PROJECT REPORT

On

IoT based Smart Agriculture System

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1.1)OVERVIEW OF THE PROJECT

the objective of this project is to bring together the traditional methods and the modern technology together for the good yield and improve the farming conditions in the system.
in this project I propose to bring together technologies like Internet of things and traditional farming methodologies to help farmers. in this project the sole focus will be upon the weather changes and how to reduce its impact on the crops .
we will be providing farmer the facility of looking and observing different parameters like soil moisture, temperature and the weather conditions of the area and then decide functions like irrigation in his/her Farm , all this at the ease of a touch by providing a web app which will be easy to use

1.2) PURPOSE

Main purpose of this project is to bring together modern technologies like Internet Of Things and cloud and farming activities to basically automate the farming activities to bring a revolution ,minimising human labour and maximising the output
and develop an application to make this possible which will be collecting data from the sensor and will display it to the farmer along with weather conditions and let farmer open irrigation pumps or turn them on accordingly

2.1) CHALLENGES IN FARMING

- Uncertain, unreliable & erratic rainfall leads to water wastage due to lack of modern equipments.

- Insufficient agricultural methods due to absence of technological interface leads to large manpower & high cost.
- Absence of proper crop monitoring process doesn't lead to enhancement in crop output efficiency.
- in many area's there is shortage of manpower and due this unavailability of manpower the output is not as much as it can be
- human errors: sometimes due to negligence like no timely irrigation, over irrigating the crops or some other reason the crops get destroyed

