A REPORT ON

SMART AGRICULTURE SYSTEM USING IOT

By –

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ABSTRACT:

The term "Things" in the Internet of Things refers to things accessed or connected through the internet. IoT is the network of interconnected things which are embedded with sensors, software, network connectivity and essential electronics that enables them to collect and exchange data . IoT Technology has brought revolution is each and every field of man's life by making everything smart and intelligent

Internet of Things has brought huge benefits in every field. Farming benefits like efficient use of water , rise of inputs and many more. The diligence of IoT in the farming industry has helped the farmers to monitor the water tank levels. This makes the irrigation process more efficient. The furtherance of IoT technology in agriculture operations has brought the use of sensors in every step of the farming process . Like how much time and resources a seed takes to become a fully-grown vegetable . The Internet of Things in farming has saved the time of the farmers .And has also reduced the excessive use of resources such as Water and Electricity. It check various factors like humidity, temperature, soil etc. and gives a clear real-time observance. Agriculture sector is evolving with the advent of the information and communication technology. Efforts are being made to enhance the productivity and reduce losses by using the state of the art technology and equipment. As most of the farmers are

unaware of the technology and latest practices, many expert systems have been developed in the world to facilitate the farmers.

1. INTRODUCTION:

1.1 OVERVIEW:

Farming in India is done using the mundane ways. The fact that most of our farmers lack proper knowledge makes it even more erratic. A large portion of farming and agricultural activities are based on the predictions, which at times fail. Farmers have to bear huge losses and at times they end up committing suicide. Since we know the benefits of proper soil moisture and its quality, air quality and irrigation, in the growth of crops, such parameters cannot be ignored. Agriculture sector is evolving with the advent of the information and communication technology. Efforts are being made to enhance the productivity and reduce losses by using the state of the art technology and equipment. As most of the farmers are unaware of the technology and latest practices, many expert systems have been developed in the world to facilitate the farmers. Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal. In 2017-18, total food grain production was estimated at 275 million tonnes

In-depth economic analysis needs to complement internet tools, to ensure higher yields on farms . Users need to be able to define the correct production function . Typically, the production function is not the same for all crops, differs in the various zones of a farm, and also changes over the crop/plant-growth cycle. Unless the farmer is aware of this varying production function, there will always remain the chance of application of inputs in incorrect amounts resulting in crop damages. Precision agriculture is all about optimizing output levels by making the best use of the available , limited inputs – and for that , the importance of following the production function is immense.

1.2 PURPOSE OF THE PROJECT:

The available fresh water is contaminated by the human and animal population and the pollution levels have increased at an alarming rate. If this continues, It will be leading to limitation of food production which in turn will affect the human productivity and thus the entire ecosystem will be affected in the years to come. The primary and the most important reason for this problem is the tremendous increase in the population which has increased at a rate which is faster than the food production rate. This population growth especially in water short countries will directly have an impact on its growth on the world map. The food production needs to be increased by at least 50% for the projected population growth. Monitoring environmental conditions is the major factor to improve yield of the efficient crops.

This will help us to develop a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors.

This Project involves integration of advanced technologies into already persisting agricultural practices with a view to boost production quality and efficiency for farming products. The goal of smart agriculture system is to ground a decision-making support system for farm management.

1.3 IoT TECHNOLOGY & AGRICULTURE:

Agriculture sector is evolving with the advent of the information and communication technology. Efforts are being made to enhance the productivity and reduce losses by using the state of the art technology and equipment. As most of the farmers are unaware of the technology and latest practices, many expert systems have been developed in the world to facilitate the farmers.

The term things in IOT refers to various IOT devices having unique identities and have capabilities to perform remote sensing , actuating and live monitoring of certain sort of data. IOT devices are also enable to have live exchange of data with other connected devices and application either directly or indirectly , or collected data from other devices and process the data and send the data to

various servers. The other term internet is define as Global communication Network connecting Trillions of computers across the planets enabling sharing of information. Not only for food, but crop production is becoming equally critical for industry, indeed crops like cotton, rubber, and gum are playing important roles in the economies of many nations. Furthermore, the food-crops-based bioenergy market started to increase recently.

1.4 OBJECTIVES :

Developing a smart agriculture system that would measure temperature, soil moisture, pressure through sensors. Getting live updates of temperature , pressure, etc of our city. Controlling motor for better yield .

