Final Report

18ES790-CAPSTONE DESIGN PROJECT

Submitted by

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ABSTRACT:

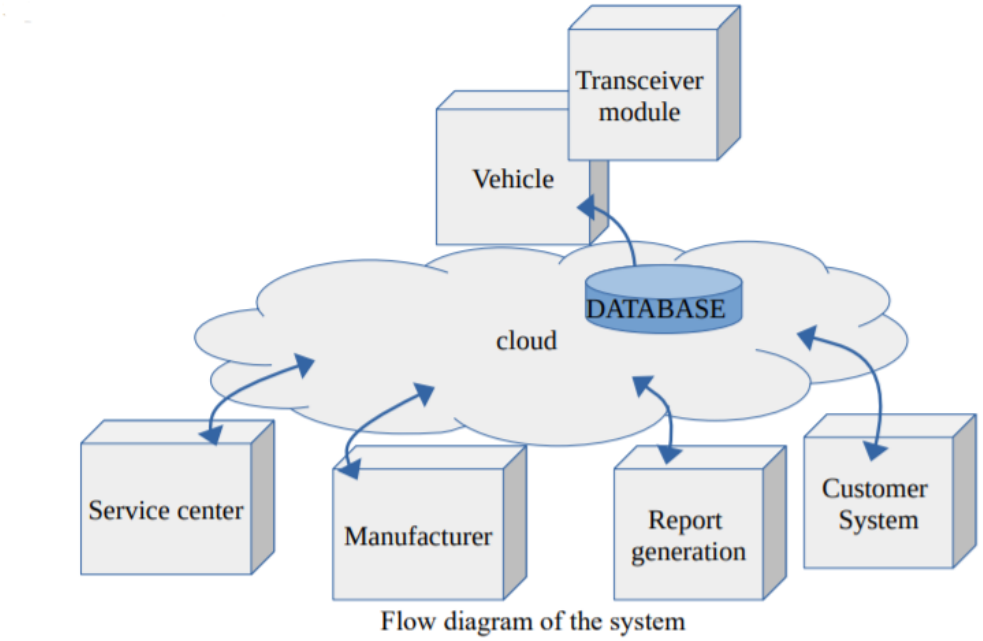
We all know that vehicles have many sensors like, sensors for Anti-locking braking system, oil level indicator, Crankshaft sensors, Fuel indicator sensors etc. In many vehicles, it is very difficult for the service labourers to find a problem when a vehicle goes for service every time. Since everything is now automated, this project is all about developing a Reporting Device which reports all information from the sensors and stores for a period of time, let us say for every service. That is, if a person buys a new vehicle and rides for a period of time, afterwards the person decides to service their vehicle. Now, during the usage period of the vehicle, the device monitors all the sensors in each functional unit. If any problem/defect was found in that period, it stores the problem/defect from the sensors as information, so that the labourers are easily able to find and rectify the corresponding defect in the corresponding unit. Once the service is done, the device can be reset, that is all the information stored in the past will be erased and set to default.

Introduction:

The future of IoT is virtually unlimited due to advances in technology and consumers desire to integrate devices such as smart phones with household machines. There are about 21.5 billion interconnected devices in the world. Their number is set to explode in the following years as internet consumption rises and new gadgets and machinery hit the market. Many automotive manufactures are now moving towards an IOT platform for manufacturing and for service purposes. The main advantages of using IoT in cars are: Optimized maintenance and logistics. Ability to monitor driver performance and vehicle status for better safety and fuel consumption. Our idea is to monitor vehicle status (fuel, efficiency/Km, battery, oil levels etc..,.) to the customer as well as the manufacturer.

Project selection:

The main aim of every car manufacturer is to increase the life of the car and it's crucial to maintain the car in a good condition to achieve it. Many problems in vehicles arise due to improper maintenance. Many lose track of their service status and it's a tiring process to keep in touch with every customer for a large automotive industry. If we maintain a system that automatically updates the vehicle's conditions periodically to a specified server, and the system will generate a report that will be forwarded to the customer and the service team, a lot of manual work will be removed. We as a team provide an IOT solution for vehicle maintenance and report generation systems.