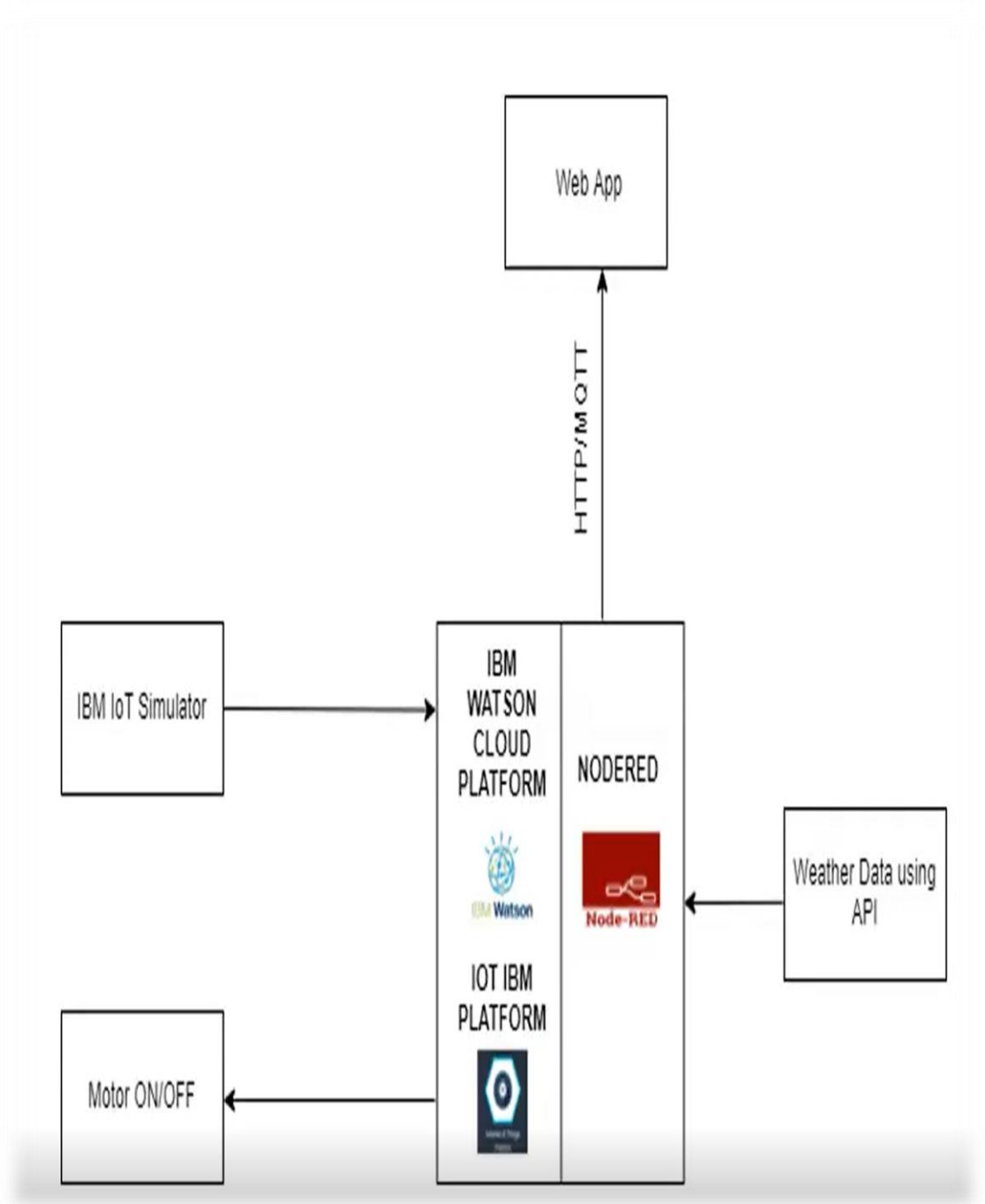
2.2) PROPOSED SOLUTION

- Using smart irrigation system with IOT & associative technology requirement to make the field cultivation process more efficiently with less cost & human interface. The following points will be covered:
    - Rain Water Harvesting & Solar Power Utilization.
    - Checking About the weather conditions with corrective measures.
    - Effect Irrigation from remote location.

- Engineering application in agricultural land can provide efficient production, remote monitoring, optimum utilization of resources like water, power with minimum manpower.

- Our project intends to use IOT , IBM Cloud Services , Open Weather API and variety of sensors to record agricultural and irrigation process and store it in a database, rain water harvesting and utilization, use of clean energy sources along with conventional energy resources which will not only maximize the agricultural production with minimum cost and better efficiency, remote monitoring with eco-friendly environment.

3.1) BLOCK DIAGRAM



3.2) SOFTWARE

3.2.1) Internet Of Things

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

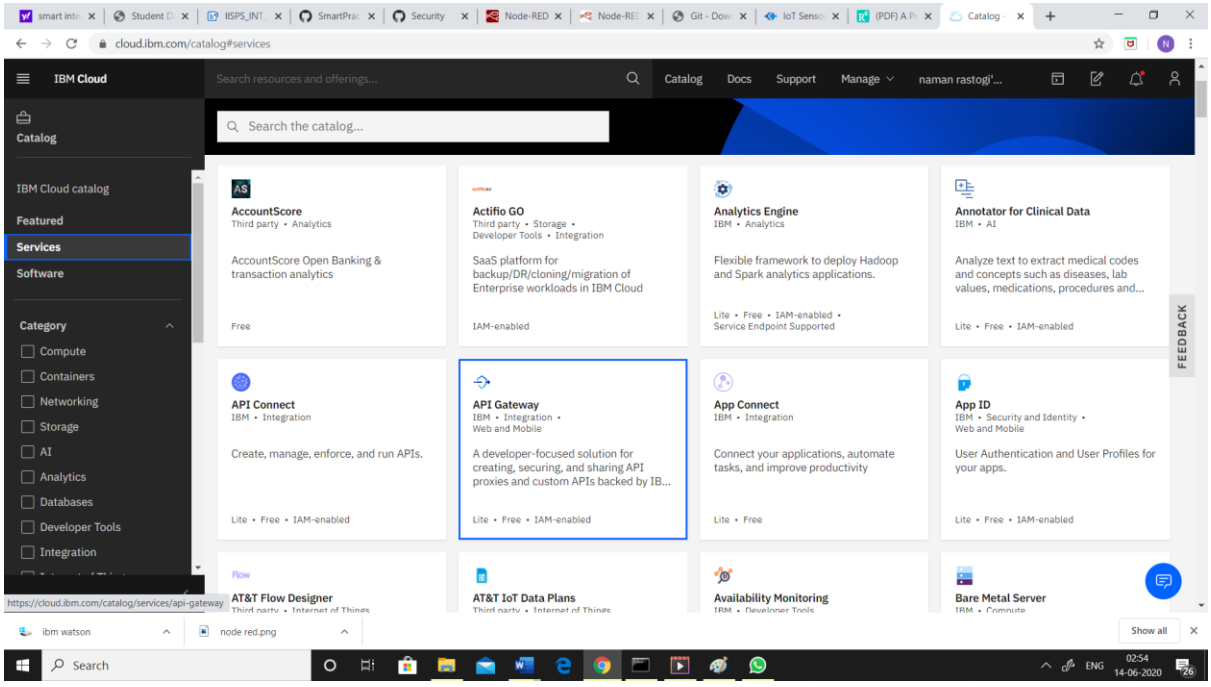
IoT makes once "dumb" devices "smarter" by giving them the ability to send data over the internet, allowing the device to communicate with people and other IoT-enabled things.

