Project Report – Group 12

EN2560 - Internet of Things Design and Competition

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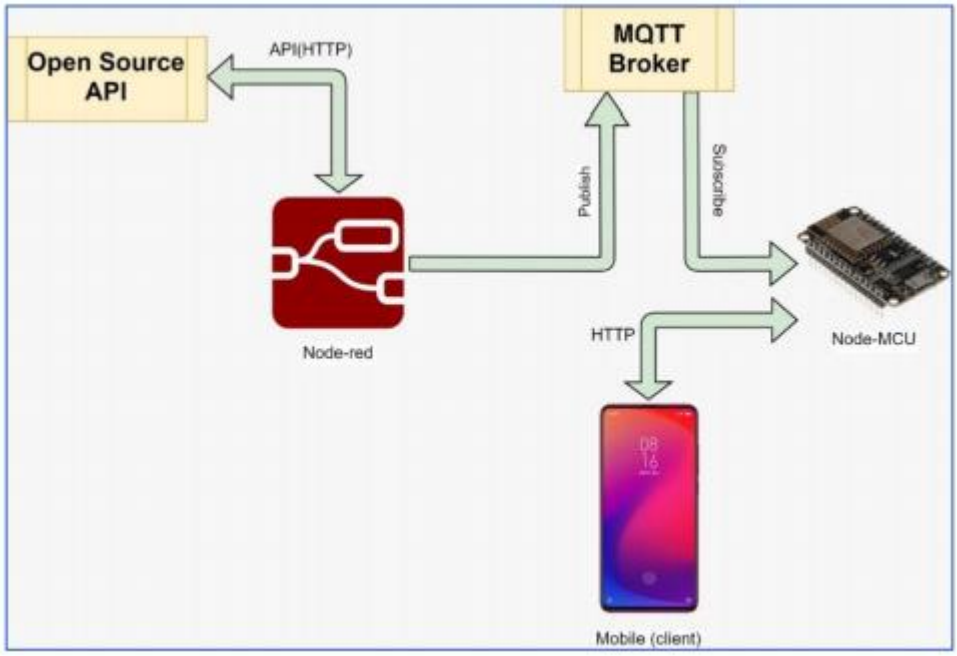
Problem intended to be solved

The purpose of this project is to implement a platform to find news of any country of user sorted categories, weather status of user interested areas and notified about them from same platform.
So, we implemented a platform that could search news of user interested categories and weather status of any locations and get notified about them.
In this project, key technologies that we used are Web development, Node-red, Node-MCU, IDM cloud service and MQTT broker. Main data sources that we used are NewsAPI and Openweather API. We developed a webpage that can search news of user interested categories and show the results. As well we added a feature that can take the temperature of a city that entered by the user and send a message to a user given mobile number if the temperature is higher than a given value.
In this report, we describe the way that we have done the project using above technologies and how can be this project is useful for the people who are willing to search news and weather in a same platform using IOT based technologies.

System overview and Operation



We used NewsAPI and Openweather API to take the relevant news and the temperature of a given city. In Node-red we implemented a flow that can take user given news categories or temperature limit of a given city from the webpage through a **MQTT in** pallet. In that flow we developed a system that can take relevant information from above open-source APIs. We used IDM cloud service to run the flow even without the command prompt in use. Settings of there can be changed as can be edited by visitors or just a view only mode with our preference. Node-red is sending a string which is consist of all the information through a **MQTT out** node to the Node-MCU.

In Node-MCU we developed a code that can Initialize the webserver, take the inputs given by a person from the web server and send them to Node-red by publishing to certain MQTT topic. Another MQTT topic was used to retrieve data from Node-red flow and send them to the web server.

Web page that hosted by webserver created by Node MCU is used to take inputs as user preferred categories of news or the temperature limit of a given city. As well it used to show the news or temperature in a user-friendly view. We used software development languages like CSS, HTML and JAVASCRIPT to fulfill this task.

Twilio is used to send a message to the user if the temperature is higher than the given limit by the user.

Hardware, software flow, protocols, online resources used

Node-red

Node-RED provides a browser-based flow editor that makes it easy to wire together flows using the wide range of nodes in the palette. Flows can be then deployed to the runtime in a single-click. JavaScript functions can be created within the editor using a rich text editor. A built-in library allows you to save useful functions, templates or flows for re-use. Node-RED is built on Node.js, taking full advantage of its event-driven, non-blocking model. This makes it ideal to run at the edge of the network on low-cost hardware such as the Raspberry Pi as well as in the cloud.

Node red flow - https://iotproject.mybluemix.net/red/#flow/f7641c4.e68b8e

MQTT broker

MQTT is a lightweight, publish-subscribe network protocol that transports messages between devices. The protocol usually runs over TCP/IP; however, any network protocol that provides ordered, lossless, bi-directional connections can support MQTT. It is designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is limited.