1.5 DELIVERABLES :

A web application which would provide
- Weather data through sensors
- Weather updates through API
- Motor Control

2. SURVEY:

o PROBLEMS FACED:

Farmers today are having to face some of the biggest challenges in the sector's history as the global population grows in size and so does the need for more and more food from fewer acres. Along with these challenges also comes the

innate competition for land and water – this problem is also being enhanced by labor shortages, climate change, and increasing environmental regulation. Absence of coordinated planning and international cooperation at an unprecedented scale, the next half century will be plagued by a host of severe water related problems, threatening the wellbeing of many terrestrial ecosystems and drastically impairing human health, particularly in the poorest regions of the world .

o SOLUTIONS:

Many systems are developed for various activities for making agriculture more advanced.

There are many systems to achieve water savings in various crops, from basic ones to more technologically advanced ones. One of the existing systems use thermal imaging to monitor the plant water status and irrigation scheduling. Automation of irrigation systems is also possible by measuring the water level in the soil and control actuators to irrigate as and when needed instead of predefining the irrigation schedule, thus saving and hence utilizing the water in a more sensible manner.

Using smart irrigation system with IOT & associative technology requirement to make the field cultivation process more efficiently with less cost & human interface. We had aslo used Rain Water Harvesting & Solar Power Utilization for betterness . Checking About the weather conditions with corrective measures & Effect Irrigation from remote location was also proposed as a solution . We tend to make our project user friendly so that common people like farmer can use it very easily also to make the field

cultivation process more efficient with less cost & human interface.

3. HARDWARES AND SOFTWARES:

- ## Node-RED:

    Node-RED is a programming tool, for wiring together hardware devices, API's and online services in new and interesting way. Node-RED is a flow-based programming tool, developed IBM's Emerging Technology by Services team and now a part of the JS Foundation. It provides a browser based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in single –click
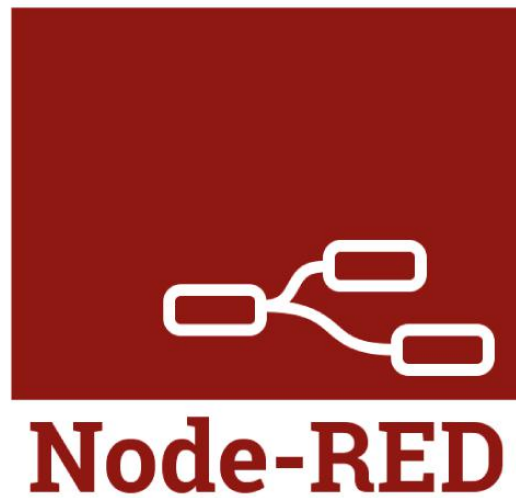
- **IBM Cloud:**

    The IBM cloud platform is a fully managed, cloud-hosted service which combines platform as a service (PaaS) with infrastructure as a service (IaaS) to provide an integrated experience. The platform scales and supports both small development teams and organizations, and large enterprise businesses. Deployed across data centers around the world, the solution you build on IBM Cloud spins up fast and performs reliably in a tested and supported environment you can trust.

    It has capabilities for device registration, connectivity, control, rapid visualization and data storage. The temperature, humidity, object temperature values are simulated by IOT

sensor and the values are stored in IBM IOT PLATFORM. The devices like motor and lights are connected through this platform. It sends the commands to the connected devices and get the events from the connected devices. Soil moisture sensor value is simulated from the platform.

- Git-Hub:

GitHub is a web-based version-control and collaboration platform for software developers. GitHub is delivered through a software-as-a-service (SaaS) business model, was started in 2008 and was founded on Git, an open source code management system created by Linus Torvalds to make software builds faster.

- Open Weather API:

    Open Weather Map is an online service that provides weather data. It provides current weather data, forecasts and historical data .

4. ADVANTAGES :

A. Data collection.
B. Reduction of risks .
C. Business gets automated.
D. Developing favourable attitudes.
E. Increases agriculture productivity.
F. Reduction of chemical application in crop production.
G. Prevents soil degradation.
H. Efficient use of water resources.
I. Precision farming changing the socio-economic status of farmers.
J. Dissemination of modern farm practices to improve quality, quantity and reduced cost of production.

5. DISADVANTAGES :

The biggest drawback of smart farming is that it requires an unlimited or continuous internet connection to be successful. This means that in rural communities, especially in the developing countries where we have mass crop production, it is completely impossible to operate this farming method. In places where internet connections are slow, smart farming will be an impossibility.

High cost can be one of the disadvantage. Lack of technical expertise knowledge and technology may hinder the growth of smart agriculture. It may also have Heterogeneity of cropping systems and market imperfections.