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.
IoT works in the following way:

- Devices have hardware like sensors, for example, that collect data.
- The data collected by the sensors is then shared via the cloud and integrated with software.
- The software then analyses and transmits the data to users via an app or website.

3.2.2) IBM CLOUD

The IBM Smart Cloud brand includes infrastructure as a service, software as a service and platform as a service offered through public, private and hybrid cloud delivery models. IBM places these offerings under three umbrellas: Smart Cloud Foundation, Smart Cloud Services and Smart Cloud Solutions.[14]



some of the service offered by IBM cloud

3.2.2.a) IBM Watson

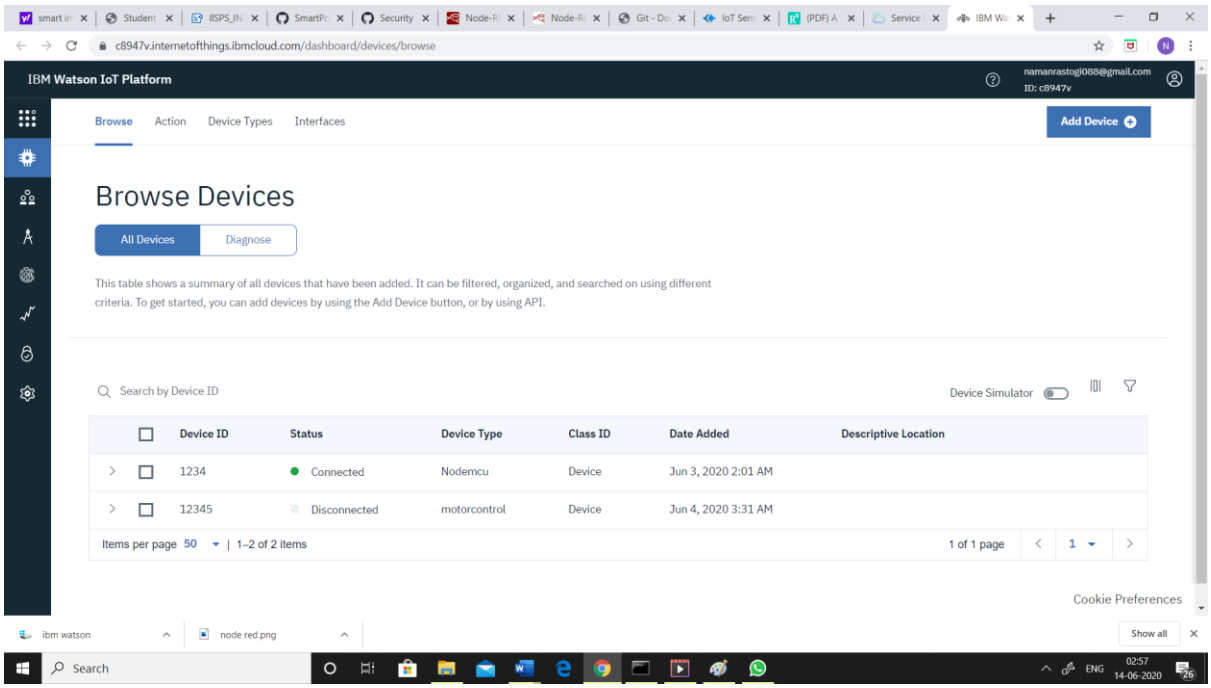
A fully managed, cloud-hosted service with capabilities for device registration, connectivity, control, rapid visualization and data storage.

This is the hub of all things IBM IoT. This is where you can setup and manage your connected devices so that your app can access their live and historical data.

The Watson IoT platform is the environment to cognitively act upon the IoT.

IoT Platform is an end-to-end, fully-managed cloud service offering that integrates a bundled set of preselected services to form a public, multitenant SaaS solution on the IBM Cloud framework.