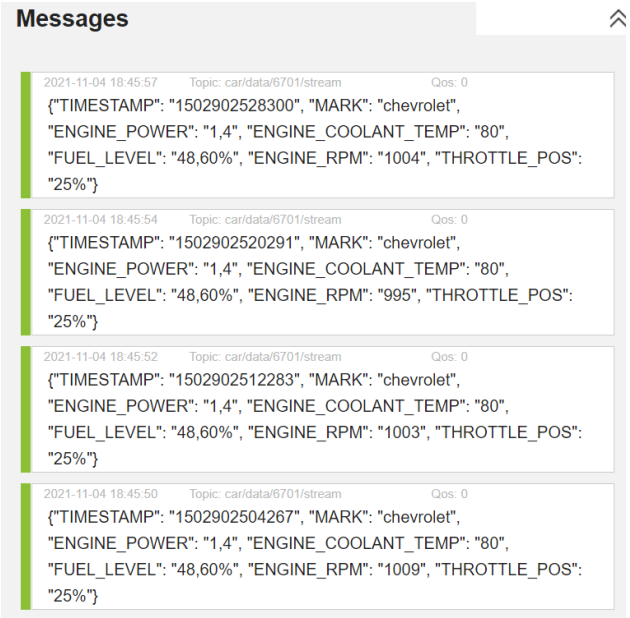
Flow diagram of the system

Functional decomposition:

- Our system collects data from the sensors available in the car itself and reports it to a transceiver module(ESP8266) which is connected to a database in the cloud.
- When a new data is updated/inserted into the table an event is triggered. This event updates the information in the dashboard, which will be displayed to the customer and manufacturer.
- Then a weekly/monthly/yearly report generation event is triggered, which will mail the report to the specified recipient.

Data collection:

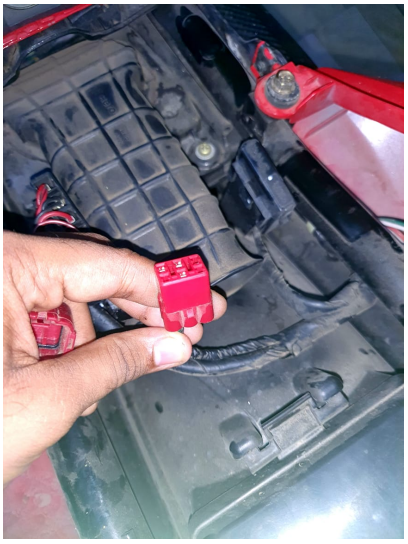
- The data is collected from the sensor stream of the car. This data is redirected to the ESP8266 module.
- The ESP8266 is connected to the server that is allotted to the car. The ESP8266, when all data is collected, converts it into a JSON file. Then the server sends a post request to the server.
- The server receives the post request, authenticates the request, parses the JSON object and updates to the database.



OBD - II Port

- The sensors in the vehicle are connected to a port named OBD - II. As per recent mandate, every vehicle which is released under BS-6 must contain a OBD -II port.
- This port is used to access the sensor data of vehicles with WIFI.

