
Smart Transportation

*(Monitoring speed and Altering Speed Limit
using OBD sensor)*

Team : Zephyr

Member:

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Objectives

- Read value from OBD II Scanner.
- If speed of vehicle cross a certain limit, trigger camera to capture the street view.
- Send an alert to the subscribed authority via MQTT broker.
- Publish New Speed Limit
- Visualisation of
 - 1.Distance Travelled
 2. Vehicle Speed Profile

Motivation/Applications

- ❖ Monitoring the status of the car == Driver + Passenger Safety
- ❖ Parent can dynamically change the speed limit of their children
- ❖ As a Black-box for logging events. Useful for insurance companies.

Hardware For The Project

1. Raspberry Pi 3
2. OBD II Sensor
3. Camera kit
4. Laptop to power up the Raspberry Pi 3

And of Course (AoC)

A CAR!!

OBD Sensor

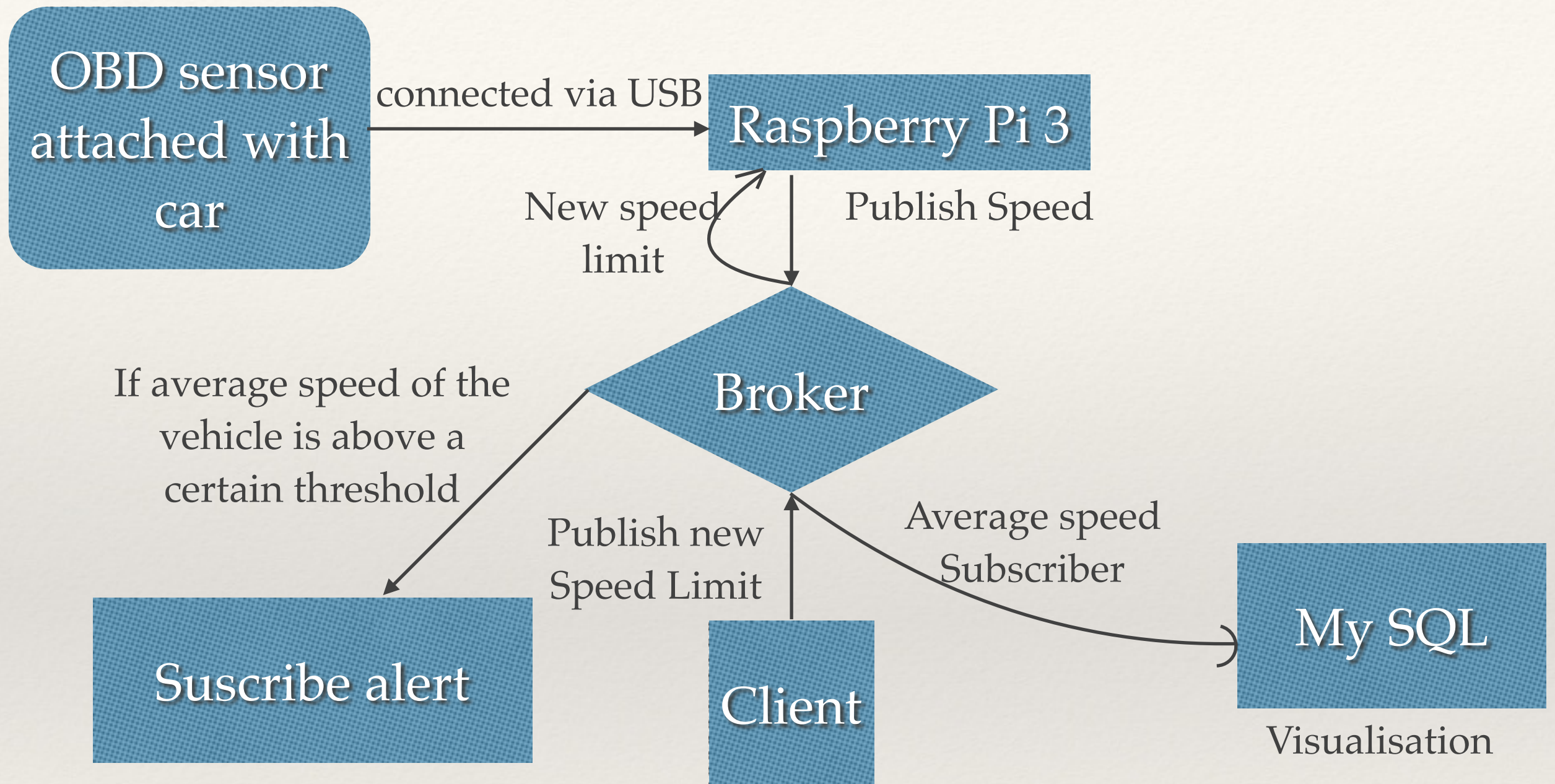
- **On-board diagnostics (OBD)**, refers to vehicle's self-diagnostic and reporting capability.
- A OBD systems give the vehicle owner or repair technician access to the status of the various vehicle subsystems.
- OBD implementations use a standardised digital communications port to provide real-time data which allow one to rapidly identify and remedy malfunctions within the vehicle.