The IBM Cloud services that make up Watson IoT Platform provide the support for the main product functions of connecting, storing, analysing, and managing with further monitoring support through the Watson IoT Platform dashboard.



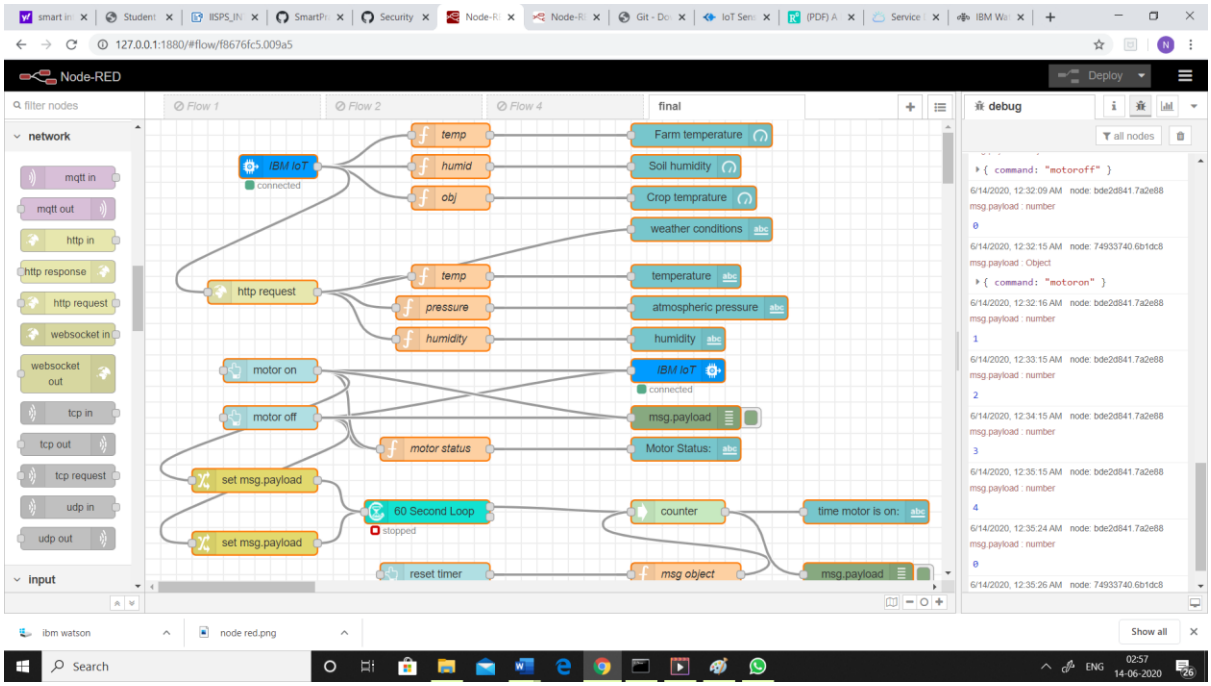
3.2.3) NODE RED

Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.

