BTP 2022

B22RVP03

Connectivity of IoT aspects for UAV applications in agriculture

Team members:
K Litheesh Kumar
Surya Satvik TU

Project Guide:
Dr. Raja Vara Prasad

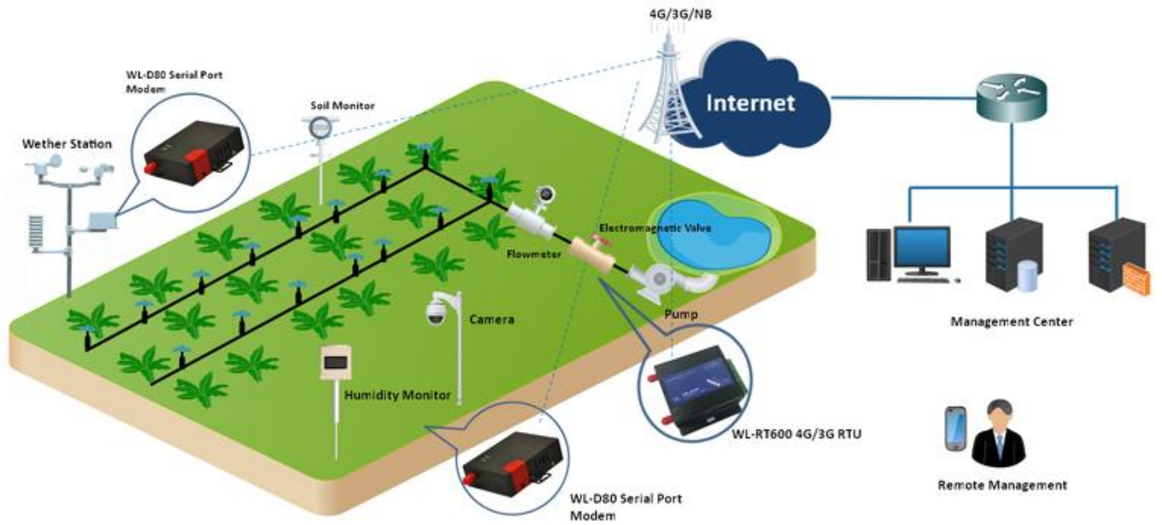
Outline

- Problem Statement
- Introduction
- Flowchart
- Literature Study
- Description of Project
- Video link
- Outcomes
- Milestones
- References

The problem

- In Smart Agriculture, the Ground level Gateway face difficulties in sending the data to Cloud.
- Monitoring the crop 24 * 7 will be difficult. Watering, spraying fertilizers takes more time.
- In this project we will try to solve it….

Introduction



- Smart farming is to improve quality and quantity of agricultural production.
- Evolution of Internet of Things (IoT) and Unmanned Aerial Vehicles (UAVs) enabled the vision of smart farming.
- IoT adds value to obtained data by automatic processing, analysis
- access by ensuring data flow between different devices like Gateways

Objectives

- The ground level sensors are using different wireless communications like Wi-Fi, Zigbee etc.
- The data from these sensors will be collected using MQTT protocol where Raspberry Pi acts as a MQTT broker.
- Subscribers can receive data from broker from its preferred source and Publishers can send data to its preferred destination.
- Raspberry pi will send the received data to drone Gateway when UAV reaches its range.

Objectives

- Drone Gateway continuously sync the data with cloud when it receives from ground Gateway.
- AI ML algorithm's in the cloud will train and test the data to identify the issues and notifies user.
- User can actuate the process with the help of app when the algorithm finds issue.