6. BLOCK DIAGRAMS :

In below diagram we can see Motor control option (on/off) was dependent on information we received regarding moisture ,temperature , humidity .
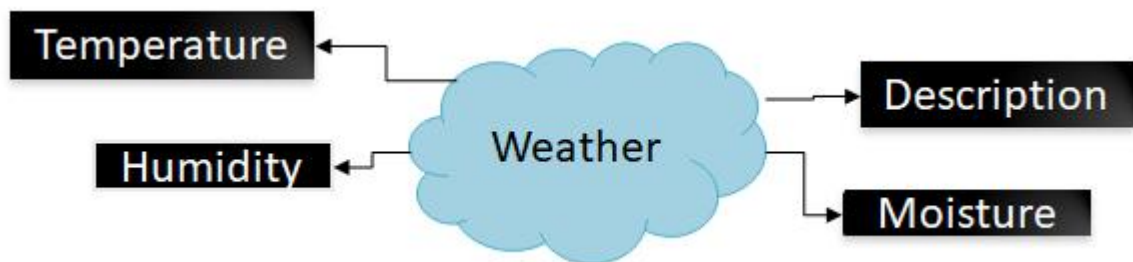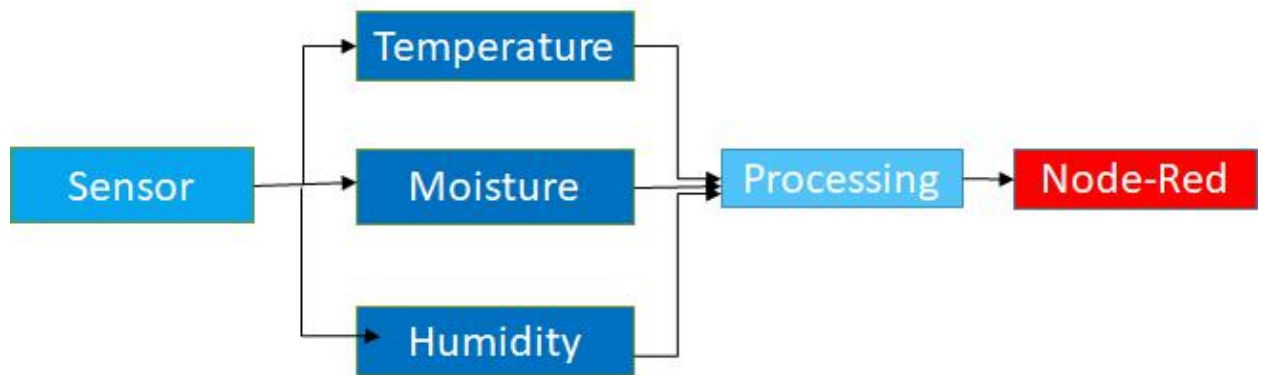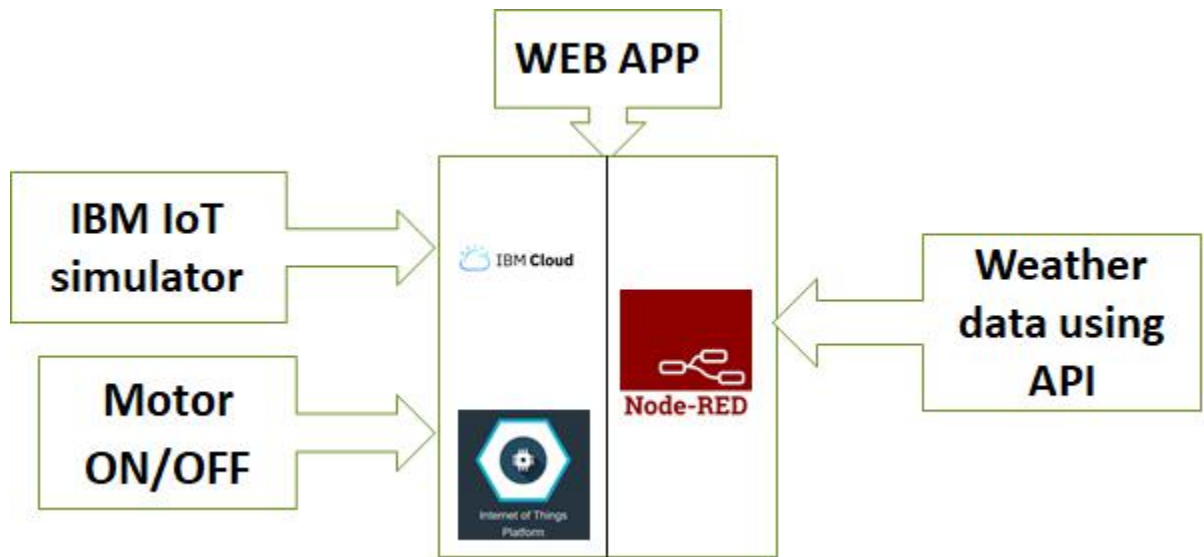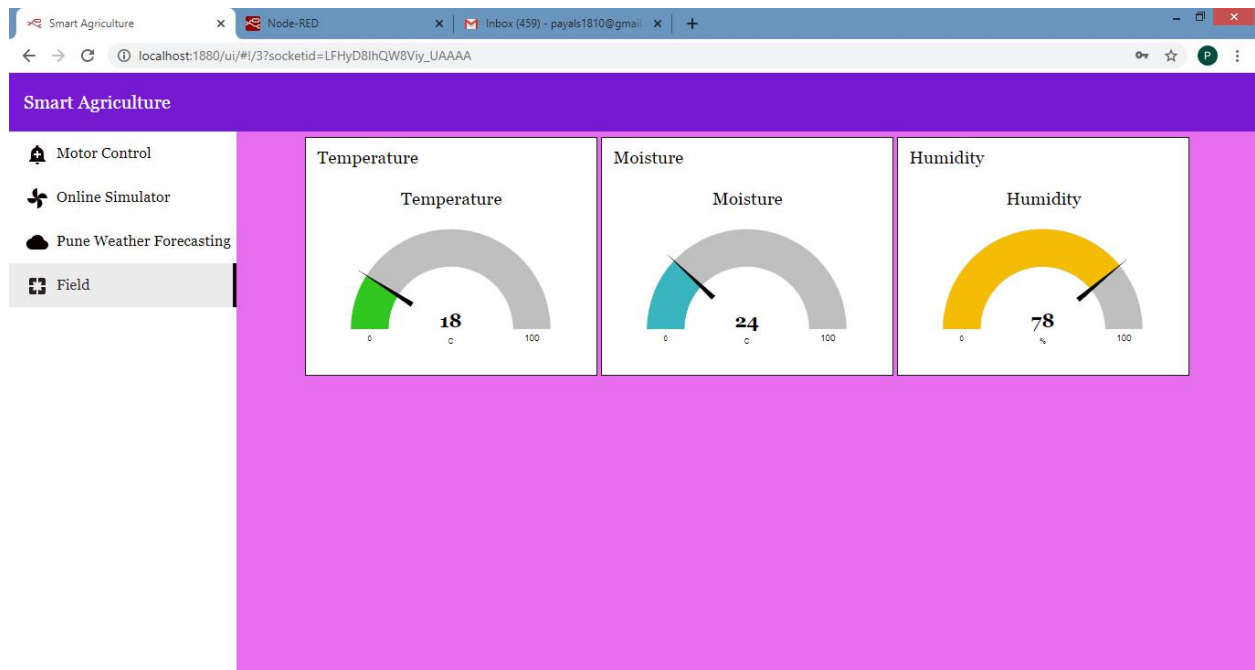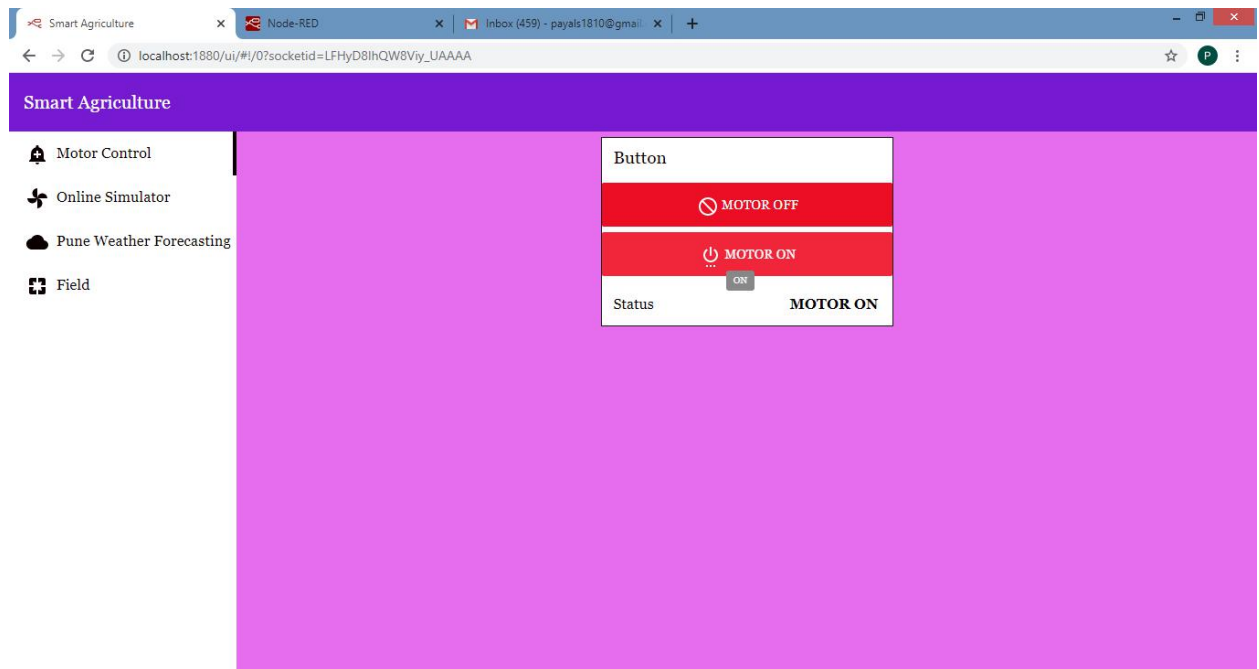
7. RESULT :

