

## MULTI PURPOSE SMART AGRICULTURE SYSTEM

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**ABSTRACT:** Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays a vital role in the growth of country's economy. It also provides ample employment opportunities to the people.[1] Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Internet of Things (IoT) is a revolutionary technology that represents the future of communication & computing. These days IoT is used in every field like smart homes, smart traffic control, smart cities etc.[2] IoT helps in better crop management, better resource management, cost efficient agriculture, improved quality and quantity, crop monitoring and field monitoring etc. In this project, we propose a Smart Agriculture System that uses Arduino, IoT and Sensors like temperature sensor, soil pH sensor, soil moisture sensor, humidity sensor, water volume sensor, Wi-Fi module, motor and LCD etc. This helps the farmers in cultivating the crop from seed throwing to crop harvesting. The data is also maintained for further farming and also supports power consumption regulation.

Keywords: Sensors, Arduino, IoT, Wi-Fi module, LCD

### INTRODUCTION:

IOT serves as a powerful, reliable and cost effective technology to implement the idea of "Smart Village" that aims to empowerment of villages with advance connectivity through web service, measurement of environment factors like Soil moisture, temperature, humidity and along with real time monitoring using GSM system.

Smart agriculture is a pathway towards development and food security built on three pillars: increasing productivity and incomes, enhancing resilience of livelihoods and ecosystems and reducing greenhouse gas emissions from the atmosphere.[3]

Introduction of Smart Agriculture System will result in an increase of crop productivity, use of renewable sources of energy which will be cost effective & require less labour.

Farming is the main occupation in India which accounts to more than 60% of Indian economy.[4] Use of ineffective means of farming leads to decrease in crop output requiring large manpower. Many farmers are abstaining from farming as they could not produce enough profit. We being engineers tend to propose innovative means of farming which will be cost efficient & will also boost the economy.[5]

### PROPOSED MODEL:

An Arduino Based Smart Agriculture System using IoT which can enable various technological methods to control the parameters like Soil moisture, Temperature, Humidity.

Our project also includes maintaining the overall data and stores in IoT and supports power consumption regulation i.e., the motor can turn ON and OFF automatically by using sensors. It can also handle the theft controlling technique for the protection of the crop in the field. [6]

The water management is performed well by using motors. Seed throwing is done by step-by-step using stepper motor in the first stage of cultivation and stores all the data and manages the field through Wi-Fi modules until the crop harvesting is completed.

It also deals with the precision agriculture and the power generation through Solar panels.

**1. Precision Agriculture:** Precision agriculture (PA) is an approach to farm management that uses information technology (IT) to ensure that the crops and soil receive exactly what they need for optimum health and productivity. The goal of PA is to ensure profitability, sustainability and protection of the environment.

**2. Seed throwing:** The precision seeding technique has been developed at full speed along with the continuous development of new agricultural technologies, especially those concerning cultivated patterns. The seed-metering device is the key component of a precision seeder. A ground wheel is used to drive the seed-metering device of the conventional direct seeder.

**3. Power Generation through solar panels:** Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using

concentrated solar power, or a combination. Photovoltaic cells convert light into an electric current using the photovoltaic effect[7]

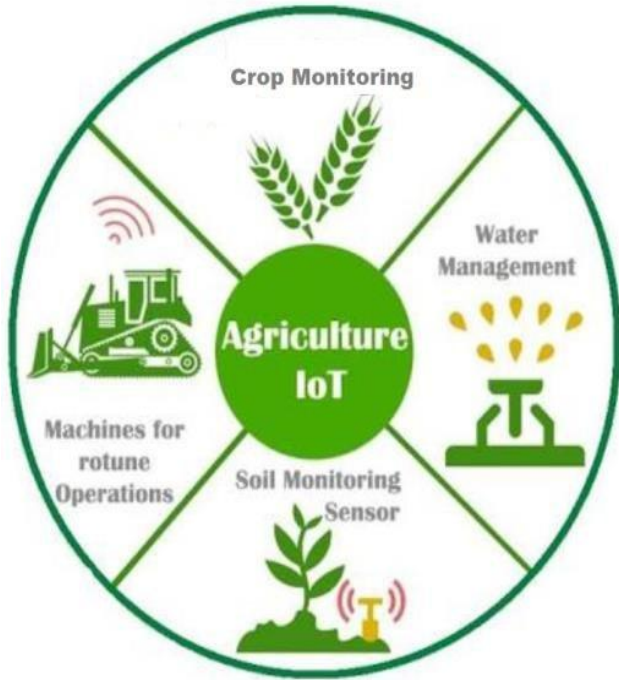


Fig 1 Agriculture IoT



Fig 3 Solar power supply implementation in agriculture

**Soil moisture sensor:** The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil.

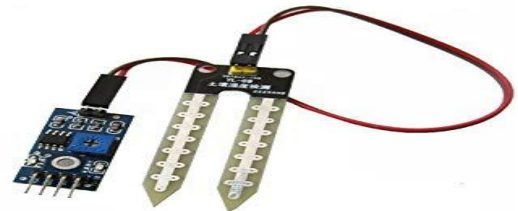


Fig 4 Soil moisture sensor

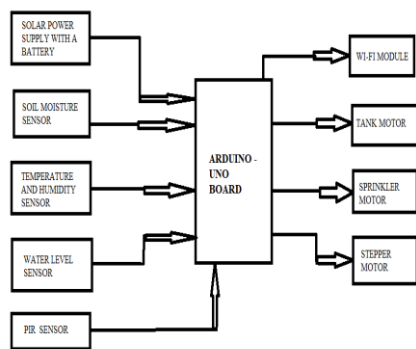


Fig 2 Block Diagram of proposed work

**Solar power supply:** Solar powered photovoltaic (PV) panels convert the sun's rays into electricity by exciting electrons in silicon cells using the photons of light from the sun. This electricity can then be used to supply renewable energy to your home or business.[8]

