

## Project 3

### Implementation of IoT in Vehicular Networks

#### Problem statement:

Design a reliable, secure, hack-proof, and scalable IoT solution which integrates the sensors given below with the cloud services and sends the users/clients the analysis of the real-time data with custom settings for emergency alarms and notifications.

Below I have tried to present a sample flow of the project. Feel free to make any changes and improvisations. You do not need to notify us if you're making any change. I have specified "OPTIONAL" tag wherever there is a possibility of making a change from the basic flow:



Accelerometer sensor

<https://robu.in/product/adxl345-digital-angle-acceleration-sensor-module/>

via wire



Temperature Sensor(for engine temperature)

<https://robu.in/product/ds18b20-temperature-sensor-module-temperature-measurement-module-arduino/>

via wire

Hint : You can find the codes to interface these sensors with Arduino/NodeMCU/Rpi simply on internet

#### Gateway:

- 1) Running Backend server
- 2) Using API's to connect with cloud services



Or



(OPTIONAL)  
mobile phone

#### Helpful resources:

- <https://medium.com/@rovai> (His projects will give you lot of implementation ideas and details. Search for relevant projects)
- <https://www.instructables.com/Controlling-Arduino-with-python-based-web-API-No-p/>
- <https://www.electronicwings.com/azure/sending-dht11-sensor-data-to-iot-hub-using-nodemcu>

exchange of packets and data

Keywords:

exchange of packets and data

Keywords:

"sending sensor data to cloud with NodeMCU"

"sending sensor data to azure with Raspberry pi"

"backend flask server arduino"

**Strong advise:** Explore existing codes available on Github

Cloud Service:

- 1) Running some analytics and data fusion
- 2) Making smart decisions and drawing conclusions



OR



OR any other cloud service

<https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-monitoring-notifications-with-azure-logic-apps>

Almost all information about such implementations are already available on azure documentation:

<https://docs.microsoft.com/en-us/azure/iot-hub/>

<https://docs.microsoft.com/en-us/azure/iot-fundamentals/>



Car Dashboard (Small LCD Display for Speed and Engine Temperature) (with warning beyond 50 degree C)



(OPTIONAL)  
Car User  
real-time data  
with proper  
UI/UX



Accessing through  
Laptop with some  
elements of dashboard  
like experience

Things you can learn in this project:

("OPTIONAL" tag indicates that those who are interested can implement it that way. No extra brownie points for doing a complicated implementation(50% marks) but you will have much more content to talk about in your viva (50% marks))

- 1) Discover characteristics to consider before building an IoT solution
- 2) Integrating sensors with Microcontroller or mobile app
- 3) Learning about various services which cloud services have to offer

- 4) Making a backend server on your microcontroller
- 5) Learn about communication protocols like MQTT and websockets
- 6) Build a full-stack website for your IoT dashboard
- 7) (OPTIONAL) Understand and implement AES and RSA message encryption, digital signatures, and the TLS/SSL/HTTPS protocol to secure your devices and users connected to your IoT project.
- 8) Gain hands on experience with building cloud solutions and how to integrate them with your IoT project
- 9) (OPTIONAL) Possibly you can implement ML/AI analytics in the cloud and make the machine learn to make smart decisions
- 10) (OPTIONAL) Android app development to send notifications and control actuators

A message for the students:

Dear Students,

This project is having actual importance and will make you learn a lot of things if you show enthusiasm. It will even be a nice addition to your CV. But the only thing is that you have to understand in deep of what you are implementing. The project consists of many simple simple steps which when we are looking at once appears to be complicated. So my strong advice will be to just take one step at a time - beginning with brainstorming about how you will implement this project. Help will be provided based on how much effort you are putting in. You can submit your queries on a channel which we will provide later.

Best Of Luck.