Obd-II connector

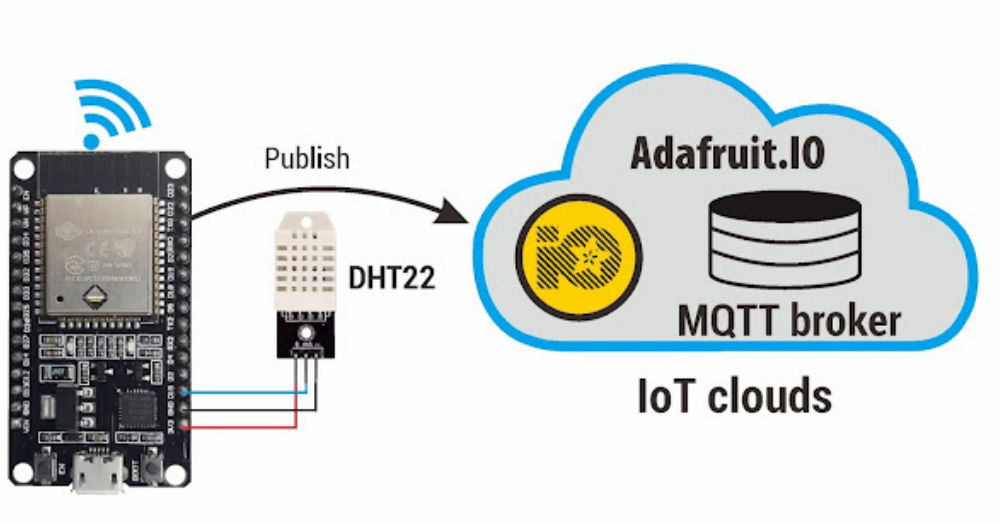


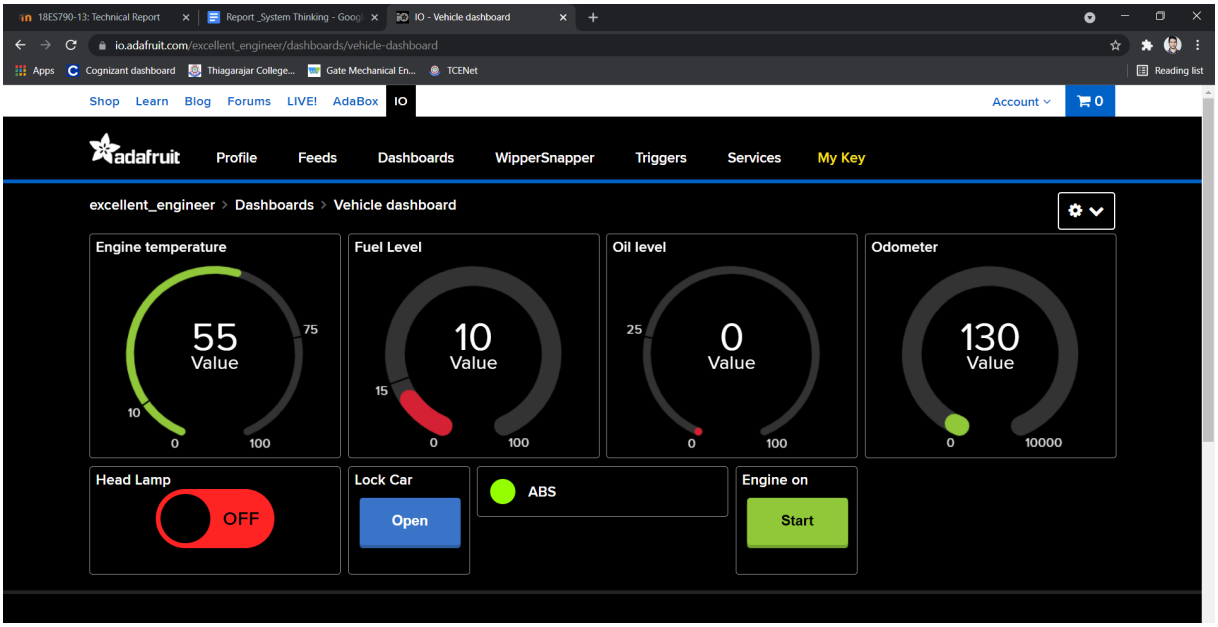
Obd-II port from one of the team mate's vehicle

Obd-II wifi module

Dashboard:

- The dashboard is designed in Adafruit.io, which is an open source MQTT broker platform.
- The data that is collected using Nodemcu is transmitted to the Adafruit broker using MQTT protocol