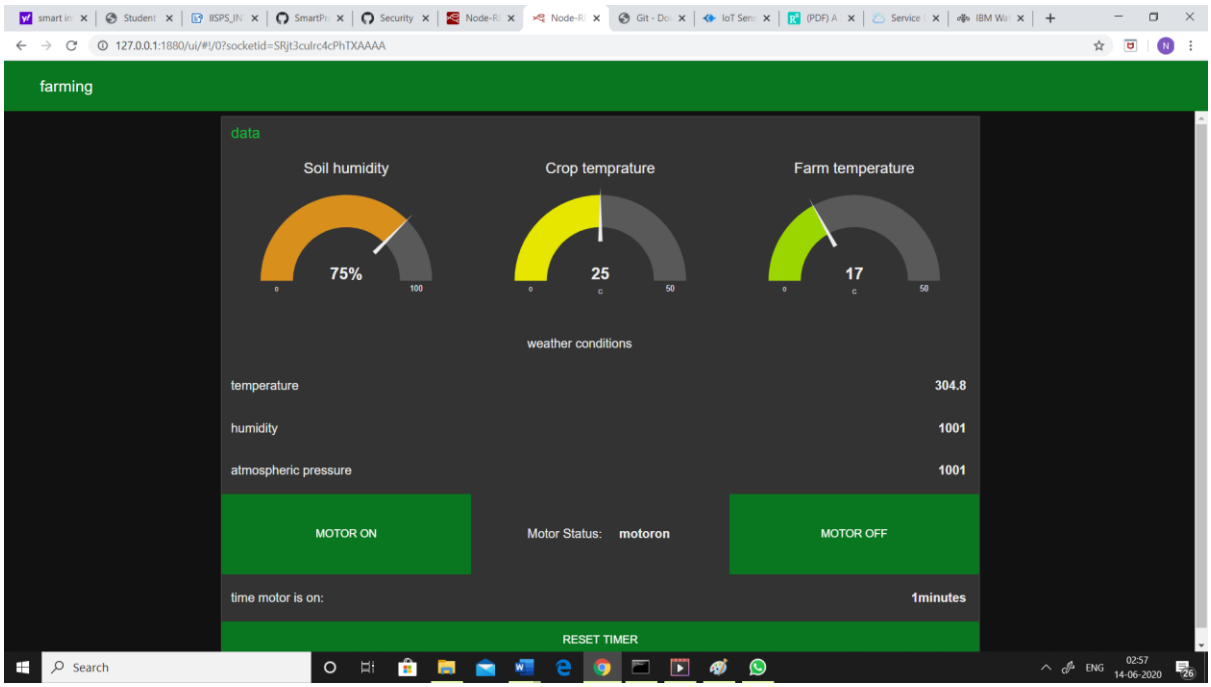
It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

The light-weight runtime 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 contains the following Watson IoT nodes that helps you to connect your devices, gateways and applications to Watson IoT Platform and create IoT solutions quickly. Watson IoT Node – A pair of nodes for connecting your device or gateway to the IBM Watson Internet of Things Platform.



node flow



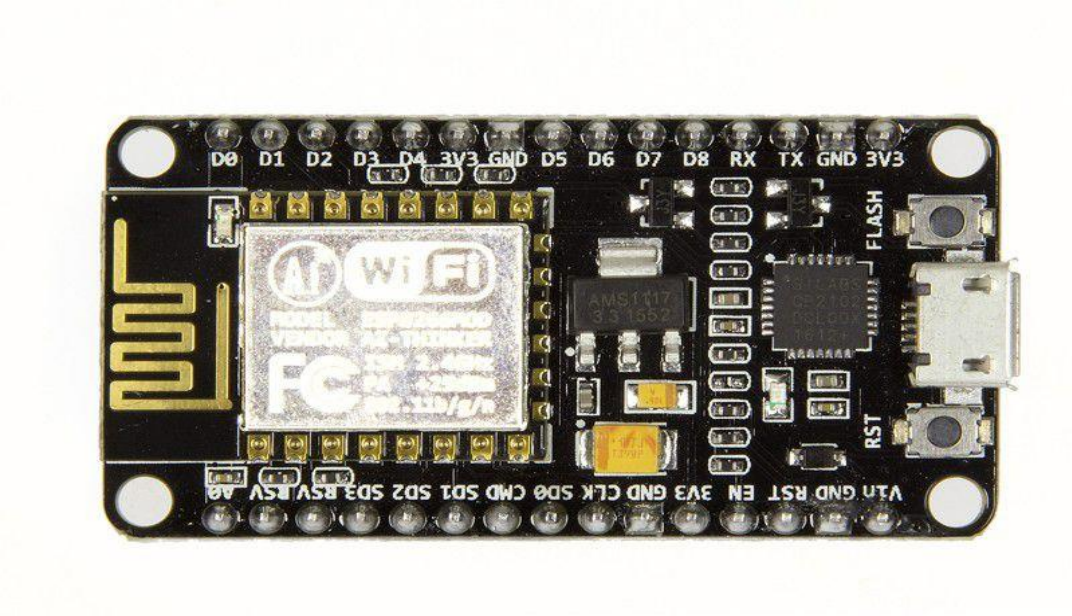
user interface created using node-red

3.3) HARDWARE

3.3.a) NODE MCU

It is an open-source firmware and development kit that helps you to prototype or build IoT products. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language.

TO activate Arduino with WIFI module a code is required but NODEMCU has inbuilt WIFI module.



Temperature Sensor: A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors. Some temperature sensors require direct contact with the physical object that is being monitored (contact temperature sensors), while others indirectly measure the temperature of an object (non-contact temperature sensors).