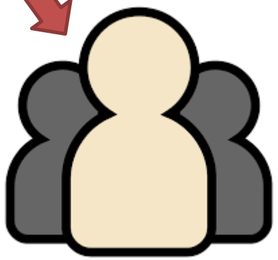
UAV will reach the range of Gateway to collect data

Data reached to drone will automatically sync to the cloud

Cloud

Ground MQTT Gateway

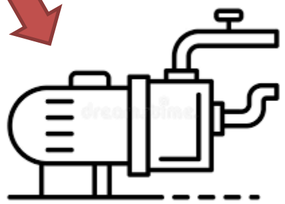
App



Users can actuate motor ON by seeing Humidity values

FLOW CHART

DHT Sensor



Pump motor

Literature study

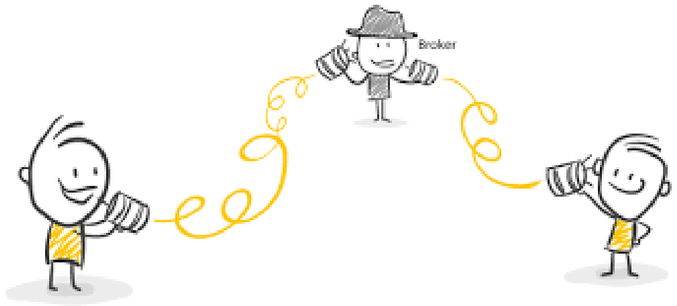
- Existing Studies on this topic

1. A Review of Applications and Communication Technologies for Internet of Things (IoT) and Unmanned Aerial Vehicle (UAV) Based Sustainable Smart Farming by Nahina Islam, Md Mamunur Rashid , Faezeh Pasandideh.

1. Applications of Internet of Things and Unmanned Aerial Vehicle in Smart Agriculture: A Review by Caprio Mistry, Ahona Ghosh, Mousumi Biswas, Bikalpa Bagui, Arighna Basak.

