SMART FARM USING NODE BASED ESP8266

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Abstract- Farming has been the standard of richness of a country for hundreds of years, but now, Farming and agriculture is one of the least chosen professions by the current generation. One major factor is the fact that farmers are forced to move to different fields of work due to crop failures, water scarcity and so on. With automation reaching its prime, it could be employed in the field of agriculture to improve two aspects: rise in the number of people working in agricultural sector and improvement in yield hence reducing high man power to tend to the crops in a farm every once in a while. For a better plant growth, there are some major criterion such as temperature, humidity and moisture. Considering these factors, the system can be employed efficiently and dexterously. The system is completely automatic and is wholly powered by the NodeMCU I.E the ESP8266. As a result, adopting the smart farm technology would optimize agricultural process and help farmers to make effective use of available resources.

Keywords: Automation, temperature, humidity, moisture, NodeMCU, ESP8266

I. INTRODUCTION

Smart farming is an exclusive farming management system powered by IOT used to develop the quality and for efficient use of agricultural products. The present farming techniques employ GPS, data management and many more to which factors such as temperature, moisture and humidity can be added on, by indubitably adapting the strategic techniques, farmers can precisely increase the effectiveness of the

byproducts. Each and every aspect of farming can benefit from technological advancements—from planting and watering to crop health and harvesting. Most of the forthcoming agricultural technologies plunge into three sorts that are expected to be the pillars of smart farming: autonomous robots, drones, and sensors, within which sensors are considered as one of the critical part of agricultural development.Smart farms will have sensors embedded throughout every stage of the farming process, and on every piece of equipment. Sensors set up across the fields will collect data on, soil conditions, moisture level and humidity. That data will go back to the farmer, and the farmers will work autonomously based on the need of the crops. Excluding the sensors from the highlight, the microcontrollers such as NodeMCU and Arduino are considered as the preeminent equipment for smart farming. Using NodeMCU is better than using an Arduino as few types Arduino doesn't have inbuilt Wi-Fi module whereas NodeMCU is itself a Wi-Fi module and it can also be used as the Wi-Fi equivalent of Ethernet module. It combines the features of Wi-Fi access point as well as the microcontroller. These characteristics make the NodeMCU a sturdy tool for Wi-Fi networking. The technological development in the field of agriculture will in turn help in the development of crop growth in terms of quality as well as quantity which will lead to mass production of crops.

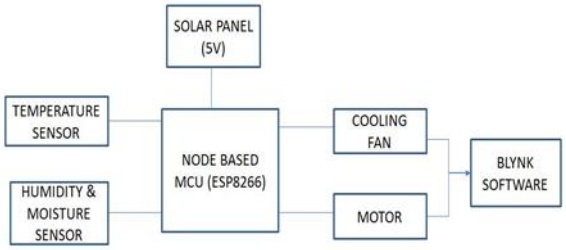


Fig.1: The Block diagram

II. PROBLEM STATEMENT

The farmers working in the farmland are solely dependent on rains for irrigation. Lately, farmers have been using manual techniques with the help of motor pumps for irrigation, which causes water loss in the long run as the system does not have specific amount of water to pump out every time, this causes the plants to be either under damped or over damped.
Another major problem with manual techniques is that, when a motor pump is in ON condition water starts flow towards the bifurcated parts which leads to the crops, in this case it takes time for the water to flow till the last crop and in some cases it may not even reach some of the crops. Hence, to avoid the particular quandary, smart farming must be brought in to act.

III. PROPOSED SYSTEM

In the suggested system, NodeMCU is considered as a crucial component on the whole. When any of the sensors present in the system senses any variation in the environment it immediately intimates it to the NodeMCU I.E it sends signal to the NodeMCU which in turn processes the required information. The NodeMCU is wholly powered by the solar panel of 5v which absorbs sunlight and converts it into electricity. The sensors such as temperature sensor and humidity & moisture sensor are linked to the NodeMCU, when the temperature surpasses the maximum temperature, the temperature sensor intimates the cooling fan which is connected to the NodeMCU and the cooling fan inaugurates itself to work which reduces the maximum temperature which will lead to better plant growth. The humidity & moisture sensor is linked with the DC motor. When, humidity and moisture of the soil declines the humidity& moisture sensor sends a signal to the spray and the DC motor, which provide water only when the moisture level is low, this helps in salvage of water. The data which is collected from the sensors are then sent to the blynk application which manages, controls and handles the consigned data and displays it in the form of graph or an indicator which will the help the farmers and notify them.

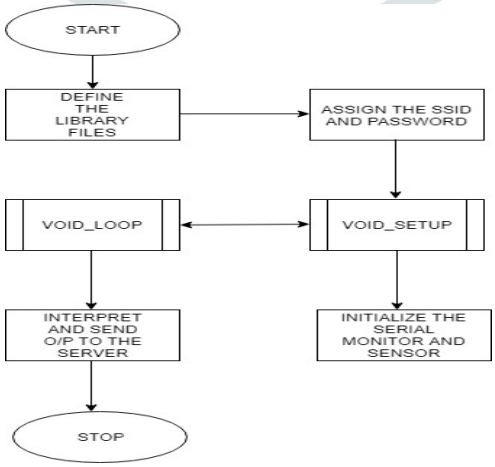


Fig.2: The Flow diagram

IV. EXISTING SYSTEM

There are colossal amount of systems present for smart farming and each differ from one another in their own ways. There are systems based on MQ telemetry transport which is an IoT based protocol which monitors and controls the functions of the system. The data is collected from a single farm or multiple number of farms which is accessed by the server and the data collected is stored in a database which is then shown as an output using a smart phone. In this system, an external user can access the server with the help of the internet and can control all the nodes connected to the server. The communication happens here with the help of the low power Bluetooth and Low Power WideArea Networks (LPWAN) communication modules. This system is used only in order handle the data virtually and not physically. There is one more system which is based on the Zigbee and GPS modules which is powered with the help of a battery. Here the microcontroller sends and receives the information using internet. Most of the other systems are far more complex when compared with today's farming techniques and hence it is kind of complicated to implement it in the smart farm.

