

Driver State Monitor

77896 – Tiago Fernandes

77907 – João Leite

77984 – Luis Pereira

78039 - João Tomásio

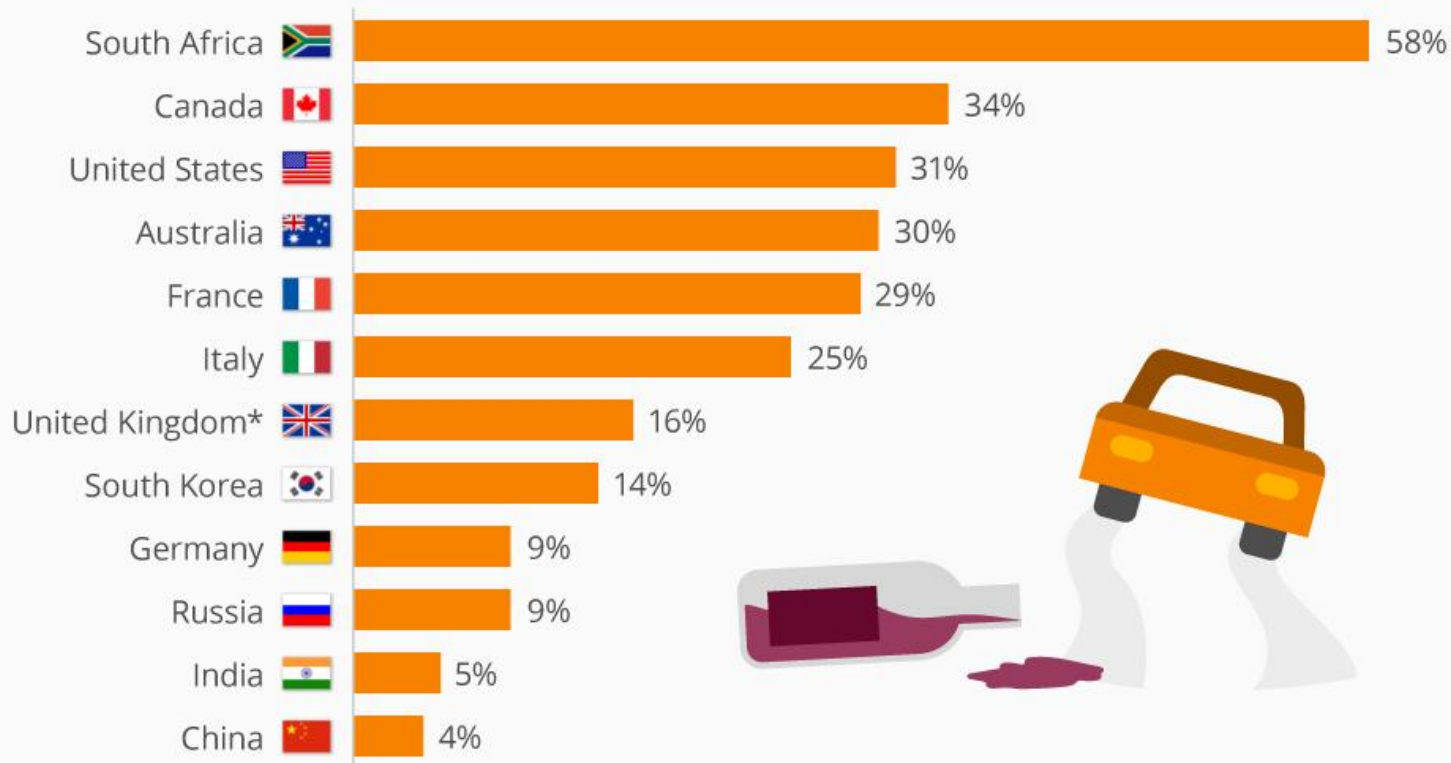
Driver State Monitor

Project goals

- *The project aims to solve the problem of irresponsabilities at the driving wheel.*
- *People drink and drive...*
- *People fall asleep at the wheel...*
- *By proposing a system that alerts the driver and the others around, we think the roads will be safer.*

The World's Worst Countries For Drunk Driving

Percentage of road accident deaths involving alcohol in 2015 (selected countries)

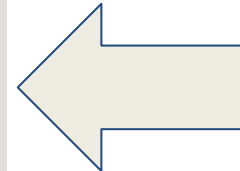
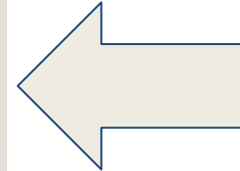




Source: FBI, Centers for Disease Control & Prevention
*Based on 1996-2000

Source: NHTSA
*Based on 1996-2000

Source: 2006 U.S. Census Bureau
*Based on 1996-2000



THE CONSEQUENCES OF DROWSY DRIVING

SLEEPINESS IS THE
PRIMARY CAUSE IN
100,000
POLICE-REPORTED
CRASHES EACH YEAR



WHICH RESULTED IN
71,000
INJURIES.