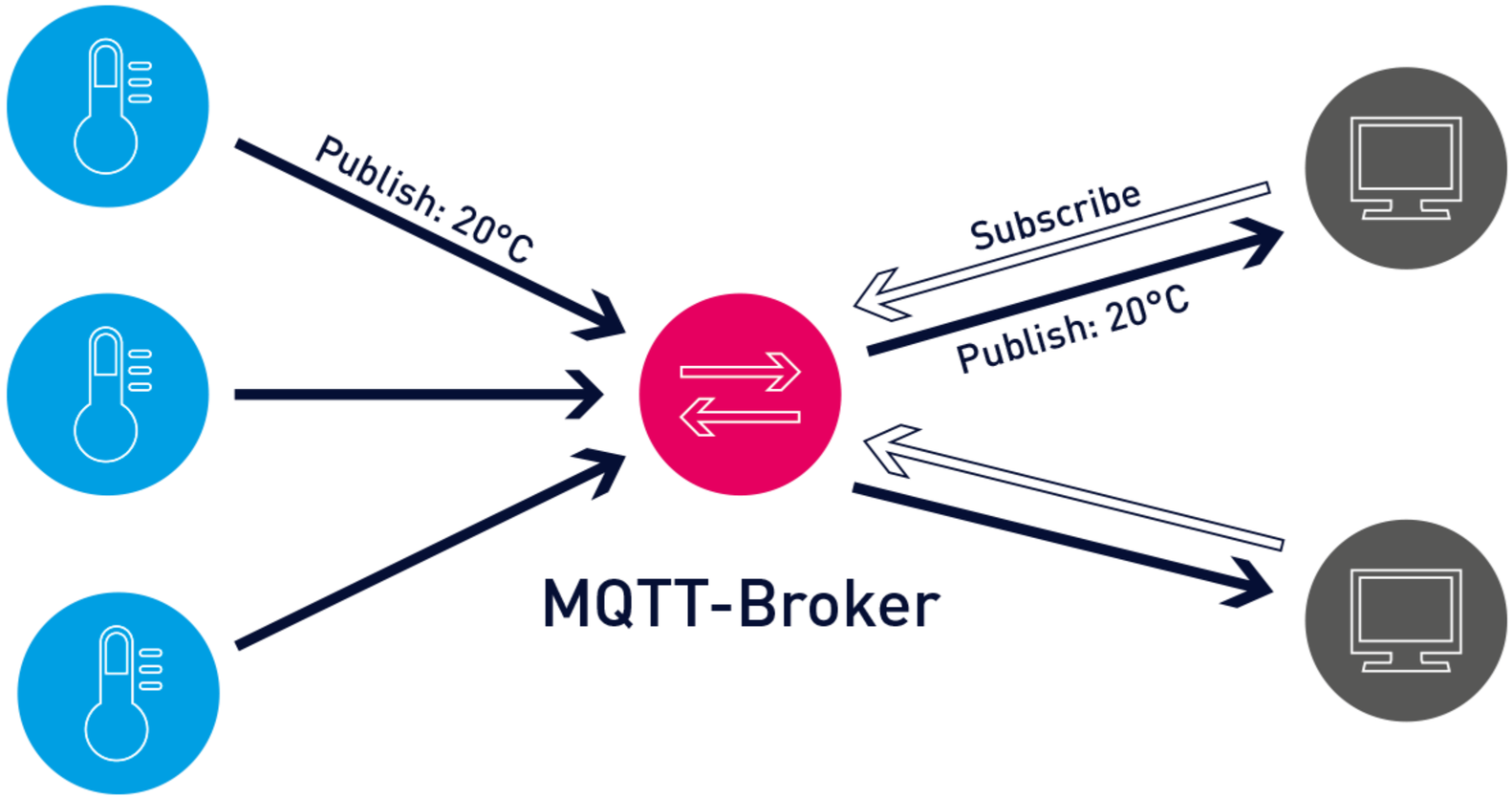
* Links are given in References slide

MQTT Protocol

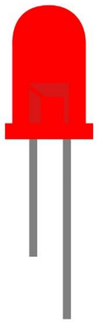


- Message Queueing Telemetry Transport
- lightweight IoT messaging protocol based on the publish/subscribe model.
- They can provide real-time and reliable messaging service for IoT devices, only using very little code and bandwidth.
- widely used in IoT, mobile internet, electricity power, and other industries.
- Example: Facebook Messenger

MQTT Protocol



FLOW CHART

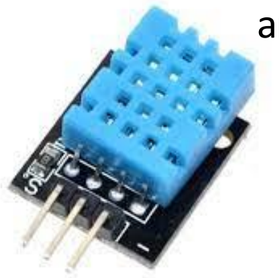


Turns led
ON

NodeMCU 1
As
Subscriber

Publish message
on led ON

Raspberry Pi
acts as MQTT
broker



Reads temperature
and Humidity values

NodeMCU 2
As
Publisher

Publish it
On topic data

Video Link

Developing MQTT protocol using Raspberry Pi and 2 NodeMCU

Click Here:
https://drive.google.com/file/d/1KniQQMG0FB0_4O-V6cQwvtRMs3HkyPjS/view?usp=sharing

Mid Outcomes

1. Connecting ground level sensors with different topologies(Star, Mesh, Tree)
2. Developing MQTT local Gateway
3. Writing code for NodeMCU connection
4. Writing code for local network and ground Gateway using MQTT protocol

End Expected Outcomes

1. Writing Code for sending information from local MQTT Gateway network to Drone gateway

2. Sending information from Drone Gateway to Cloud through 4G Dongle

3. Writing code for 4G Dongle connection

Other Outcomes

PHASE-3: October 2022

1. Writing code for Algorithms in Cloud using AI & ML
2. Writing code for detecting problem from that in Cloud

PHASE-4: December 2022

1. Coding for giving instructions from Cloud to ground level Actuators like pump motor etc..
2. App User interface

Milestones

Phase 1

connecting of sensors in ground level Gateway using MQTT protocol

Phase 2

Sending data from ground level Gateway to Drone Gateway and then to Cloud using 4G Dongle

Phase 3

Detecting the problems in cloud using AI ML algorithms and actuating with respective to the issue

Phase 4

Creating User interface from cloud to ground values and Actuation

References

[1] https://en.wikipedia.org/wiki/MQTT

[2] https://www.emqx.com/en/blog/use-mqtt-with-raspberry-pi

[3] https://www.ibm.com/docs/en/ibm-mq/8.0?topic=telemetry-send-message-mqtt-client

[4] https://bytesofgigabytes.com/mqtt/esp8266-as-mqtt-publisher-and-subscriber/

[5] https://osf.io/fmgtw/download

Thank You

Contact Us

K Litheesh Kumar - S20190020218
litheeshkumar.k19@iiits.in

Surya Satwik - S20190020254
suryasathvik.t19@iiits.in