SAFETY IN MOTION

FULLY MODULAR

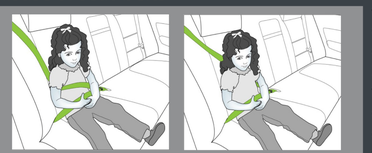
Problem Statement

The mode of transport that we use the most today is the personal vehicle of the car. Undoubtedly, dangers may arise when drivers are not cautious on the road or when passengers do not take safety measures seriously. Presently, cars merely have a sound system that warns passengers when they are not strapped in. However, this is insufficient as safety problems continue to persist. We have identified the three main safety concerns to be drivers not staying focused while driving, misuse of seat-belts by passengers and lastly, children sitting in the front seats of the car. Tackling this problem heads-on, we not only aim to eradicate these problems but also add additional features to the car to make it a comprehensive safe mode of transport.

Unfocused Driver

Manual distraction occurs anytime a driver takes his or her hands off the wheel for any reason. This could be for adjusting the dashboard, weariness, etc. This could endanger not only the passengers but also other bystanders.

Misuse of seat-belts



40,000 people die each year in car crashes, the leading cause of death for people age 3 through 34. Seat belts can prevent fatalities in about half of these crashes. However, people often do not wear seatbelts or uses them wrongly.

Childen in front seats

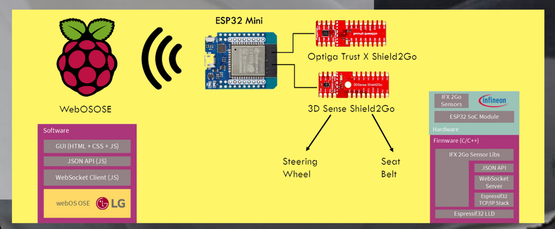
Children in front passenger seat are more prone to injury/death upon deployment of airbag in the event of a crash. Additionally, of the children ages 12 years and younger who died in a crash in 2016 (for which restraint use was known), 35% were not buckled up. This is because current car system is unable to detect childrens as most cars uses weight sensors. Hence the seat-belt warning will not be triggered.

Our Solution

A smart, secure, modular system that has cross compatibility with any vehicle on the road.
System is able to inform the user of any safety violations that the user practices inside the car.
System does not only focus on safety inside the car but also external safety precautions such as anti-theft and locking mechanism.

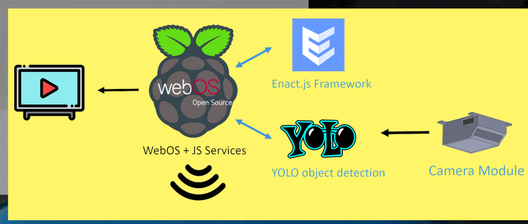
INFINEON

Using Infineon's starter kits, we utilised the 3D Sense Shield2Go and the magnetic sensors for the steering wheel and seat-belts, detecting when driver is not holding the steering wheel for a period of time or when the seat-belt is not fastened. Optiga Trust is used to secure end-to-end encryption. Which is then compiled using WebSocket communication.

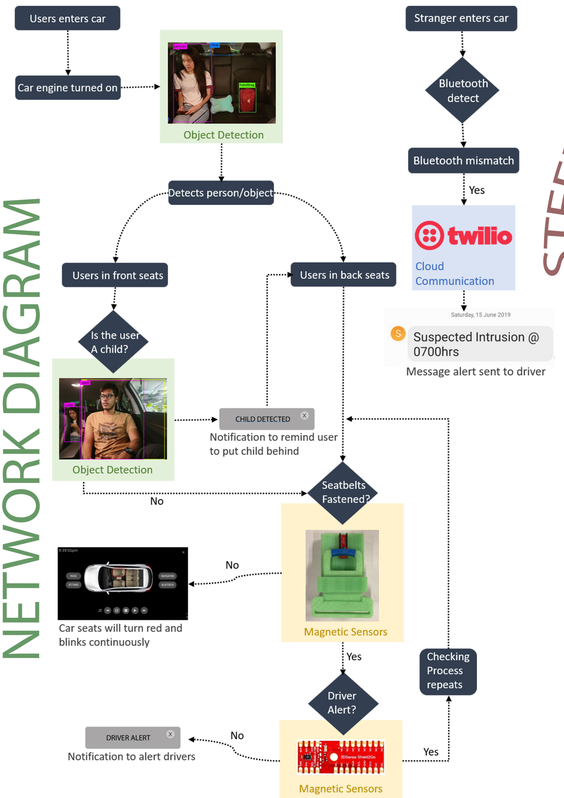


LG-WebOS

LG-WebOS and Enact.js enabled us to communicate everything into a user interface that users can interact with. Additionally, our object detection also employs WebOs calls YOLO on its system to run via a JS Service, detecting whether it is an object or person, so that children can still be detected irrelevant of their weight, making sure they are wearing seatbelts and not sitting in front seats.

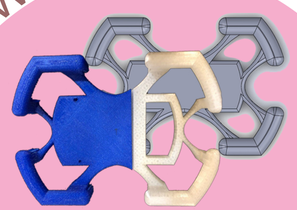


NETWORK DIAGRAM



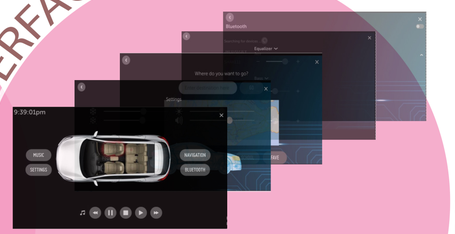
MAIN FEATURES

STEERING WHEEL



- Futuristic wheel to emphasize our visionary system
- On-wheel screen, easier reach, eyes can still be kept on road and is a non-intrusive display
- Screen is detached from the wheel so that it will not spin together

INTERFACE



- Simple and clean design, easy to navigate
- Non-distracting (Faint signals – slow blinking for notification)
- Notifies users when:
  a. Child detected in front seat
  b. Person detected and seatbelt not used
  c. Driver is not alert

SEAT-BELTS

- Follows similar design as present seat-belts in cars
- Familiar and intuitive to use

Warning Drivers

Magnetic sensors senses if the user is holding on to the steering wheel. Should the system detects no hands on wheel for more than 30s, a warning wil be triggered on the screen.

WIFI Unlock

RPI scans for WIFI address nearby. Device auto-latch to RPI's WIFI network.
If registered users' MAC address is detected, car will auto unlock. Similarly, car will auto lock if user's WIFI is no longer detected.

Proper Seatbelt usage

Magnetic sensors senses if user buckled up their seatbelts. Object detection is used to differentiate objects and humans to make childrens are also detected regardless of their weight.

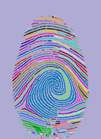
Bluetooth Intrusion Detection & Message Notification

Should user's bluetooth not be detected when someone enters the car, a warning SMS will be sent to registered users' phone number to alert user that a suspected break-in is detected.

Detecting Children

Object detection is also used to detect childrens sitting in front. Should a child be detected, a warning will be triggered on the screen.

Personalisation for safety



With object detection, users can opt for face unlock and personal preferences such as aircon temperature, music volume, etc. can be set and auto-adjusted for each user which would be beneficial for shared cars with several drivers.

REFERENCES

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