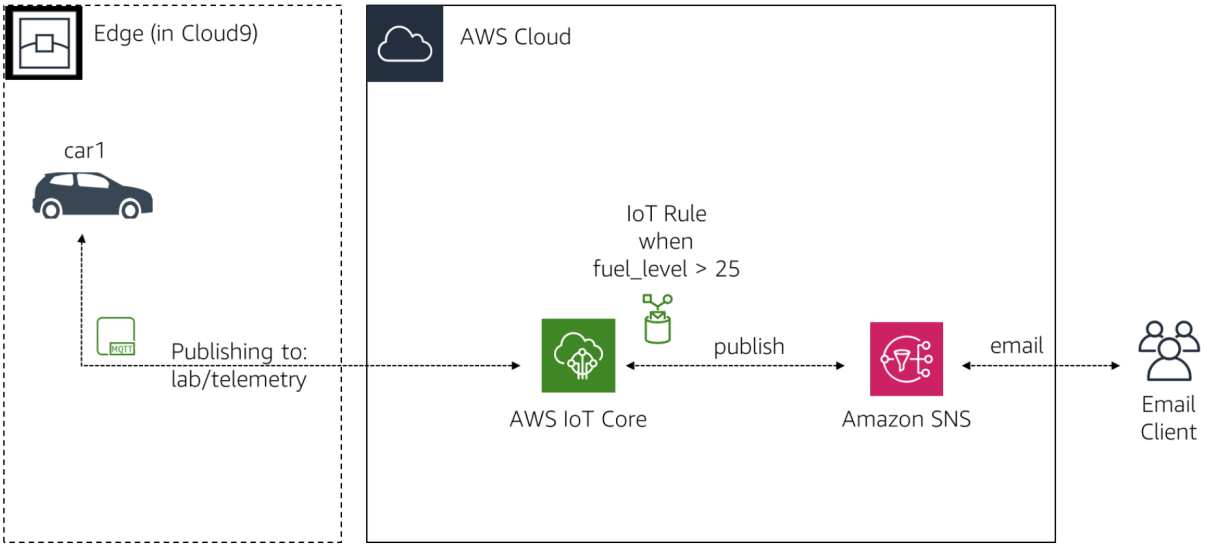




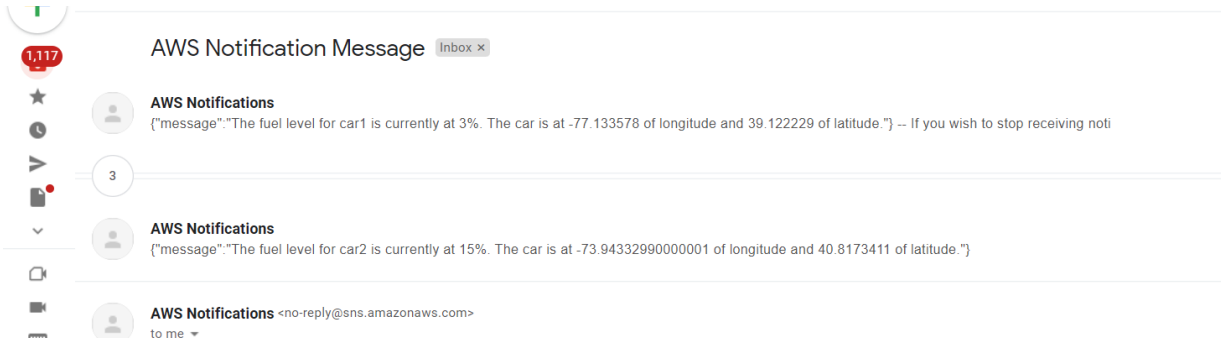
- The above image is the dashboard designed by us in adafruit.io.

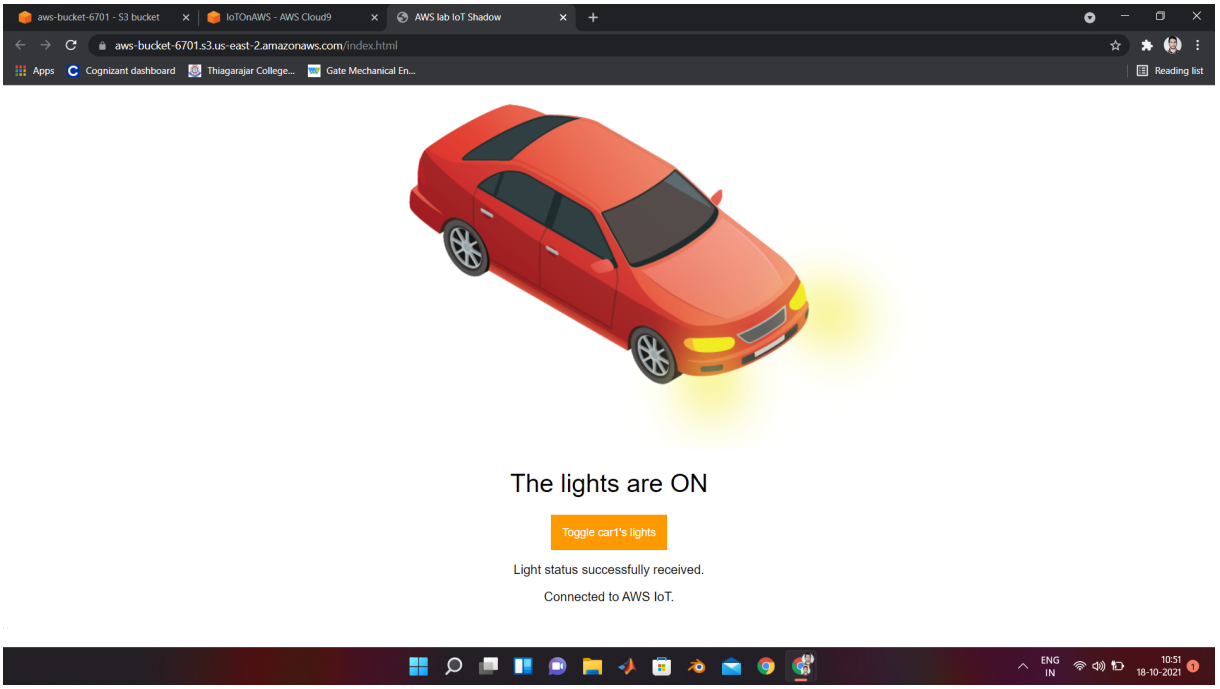
Mqtt using Amazon web services(AWS)

