APPLICATION OF IoT IN ROOFTOP FARMING OF FOOD CROPS: IRRIGATION AND FERTILIZATION

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ABSTRACT: *Present work deals with studying the application of IoT in rooftop farming. Application of IoT plays a crucial role in all fields especially in food and agriculture industry. IoT in rooftop farming or smart farming ensures data flow between sensors and other devices, making it possible to add value to the obtained data by automatic processing, analysis, and access, and this leads to reduce time and cost- effective production and management effort on farms. Sensors were used as an efficient method for watering and fertilizing of plants. This work helps to promote an encouragement to people in making rooftop farming or gardening by IoT application. Here we aim to make people to aware about IoT based rooftop farming improves the entire agriculture system by monitoring the field in real Time. With the help of sensors and interconnectivity, the internet of things in agriculture has not only saved the time of the peoples but has also reduced the extravagant use of resources such as water and electricity. Through this work the main aim is to irrigate and fertilizing the plants in the absence of individual with the help of IoT application by using soil moisture sensor, optional sensors etc.... roof top farming by IoT application helps to achieve healthier food crops to reach our dining tables.*

Keywords: Fertilizing, IoT, plants, Rooftop Farming, Sensors, Watering.

1. INTRODUCTION

Application of IoT solutions in agriculture means or denotes smart agriculture. Similarly, application of IoT in farming or agriculture is a farming management Concept using modern high technology that sustainably increases the quantity and quality of agricultural food crops. In other words, IoT based smart farming enabling the future of agriculture. Farmers in the 21st century have access to soil scanning, water, humidity, automatic water sprinkling, drip irrigation, and application peoples can watering and fertilizing their plants or food crops in their absence its really helpful to the working peoples and during the period of infectious diseases like Covid -19 they can watering, fertilizing their plants if they were in quarantine etc. ... in their absence. That means peoples can monitor their plants from anywhere based smart farming is highly efficient. It makes farming precise and profitable when compared with the conventional approach. The rise of more efficient industries, connected cars, and smarter cities, are all paramount components of the IoT world. However, the application of technologies such as IoT in agriculture could have the greatest global impact. Application of IoT technologies will help farmers both to reduce waste and enhance productivity. IoT based rooftop farming enables to increases the crop yields, crop quality, and livestock management through enhanced the monitoring of soil conditions through sensors, better use of fertilizers etc... By using of different types of sensors it is easy to watering the plants in the absence of an individual the soil moisture sensors measure the moisture content in plants or soil and if the water content is low irrigation starts. Common sensor also can measure the amount of water in the soil where this sensor is installed. The common sensor works with all crops, plants, trees in any field so it can easily detect the moisture content in food crops that grown in roof top farming. It is compatible with all irrigation systems and at any stage of growth. It also good for all types of water, including clean, saline and purified. The most important thing is all peoples can cultivate food crops in their own houses if they live in flats also and people who doesn't likes farming can also make an encouragement to them for take part in farming and it promotes or helps to produce fresh food crops with free of chemical fertilizers.

2. IoT IN ROOFTOP FARMING:

Agriculture is the backbone of the economic system of a country. Farming meant that people did not need to travel to find food. That means we can cultivate crops in our home itself. Rooftop farming can be a viable option for urban agriculture on account of decreasing agricultural land, especially in Indian cities. It can a play a significant role in urban environmental management and enhance the continuously deteriorating quality of air while offering organic and chemical fertilizer – free produce based rooftop farming is a system built for monitoring the crop field with the of sensors and automating the irrigation system... IoT based rooftop farming is highly efficient when compared with the conventional approach. Usage of IoT in rooftop farming opens a wide range of advantages. It helps to sensing for soil moisture and nutrients, controlling water usage for optimal plant growth, determining custom fertilizer profiles based on soil chemistry etc... through the application of IoT without an individual or absence of an individual we can irrigate and fertilize the plants.

2.1 Sensors:

Sensors plays a key role in IoT rooftop farming. Different types of sensors can be used the usage of sensors is depends upon our choice's basis on their cost etc... Mainly soil moisture sensors, common sensors were used. Soil moisture sensors measures the volumetric water content in soil. Sensor uses capacitance to measure dielectric permittivity of the surrounding medium (plants). The sensor creates a voltage proportional to the dielectric permittivity and therefore the water content if the soil. The sensor averages the water content over the entire length of the sensor.

Common sensor is manufactured using the most advanced technologies. With common sensor, the plant itself draws the required amount of water and at the required time by opening and closing the irrigation, in the plot or field where the plant is located, common sensor is autonomous and also receives energy from solar panels. Common sensor's ability to measure the amount of water in the soil where this product is installed. Common sensor works with all crops, plants, trees. There is only the need of one common sensor unit per field to deliver the proper amount of irrigation.

2.2 Data logger:

A data logger is an electronic device that records data over time or in relation to location either with a built-in instrument or sensor or via external instruments and sensors.

2.3 Solenoid valve:

Solenoid valve is an electrochemically operated valve. They mainly used to regulate the fluid and to control the flow of fluid like water.

