

Team 2

Abhishek Hariharan Iyer

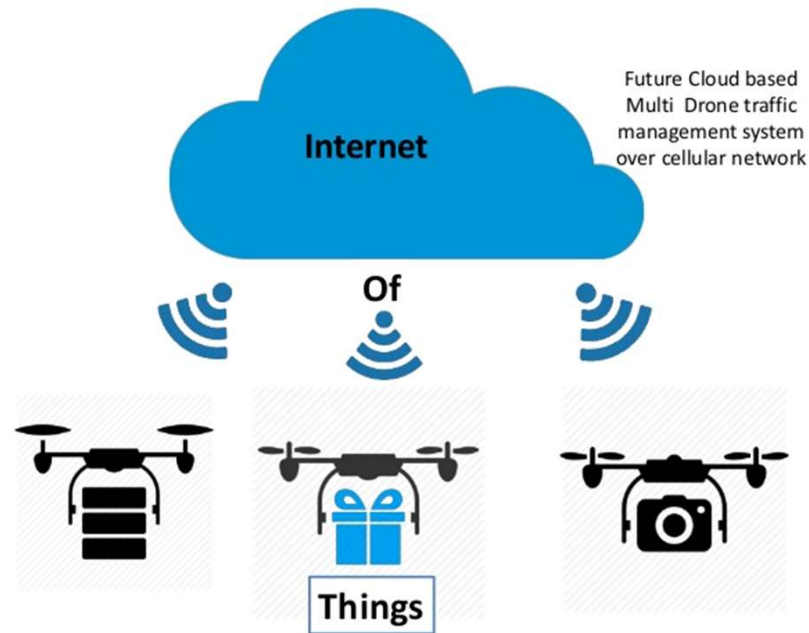
-2018A3PS1105P

Sai Krishna Neeraj B -

2017B4A80784P

Aaditya Sharma -

2017B4A80844P



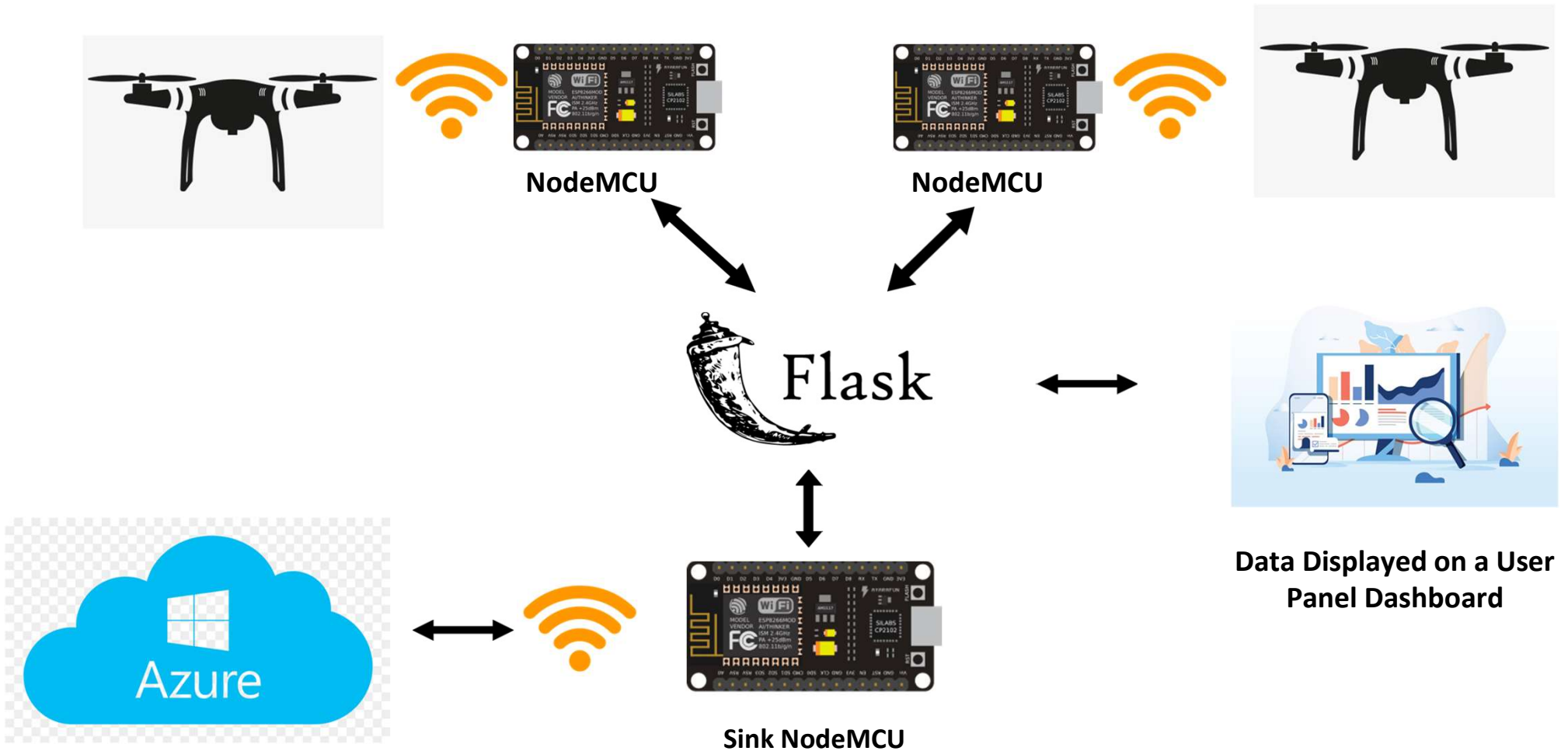
IoT in Drone Networks

Drone based Sensing with help of geo-location data

Motivation

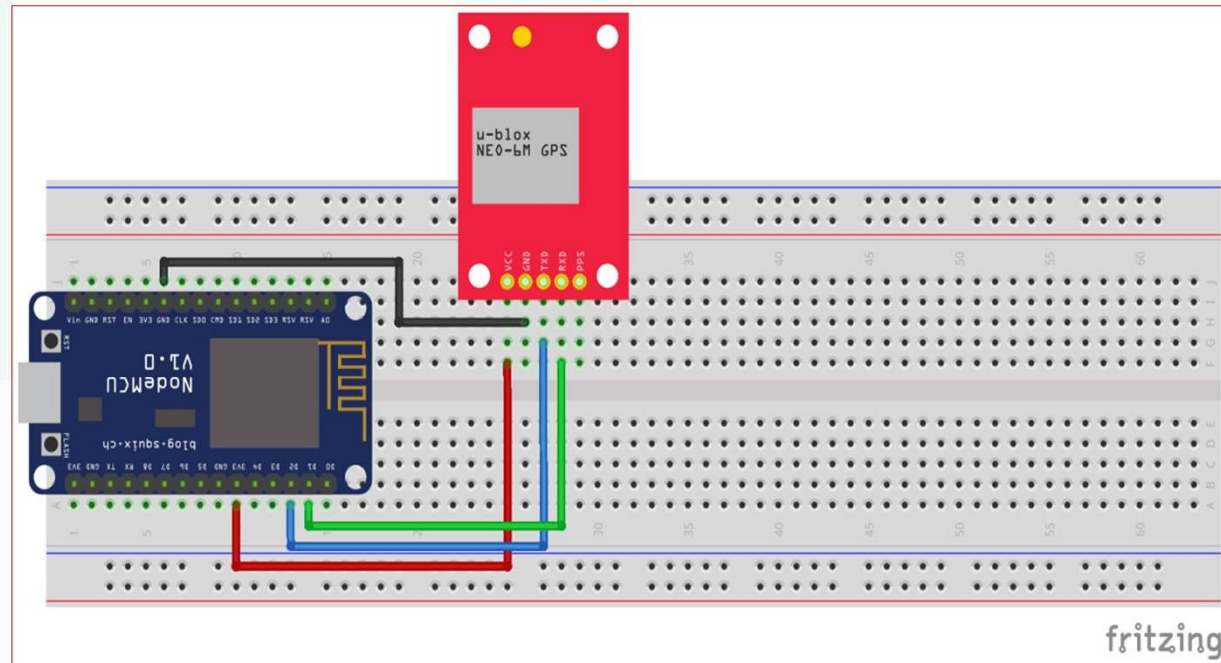
- **IoT based Drone networks are used for various types of surveillance or monitoring systems. These systems can be used in monitoring of agricultural data, last mile delivery, air quality monitoring and security monitoring.**
- **Drones can act as both sensing and actuating nodes. E.g. After analysis of moisture levels, a drone can spray some amount of water at a particular location in a farm.**
- **These systems also find applications in real time traffic monitoring.**
- **Drone network can also be used for deployment of other IoT nodes and their maintenance.**