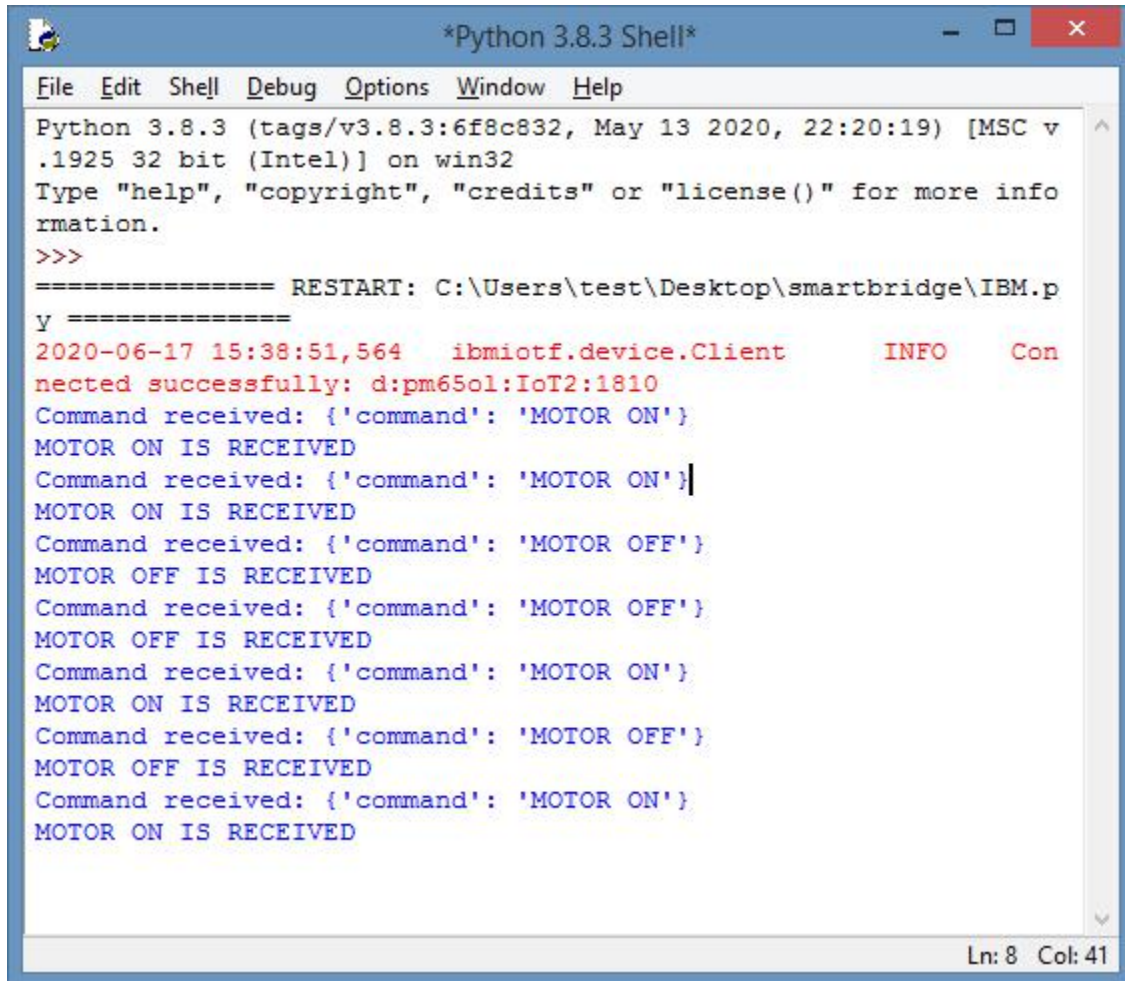A smart Agriculture system is built which has following outputs:

➢ Output of IoT simulator showing temperature, humidity, soil moisture :
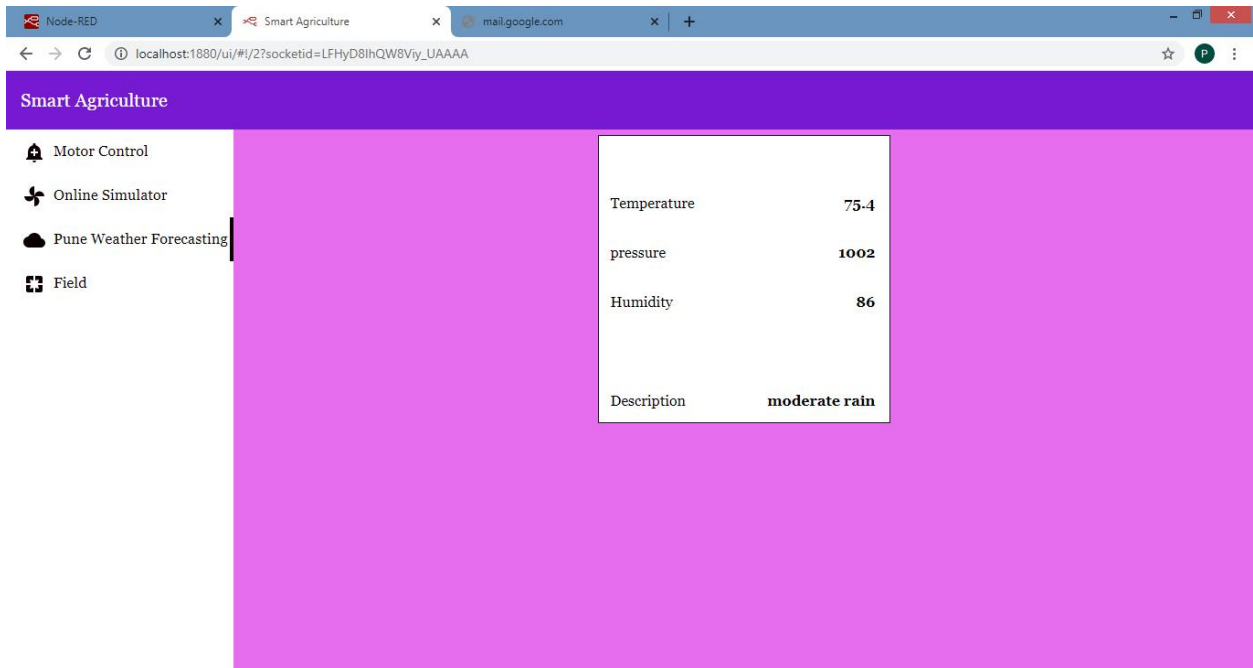
> Motor button and its status:

➢ Motor button status on python idle

➢ Parameters obtained from Open weather API

7. CONCLUSION :

The IoT system based smart Agriculture has high efficiency and accuracy in fetching the live data of temperature and soil moisture IoT enabled agriculture has helped implement modern technological solutions to time tested knowledge. This has helped bridge the gap between production and quality and quantity yield. Using IoT in agriculture has a big promising future as a driving force of efficiency, sustainability, and scalability in this industry. Sytem proposed via this will assist farmers in Soil moisture , temperature , humidity monitoring and inturn controlling motor .

8. FUTURE SCOPE:

IoT plays a major role in todays modern world Using Smart Farming techniques, farmers can better monitor the needs of individual animals and adjust their nutrition correspondingly, thereby preventing disease and enhancing herd health. To face the increased need for production of food with available limited water resource, we need to deploy many such systems.