3. METHDOLOGY AND PROCEDURE:

Here presents a sample and simple application of IoT in roof top farming for irrigation and fertilizing of plants.
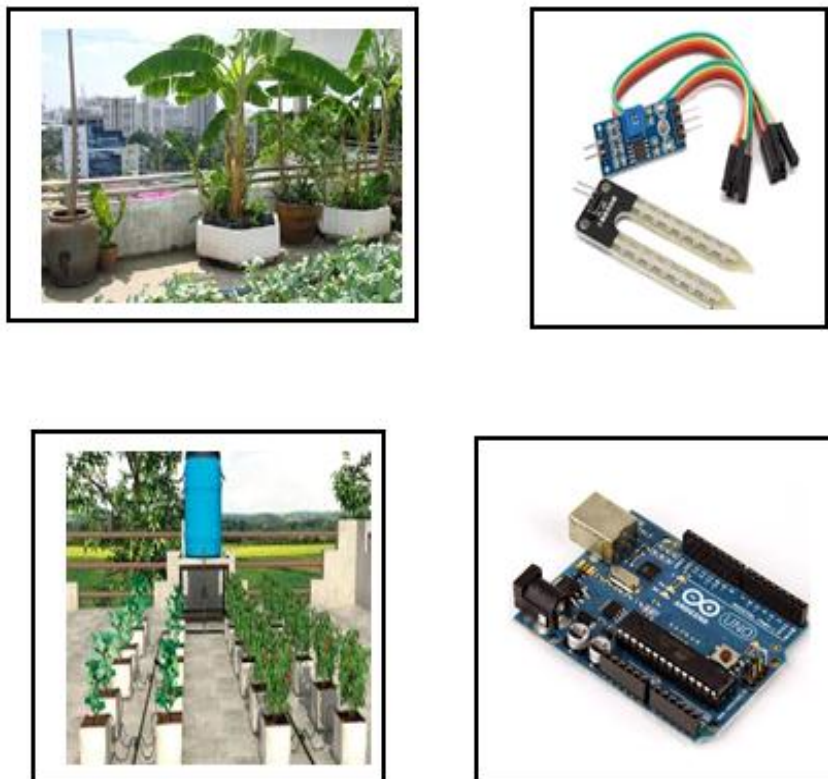

Figure 1. Indicates the pictorial representation of IoT application in rooftop farming for irrigation and fertilization of plants.

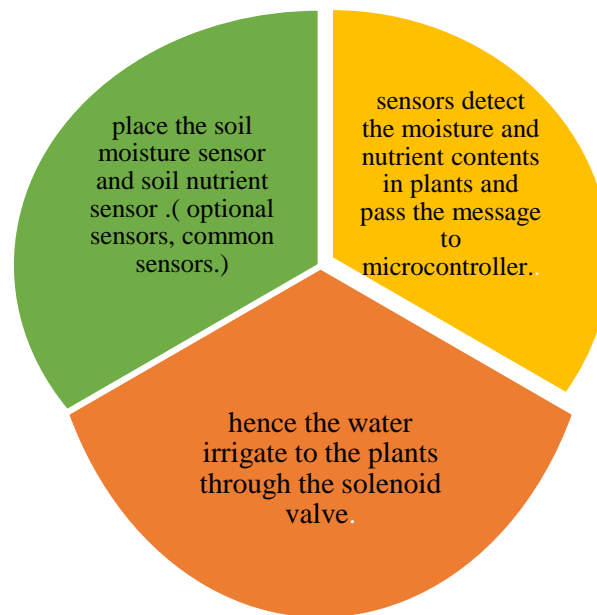- Using soil moisture and nutrient sensors irrigate and fertilizing the plants.

Figure 2. Process of irrigate and fertilizing of plants using IoT in rooftop farming.

- Soil moisture sensors and soil nutrient sensors installed at three locations and at two depths [6 and 12] were used with a datalogger and a 24VAC solenoid valve.
- The soil moisture values and nutrient values reached the lower threshold hence the irrigation is attained.

4. RESULTS AND DISCUSSION:

- ➢ Through the usage of IoT in rooftop farming its really useful to irrigate and fertilizing the plants.
- ➢ We can irrigate and fertilize the plants in the absence of an individual.
- ➢ Its really effective during lockdown periods and in pandemic situations.
- ➢ Different types of sensors are available for determine the moisture content and nutritive content in soil. Choosing of sensors depends upon our own choices. Water resistant sensors are also available.
- ➢ Really less cost and save time.
- ➢ Thus, we can produce healthier and fresh food crops to our dining tables from our home itself.

5. CONCLUSION:

There is a wide range of methods are available to make rooftop farming including the irrigation and fertilization of plants using IoT. When selecting a sensor consider its advantages and disadvantages and type of your soil that means what will work with your soil. Through IoT application in roof top farming we can make a farming land in all homes, apartments etc…with less cost and time and to reduce the extravagant uses of water, fertilizer etc…

6. ACKNOWLEDGEMENT:

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