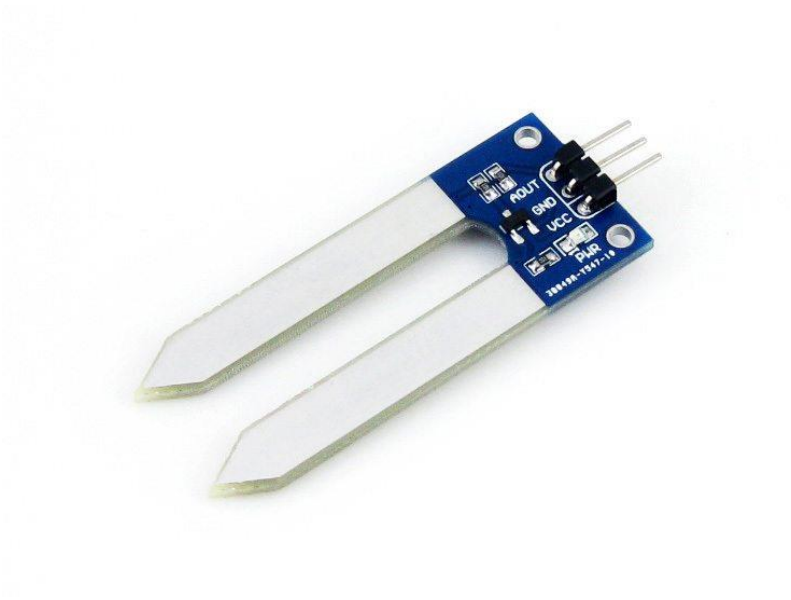
3.3.B) HUMIDITY SENSOR

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor when looking for comfort.

Humidity sensors work by detecting changes that alter electrical currents or temperature in the air.

There are three basic types of humidity sensors:

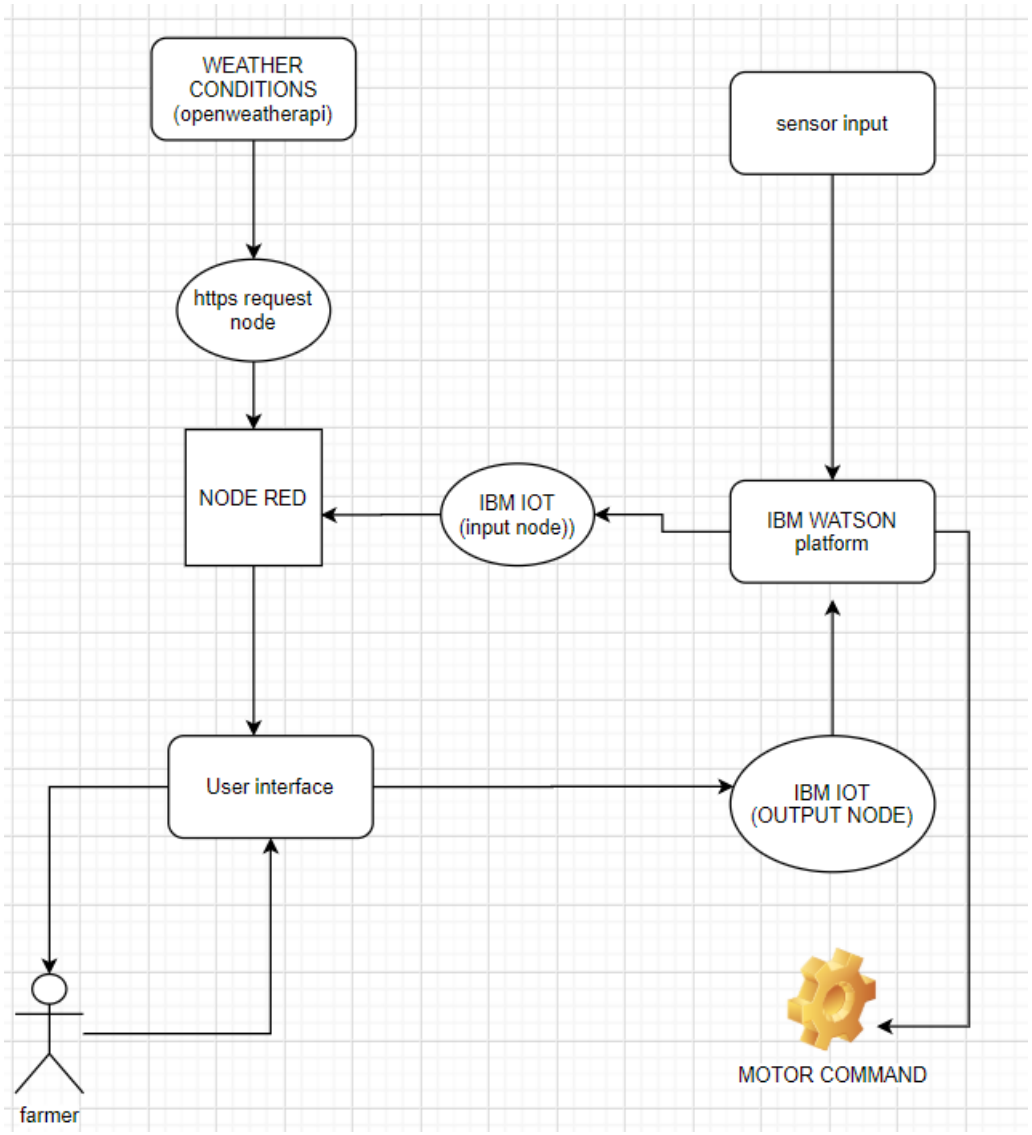
- Capacitive
- Resistive
- Thermal



3.3.B) MOTOR DRIVER

Motor drivers acts as an interface between the motors and the control circuits . Motor require high amount of current whereas the controller circuit works on low current signals. So, the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

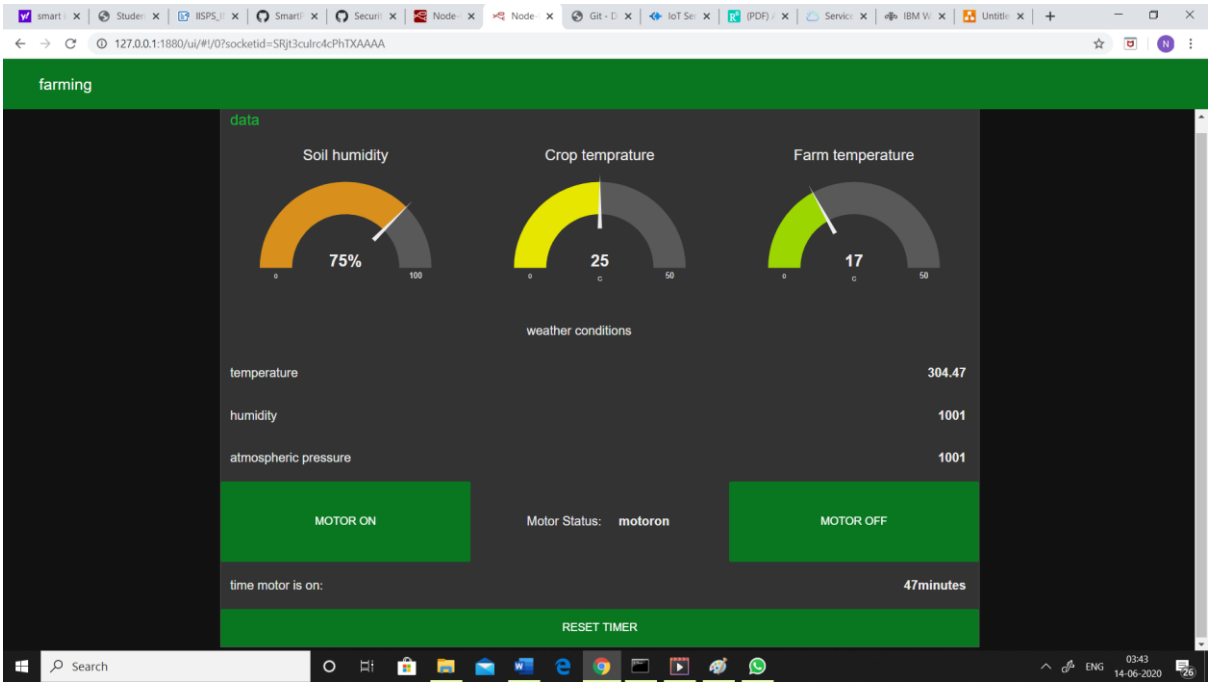
3.2) FLOW CHART



4) RESULT

successfully completed the objective. tasks accomplished are:

- successfully automated the irrigation system
- successfully developed an User Interface that would display real time data
- integrated motor control on the UI and was able to control motor at ease of one touch



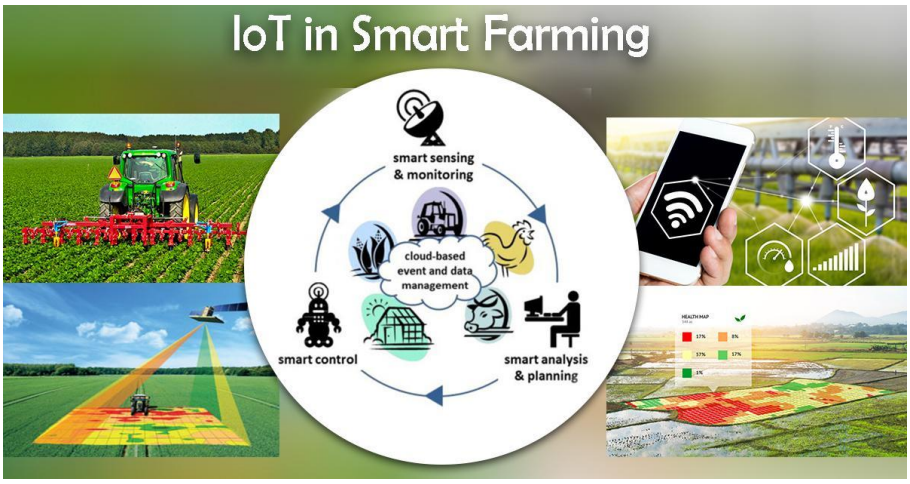
5)Advantage/Disadvantages

Advantages	disadvantages
Reduced the need of manpower	Will not work if farmer has no internet connection
More output and less man labour	If one component fails whole system fails
Remote control no need to be physically present	If damaged cannot be repaired by a layman
Reduces the effective cost	Technical fault can lead to crop damage

6)APPLICATION

Our proposed system will be highly beneficial to farmers as farming accounts to more than 60% of occupation in our country. Also crop production will be increased if our system is used as it uses IOT & different sensors to gather information regarding irrigation outputs & also provides protection to farms. Also, farmers can use remote technology to activate/deactivate water pumps which are powered by clean sources of energy thus keeping the environment clean.

The application of the Internet of Things in agriculture promises previously unavailable efficiency, reduction of resources and cost, automation and data-driven processes. In agriculture, however, these benefits don't act as improvements, but rather the solutions for the whole industry confronting a range of dangerous problems.



Monitoring climate conditions

Weather stations equipped with smart sensors can collect weather data and send useful information to a farmer. Moreover, the information is analysed by special software and the farmer gets ready-made analysis that helps him have a detailed forecast and avoid crop losses.

Crop monitoring

As in the case of weather condition monitoring, sensors for crop monitoring also collect all information like crop health, humidity, precipitation, temperature, and other parameters. If there are any deviations, farmers may identify them beforehand and take appropriate actions. Also, sensors help farmers determine when the best moment to plant crops and harvest them.

7)CONCLUSION

The development of agricultural sector will always be a priority especially given the dynamics of the world today. Therefore, using IoT in agriculture has a big promising future as a driving force of efficiency, sustainability, and scalability in this industry.

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. Data Ingested by obtaining and importing information from the multiple sensors for real time use or storage in a database ensures swift action and less damage to the crops. With seamless end to end intelligent operations and improved business process execution, produce gets processed faster and reaches supermarkets in fastest time possible.

8)FUTURE SCOPE

The Future of Smart Agriculture Technology:

According to a new market intelligence report by BIS Research, the global smart farming market is expected to reach $23.14 billion by 2022, rising at a compound annual growth rate (CAGR) of 19.3% from 2017 to 2022.

A recent Beecham's report entitled Towards Smart Farming: Agriculture Embracing the IoT Vision predicts that food production must increase by 70 percent in the year 2050 in order to meet our estimated world population of 9.6 billion people. It also describes growing concerns about farming in the future: climate change, limited arable land, and costs/availability of fossil fuels. So, what's the solution? Smart farming.