Some of the parameters that can be extracted from OBD sensor are:

- 1.RPM
- 2.Vehicle Speed
- 3.Odometer reading
4. Throttle Position
5. O2 sensor



Architecture



@PI

Publish Speed

```
pi@raspberrypi: ~/pi/CalculateAvgSpeed
pi@raspberrypi: ~/pi/CalculateAvgSpeed
pi@raspberrypi: ~/pi/CalculateAvgSpeed $ ls
147701706-tcpiothummerschoolmqttbrokercloudappnet1883  broker.properties
292028052-tcpiothummerschoolmqttbrokercloudappnet1883  pom.xml
563270611-tcpiothummerschoolmqttbrokercloudappnet1883  src
bin                                                       target
pi@raspberrypi:~/pi/CalculateAvgSpeed $ cd
pi@raspberrypi:~ $ cd pi/
pi@raspberrypi:~/pi $ ls
CalculateAvgSpeed  PublishSpeed  SubscribeSpeedChange
Instructions.txt  speed.csv
pi@raspberrypi:~/pi $ nano Instructions.txt
pi@raspberrypi:~/pi $ cd CalculateAvgSpeed/
pi@raspberrypi:~/pi/CalculateAvgSpeed $ java -cp target/CalculateAvgTemp-0.0.1-SNAPSHOT-jar-with-dependencies.jar org.controller.SubscribeTemperature
subscription topic : zephyr/speed
tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 : {"e":[{"u":"cel","v":4.8}, {"u":"cel","v":90.4}, {"u":"cel","v":25.4}, {"u":"cel","v":80.0}]}
Speed limit is:100
Connecting to broker: tcp://iotsummerschoolmqttbroker.cloudapp.net:1883
Connected
Publishing topic : zephyr/speed/average
Publishing topic : zephyr/speed/averageTo : tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 : publishing message: 50.15
tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 : {"e":[{"u":"cel","v":4.8}, {"u":"cel","v":90.4}, {"u":"cel","v":25.4}, {"u":"cel","v":80.0}]}
Speed limit is:20
Connecting to broker: tcp://iotsummerschoolmqttbroker.cloudapp.net:1883
Connected
Publishing topic : zephyr/speed/alert
Publishing topic : zephyr/speed/alertTo : tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 : publishing message: 50.15
Connecting to broker: tcp://iotsummerschoolmqttbroker.cloudapp.net:1883
Connected
Publishing topic : zephyr/speed/average
Publishing topic : zephyr/speed/averageTo : tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 : publishing message: 50.15
```

@CLIENT

Publish New speed limit

```
partha@ubuntu: ~/Documents/speed/Code/PublishChangeSpeed
partha@ubuntu: ~/Documents/speed/Code/SubscribeAv... x partha@ubuntu: ~/Documents/speed/Code/SubscribeAl... x partha@ubuntu: ~/Documents/speed/Code/PublishChan... x
partha@ubuntu:~/Documents/speed/Code/SubscribeAlert$ cd ..
partha@ubuntu:~/Documents/speed/Code$ ls
pi PublishChangeSpeed speed.csv SubscribeAlert SubscribeAvgSpeed
partha@ubuntu:~/Documents/speed/Code$ cd PublishChangeSpeed/
partha@ubuntu:~/Documents/speed/Code/PublishChangeSpeed$ ls
bin pom.xml PublishAvgTemperature.java~ src
broker.properties pom.xml~ PublishChangedSpeed.java~ target
partha@ubuntu:~/Documents/speed/Code/PublishChangeSpeed$ java -cp target/Publish
Temperature-0.0.1-SNAPSHOT-jar-with-dependencies.jar org.controller.PublishTempe
rature
Connecting to broker: tcp://iotsummerschoolmqttbroker.cloudapp.net:1883
Connected
Enter the new speed limit:
20
Publishing topic : zepnyr/speedChange To : tcp://iotsummerschoolmqttbroker.cloud
app.net:1883 : Publishing message:{"e":[{"u":"m","v":20}]}
partha@ubuntu:~/Documents/speed/Code/PublishChangeSpeed$
```