Work Flow



Integrating Sensors with NodeMCU

GPS Module Neo6M V2



Making BackEnd Server on NodeMCU

- **We use Arduino IDE with ESP8266 add-on.**
- **We also include various libraries to help in the different applications needed in our device.**
- **ESP8266WiFi.h - To enable NodeMCU to WiFi connection.**
- **WiFiClientSecure.h, ESP8266HTTPClient.h- To enable HTTP requests.**
- **ArduinoJson.h - To enable Arduino to handle JSON objects.**
- **NTPClient.h- To give Arduino time handling capabilities.**
- **AzureIoT Hub.h, AzureIoTProtocol_MQTT.h, AzureIoTUtility.h - To enable Arduino to communicate with the Azure IoT hub through a Primary connection key unique to the Hub.**

HTTP

- **The encryption and security functionality for HTTP is implemented through the Transport Layer Security (TLS) protocol. Basically put, TLS defines a standard way to make any network communication channel secure.**
- **When a GET request is sent, server returns data**
- **When a POST request is sent, data is sent to server**
- **In our project, we use in-built libraries of Arduino IDE to realize HTTP GET and POST requests.**

JSON

- **JSON stands for JavaScript Object Notation. JSON is a lightweight format for storing and transporting data. JSON is often used when data is sent from a server to a web page.**
- **Through our Flask server, we use JSON strings to pass location data between the NodeMCUs.**
- **For a complex Geographic Information System (GIS), a special open standard format called GeoJSON exists to represent simple geographical features.**

MQTT Protocol

- **MQ Telemetry Transport (MQTT) is a popular low-overhead messaging protocol used by many IoT devices to communicate.**
- **The MQTT protocol uses a publish / subscribe communications model which allows for data to be sent and received asynchronously. A web service called a broker manages where the data is coming from and going to. It's similar to REST for HTTP communications but with several very important distinctions.**
- **In our project, we use the MQTT protocol to enable the NodeMCU to communicate with the Azure IoT Hub.**

Azure Setup

- **We start by creating a new IoT Hub and new resource group with F1 Tier services and central India as location**
- **On this IoT hub we add a new device and use the primary connection string and primary key for connecting our device to the hub.**
- **Now, We create a storage account, followed by setting up a consumer group and stream analytics job with end point(Sink) as blob storage.**

Flask

- **Flask is a micro web framework written in Python.**
- **A framework makes life easy by providing reusable code or extensions for common operations.**
- **Flask can be used for both frontend and backend, however it is popularly used for data access at the backend.**
- **There are a number of frameworks for Python, including Flask, Tornado, Pyramid, and Django.**
- **Flask is based on Werkzeug WSGI toolkit and Jinja2 template engine.**

Work Split Up

- **Flask server, Dashboard, HTTP Post Request- Abhishek H Iyer**
- **HTTP Get request, Arduino Backend- Sai Krishna Neeraj B**
- **Azure Setup, Azure IoT Hub, Azure Storage- Aaditya Sharma**