- We have added notification to the user by email using amazon web services. AWS provides IOT services which work on MQTT protocol.The AWS IOT is not free to use.
- We used IOT rules, which is used to send notifications to the customer via mail using Amazon simple notification service(SNS)
- AWS IoT rules send data from your devices to other AWS services. They listen for specific MQTT messages, format the data in the message payloads, and send the result to other AWS services.

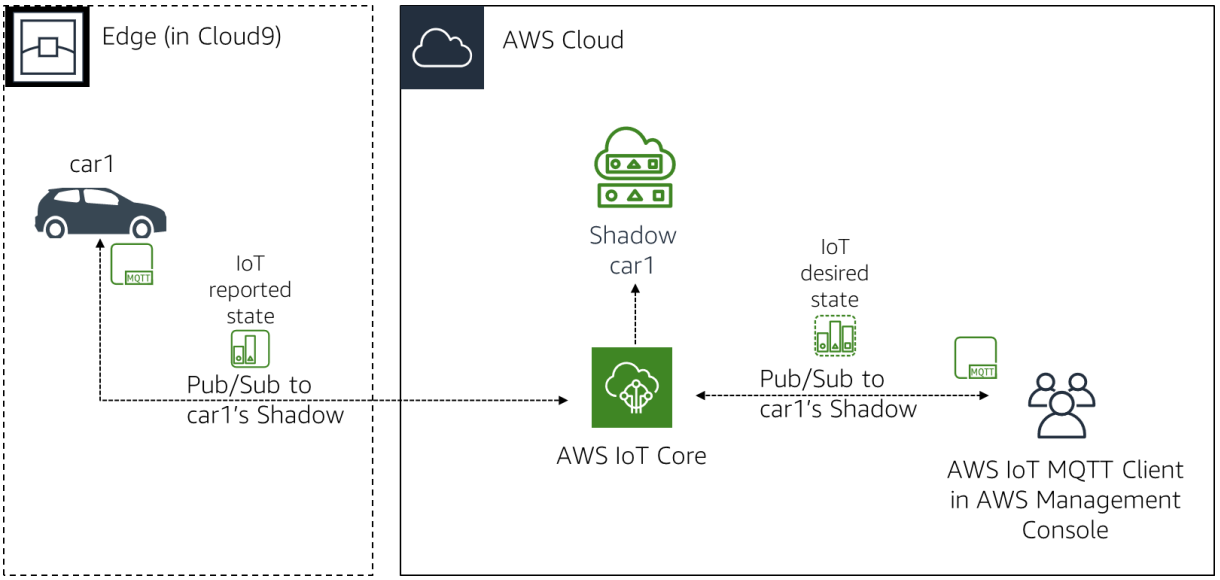


- Amazon Simple Notification Service (Amazon SNS) is a fully managed messaging service for both application-to-application (A2A) and application-to-person (A2P) communication.





- The above image shows the server hosted in amazon web services using Amazon simple storage service(S3) which works on NODE JS.



Conclusion

Nowadays,The demand for vehicles is increasing continuously and the cost of the vehicles are higher. If every vehicle has automated reporting that can report the current status of the vehicle, it will be easier for the manufacturer to service the vehicle and it will be beneficial for the customer to monitor and maintain the vehicle's condition easily. This system helps in achieving the above mentioned goals.