Node-MCU

Node-MCU is an open source firmware for which open source prototyping board designs are available. The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica-Xtensa LX106 core, widely used in IoT applications.

WebSocket

This communication protocol was used to establish full-duplex communication between web server created by Node-MCU and web page over a single TCP connection.

Open source API

- Openweather API - https://openweathermap.org/api

This API provides information on weather of any place in the world. We used this API to build weather dashboard shown in below images.

- News API - https://newsapi.org/

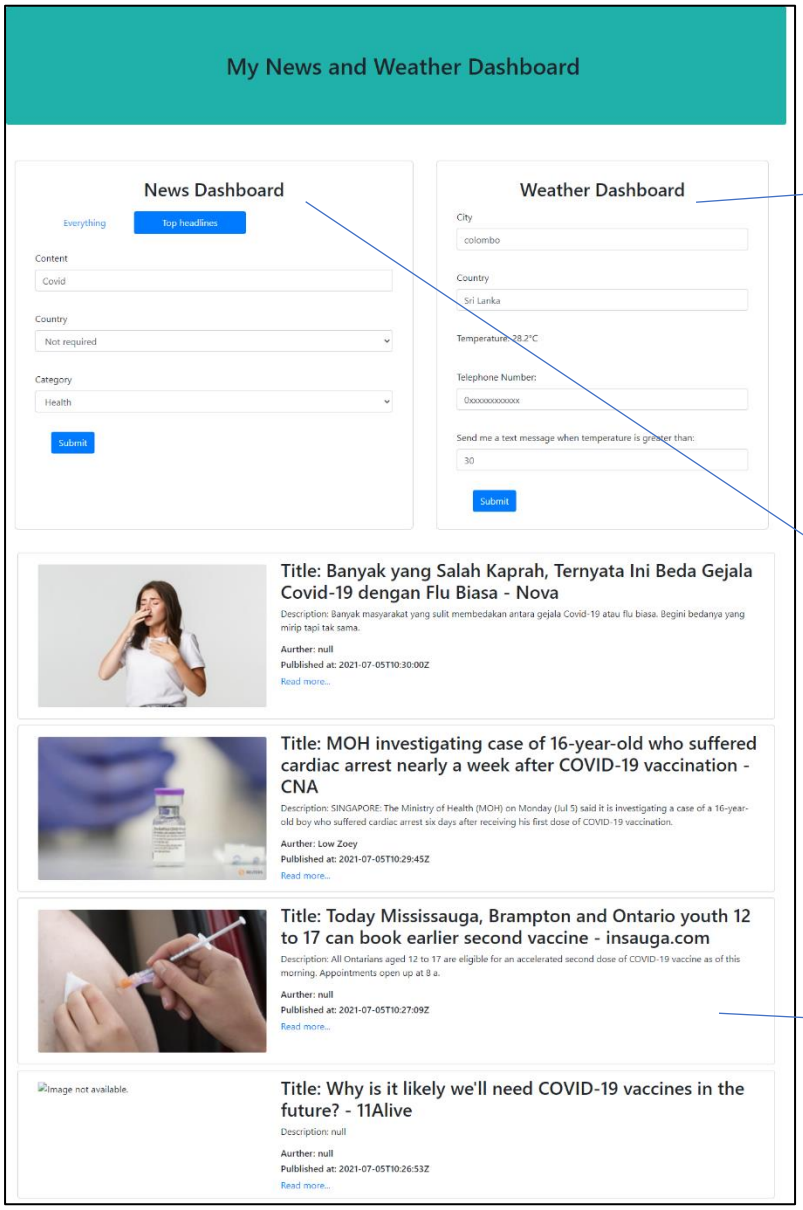
News API is a simple HTTP REST API for searching and retrieving live articles from all over the web. Ex: https://newsapi.org/v2/everything?q=tesla&from=2021-03-22&sortBy=publishedAt&apiKey=xxxxxxxxxxxxxxxxxxxxxxxx

By setting HTTP request like above user may receive news about Tesla that was published after 2021-03-22. Customizing the URL according to user preference was done in Node-red

OUTCOMES

- User can enter the categories that he wants to get the news or the city and temperature limit.
- User can receive the relevant news by the same webpage.
- Any device that has ability to connect to the webserver, can get the link of the webpage can take the information that they want. If we did this just only by the node-red, only a local host that has the node-red flow can take those.
- As the flow is connected through a cloud service, anyone who got the permission by the developer can develop the flow and take the project to a better position.
- It is easy to use and get the news through this project as it filters the news what you want. If you just google them, there can be some unnecessary information also there.

As a group we got more knowledge about many key technologies and how to work with them. Following are some screenshot of the user interface of our project.



Weather Dashboard – User can get temperature of any place in the world. Mobile alerts can also be sent

User input section for news – First user has to select one of two tabs above called Everything or Top headlines. Then user has to enter some information about desired news such as language, keyword, country etc.

Search results sorted according to most popular source.

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