ALERTS

```
partha@ubuntu: ~/Documents/speed/Code/SubscribeAlert
[INFO] Building jar: /home/partha/Documents/speed/Code/pi/PublishSpeed/target/Pu
blishTemperature-0.0.1-SNAPSHOT.jar
[INFO]
[INFO] --- maven-assembly-plugin:2.2-beta-5:single (default) @ PublishTemperatur
e ---
[INFO] META-INF/ already added, skipping
[INFO] META-INF/MANIFEST.MF already added, skipping
[INFO] Building jar: /home/partha/Documents/speed/Code/pi/PublishSpeed/target/Pu
blishTemperature-0.0.1-SNAPSHOT-jar-with-dependencies.jar
[INFO] META-INF/ already added, skipping
[INFO] META-INF/MANIFEST.MF already added, skipping
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 3.606 s
[INFO] Finished at: 2016-06-24T19:33:22-07:00
[INFO] Final Memory: 19M/207M
[INFO] -----
partha@ubuntu:~/Documents/speed/Code/pi/PublishSpeed$ cd ..
partha@ubuntu:~/Documents/speed/Code/pi$ cd ..
partha@ubuntu:~/Documents/speed/Code$ ls
pi PublishChangeSpeed speed.csv SubscribeAlert SubscribeAvgSpeed
partha@ubuntu:~/Documents/speed/Code$ cd SubscribeA
bash: cd: SubscribeA: No such file or directory
partha@ubuntu:~/Documents/speed/Code$ cd SubscribeAlert/
partha@ubuntu:~/Documents/speed/Code/SubscribeAlert$ ls
-1398459884-tcplotsummerschoolmqttbrokercloudappnet1883 pom.xml~
bin src
broker.properties SubscribeAlert.java~
pom.xml target
partha@ubuntu:~/Documents/speed/Code/SubscribeAlert$ java -cp target/SubscribeAv
gTemp-0.0.1-SNAPSHOT-jar-with-dependencies.jar org.controller.SubscribeAvgTemp
Subscription topic : zephyr/speed/alert
Speed limit exceeded!! at timestamp:
1466823503058
tcp://iotsummerschoolmqttbroker.cloudapp.net:1883 AverageSpeed : {"e":[{"u":"m",
"v":50.15}]}
Average speed:50.15
█
```

Speed Limit Modified@PI

```
pi@raspberrypi: ~/pi/SubscribeSpeedChange
pi@raspberrypi: ~/pi/CalculateAvgSpeed x pi@raspberrypi: ~/pi/PublishSpeed x pi@raspberrypi: ~/pi/SubscribeSpeedChang x pi@raspberrypi: ~/pi
pi@raspberrypi: ~/pi/SubscribeSpeedChange 162x41
peace@peace-X200MA:~$ sudo ssh pi@10.16.241.222
[sudo] password for peace:
Sorry, try again.
[sudo] password for peace:
pi@10.16.241.222's password:

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Jun 24 13:53:56 2016 from 10.16.240.218
pi@raspberrypi:~ $ cd pi/
pi@raspberrypi:~/pi $ nano Instructions.txt
pi@raspberrypi:~/pi $ cd SubscribeSpeedChange/
pi@raspberrypi:~/pi/SubscribeSpeedChange $ java -cp target/SubscribeSpeedChange-0.0.1-SNAPSHOT-jar-with-dependencies.jar org.controller.SubscribeSpeedChange
Subscription topic : zephyr/speedChange
tcp://iotsummerschoolmqbroker.cloudapp.net:1883 : {"e":[{"u":"m","v":20}]}
New speed limit:20
```