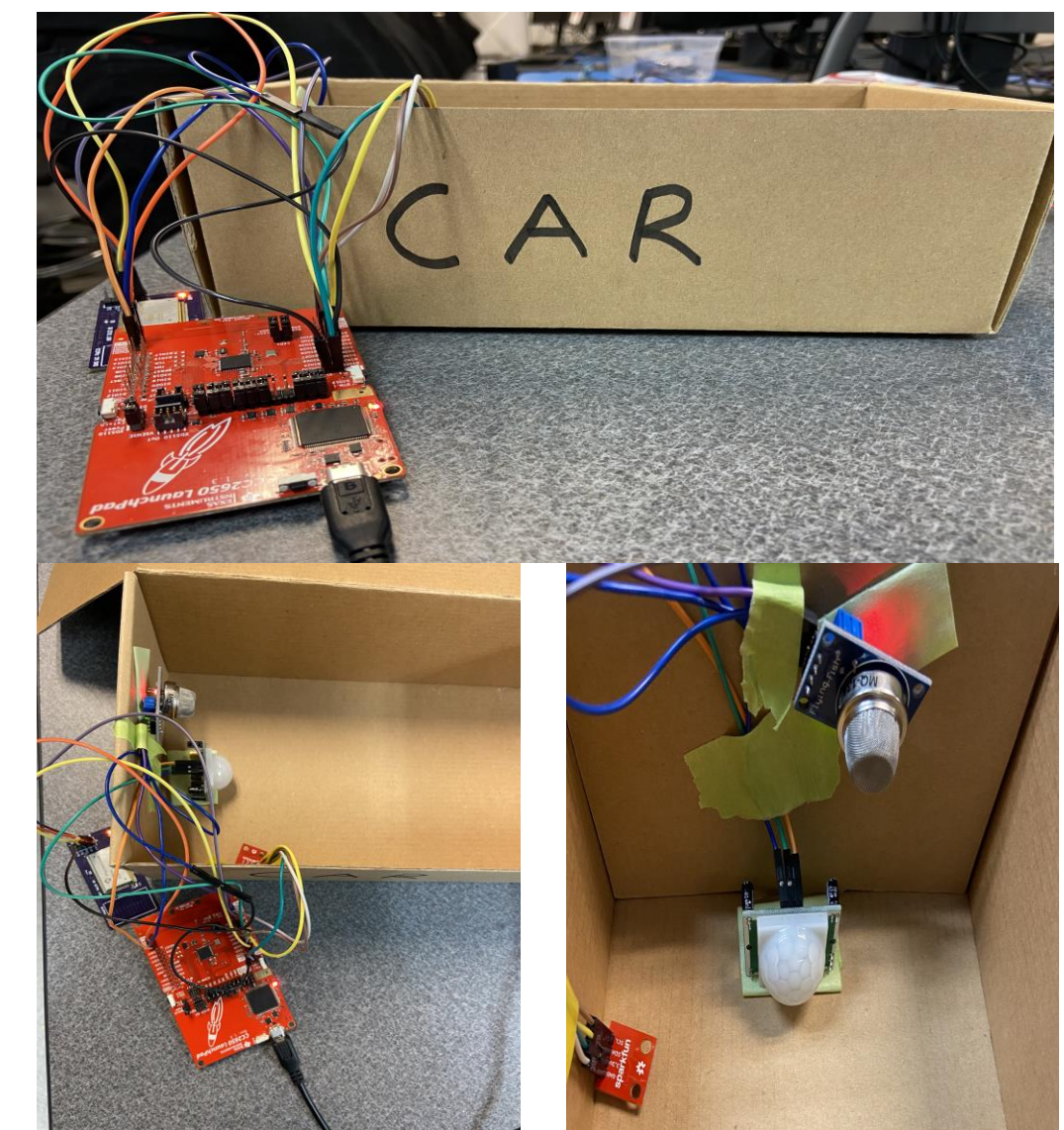
Systemperaturetem test bed consisting of CC2650 Launchpad, LoRa, & humidity sensor, motion sensor, air quality sensor

References

1. www.kidsandcars.org
2. Google Firebase
3. Silicon labs Si7021-A2 temperature & humidity sensor datasheet
4. Microchip RN2903 LoRa Transceiver module datasheet
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