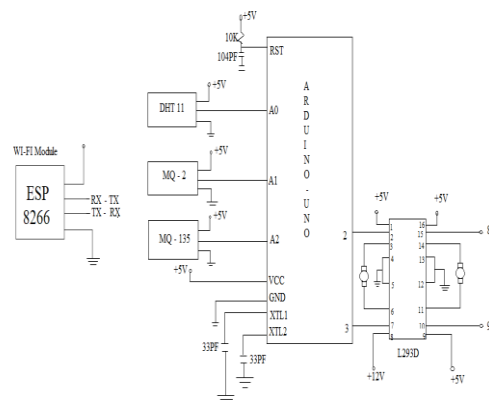
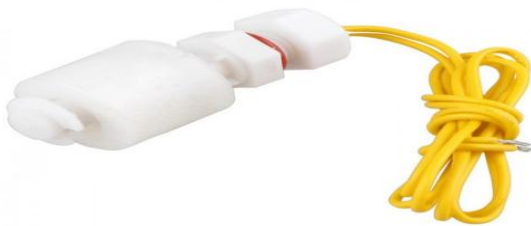


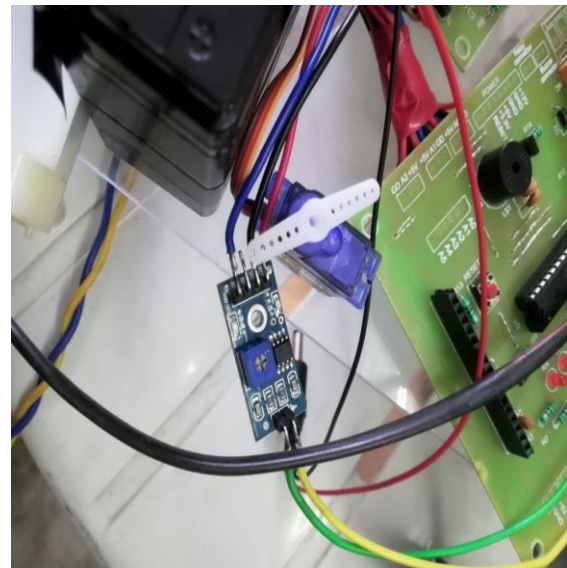
Fig 5 Components with circuit connection

**Water level sensor:** Water Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Such measurements can be used to determine the amount of materials within a closed container or the flow of water in open channels.

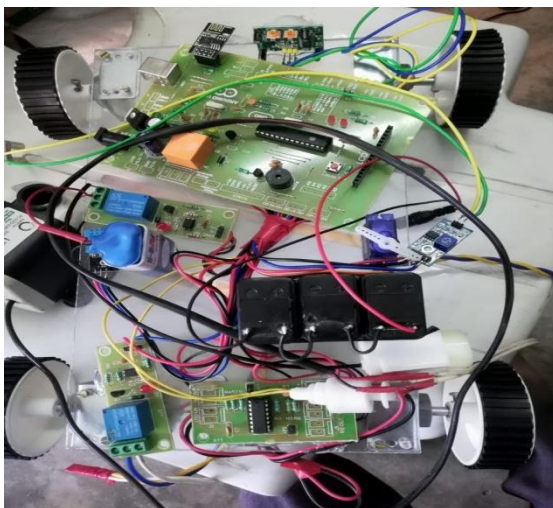


**Fig 6 Water level sensor**

**EXPERIMENTAL RESULTS:** Crop Management the sensors get the info associated with crop observation and send to the server. The server can implement action such watering the plants if the soil wetness below the edge values. Such actions square measure done by the server mechanically while not manual intervention.



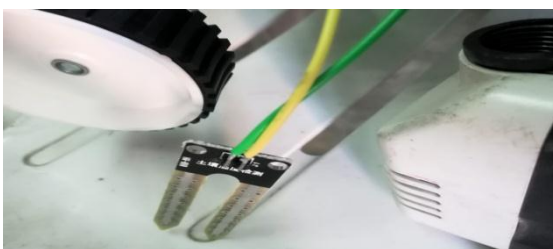
**Fig 10 Stepper motor for seed throwing**



**Fig 7 Implemented project**

**CONCLUSION:**

An Arduino Based Smart Agriculture System using IoT which can enable various technological methods to control the parameters like :Soil moisture ,Temperature ,Humidity Our project also includes maintaining the overall data and stores in IoT and supports power consumption regulation i.e., the motor can turn ON and OFF automatically by using sensors.[9] It can also handles the theft controlling technique for the protection of the crop in the field .The water management is performed well by using motors. Seed throwing is done by step-by-step using stepper motor in the first stage of cultivation and stores all the data and manages the field through Wi-Fi modules until the crop harvesting is completed. This idea of modernization of farming is straightforward, reasonable and operable. Solar panel with battery gives additional facility of the electricity. In this way it may be said that the work is highly useful for Indian farmers. This helps the farmers in cultivating the crop from seed throwing to crop harvesting. The data is also maintained for further farming and also supports power consumption regulation.



**Fig 8 Soil moisture sensor to sense the moisture level**

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**Fig 9 Temperature and Humidity sensor**

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