4%
AT LEAST
OF ALL FATAL ACCIDENTS
ARE CAUSED BY
SLEEPINESS



Driver State Monitor

Project Description

In our solution, we'll have the following sensors in the car:

- Alcoholometer (Breathalyzer)
- Attention factor (Mindwave)
- Driving Patterns monitor (steering wheel)
- Heart-rate sensor (Fit-bit)

Driver State Monitor

Project Description

- In our solution, we'll ensure that all the clocks of all the participants will be synchronized in order to guarantee the fresh information

Driver State Monitor

Project Description

How the car detects the driver is not ok:

- Before starting the engine, the driver needs to pass the breathalyzer test. If it succeeds, the engine starts.
- As he's driving, the rest of the sensors measure the attention and driving pattern as well as the breathalyzer again.

Driver State Monitor

Project Description

When the car detects the driver is not ok:

- Warning light appears in the driver's dash to signal the car will stop in 1 minute;
- Warning light will appear in nearby cars to signal danger around;
- A message is sent to RSU with sensors raw data;
- RSU resends it to Center-its so the data can be analysed for legal purposes.

Driver State Monitor

Project DEMO

First scenario:

- The user is drunk and wants to start the car.
- He needs to pass the breathalyzer test.
- The car won't start because the user is drunk.

Driver State Monitor

Project DEMO

First scenario steps:

1. User uses the Alcoholometer
2. Raspberry reads the Value retrieved from Alcoholometer
3. The value is over 0.2
4. With this value the car will not start

Driver State Monitor

Project DEMO

Second scenario:

- The user is drunk and wants to start the car.
- He needs to pass the breathalyzer test.
- He asks a sober friend to start the car for him.
- The car will start, but the Attention factor and driving patterns monitor will be triggered.
- The car will alert the driver, the drivers around and message the RSU with raw sensor data.
- The user will stop the car voluntarily.

Driver State Monitor

Project DEMO

Second scenario steps:

1. User uses the Alcoholometer
2. Raspberry reads the Value retrieved from Alcoholometer
3. The value is over 0.2
4. With this value the car will not start
5. Uses a friend to do the test
6. Raspberry reads again the Value retrieved from Alcoholometer
7. The value is under 0.2
8. The car starts
9. While driving MindWave is always active
10. Raspberry reads the Value retrieved from MindWave
11. Average of 20 samples : value of each sample from 0-100
12. The value of the average is over 20, all good
13. The value of the average is under 20, the driver will receive a message to stop the car

Driver State Monitor

Project DEMO

Second scenario steps:

14. The driver stop the car voluntarily
15. While driving, Steering checker is always active
16. Raspberry reads the Value retrieved from Steering
17. Values of 100 samples:
We check if the driver reaches limit values on the wheel many times in 10s
18. The driver will receive a message to stop the car
19. The driver stop the car voluntarily

Driver State Monitor

Project DEMO

Third scenario:

- The user is tired and wants to start the car.
- He needs to pass the breathalyzer test.
- The car will start.
- The Attention factor will be triggered.
- The car will alert the driver, the drivers around and message the RSU with raw sensor data.
- The user will stop the car voluntarily.

Driver State Monitor

Project DEMO

Third scenario steps:

1. User uses the Alcoholometer
2. Raspberry reads the Value retrieved from Alcoholometer
3. The value is under 0.2
4. With this value the car will start
5. Raspberry reads the values retrieved from MindWave
6. Average of last 20 samples: value of each sample from 0-100
7. The value of the average is under 20
8. Triggered an action to led other cars know he is in Danger Mode
9. The driver will receive a message to stop the car
10. Stops the car voluntarily

Driver State Monitor

Project DEMO

Forth scenario:

- The user is tired or drunk.
- The user will be obligated to stop the car.

Driver State Monitor

Project DEMO

Forth scenario steps:

1. User uses the Alcoholometer
2. Raspberry reads the Value retrieved from Alcoholometer
3. The value is over 0.2
4. With this value the car will not start
5. Uses a friend to do the test
6. Raspberry reads again the Value retrieved from Alcoholometer
7. The value is under 0.2
8. The car starts
9. MindWave and Steering will retrieve data to raspberry
10. Raspberry reads the Value retrieved from MindWave
11. The value of the average is under 20, the driver will receive a message to stop the car(1min)
12. At the same time, Raspberry reads the values retrieved from Steering
13. The driver will receive a message to stop the car(1min)
14. After one minute , if the continues in running mode it will stop automatically