V. SYSTEM ARCHITECTURE

The system developed in this project can be implemented in any of the farms which will make it a smart farm. The ESP8266 NodeMCU is one of the major component in the system, it is powered by the solar panel and it senses the data from the sensors present and sends it to the output devices. It is a highly integrated chip used to provide full internet connectivity and it also has an in-built Wi-Fi module. It can be directly programmed through USB port using Arduino IDE.

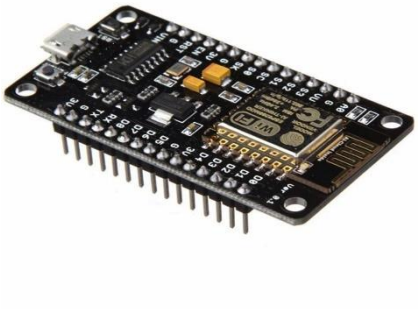


Fig.3: ESP8266 NodeMCU

In the proposed system, we use two main sensors, one is the soil moisture sensor which consists of two electrodes: the wetter the soil, the more conductive it is the less resistance it has and they're often very cheap to produce and quick to degrade. It operates predominantly by measuring the electrical conductivity of the soil.

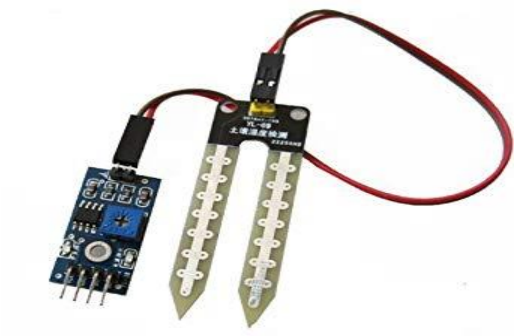
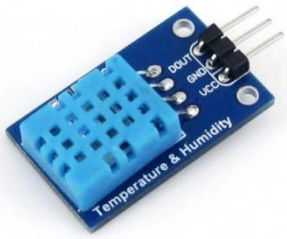


Fig.4: Soil moisture sensor

Another is the temperature and humidity sensor which features a calibrated digital signal output with the temperature and humidity sensor capability. Its technology fortifies the high reliability and excellent long-term solidity. This sensor comprises a resistive

element and a sensor for wet NTC temperature measuring devices. It has excellent value, response, anti-interference ability and



outrageous performance.

Fig.5: Temperature and humidity sensor

VI. RESULT ANALYSIS

Fig.6: Output

The given figure is the output for both the soil moisture sensor as well as the temperature and humidity sensor. The MOISTURE (%) in the above figure shows the moisture level in percentage and it varies based on the soil moisture level and an ideal soil moisture level can be considered as 45 to 60 %. The gauge on the left shows the particular room temperature of the present room. It collects and senses the data with the help of the temperature and humidity sensor and sends it to the nodeMCU which later sends the output to the Blynk which displays the output finally. The gauge on the right shows the particular humidity level in the room and the process is same as the gauge on the left but this gauge shows the humidity instead of temperature.

VII. FUTURE SCOPE

Right now, as efficient as our proposed model is, it can be enhanced to improve its capabilities and features greatly. Some of the adjustments or modifications that can be implemented into it can transform it into automated systems that can be used in various environments and can also be used on a large scale. Such as, multiple sprinklers can be connected to the device and necessary coding can be done to use it on a widespread area with multiple crops of the same species. If the proposed model is required to be used for an area with different crops, the model can be designed and coded in a way that it has the suitable humidity level and the necessary moisture level for the crop to grow in. With this in effect, one device can execute different processes based on the crops. If the model is to be used on a large scale farming area, it can be collaborated with Machine learning to identify the crops by itself and access the required data from a centralized database with the addition of any visual recognition sensor powered by python based scripts. The model can be mass produced and further used in multiple acres of farmlands that belong to the same farmer to deduce the statistics of every change in humidity and soil moisture levels along with an event log of every instruction executed by the NodeMCU, along with the usage of Big Data Analytics, the collected data from hundreds of acres can be all sorted and organized in a simpler and easier representation to evaluate the specific land and its output based on the comparison between its yield and the amount of nurturing done by the model with the amount of instructions executed as the variable. This form of analyzing the growth and yield of farmlands can further be used to grade lands in terms of efficiency and the lower yielding lands can be dealt with properly or even be put to use for a different crop altogether based on its conditions. There are multiple evolutions this model could take based on what it is set to be used for. As time progresses and when automation enhances farming and agricultural practices worldwide, this system would be a strong base to build up on.

VIII. CONCLUSION

Lack of mechanization is considered to be one of the reasons for the downfall of agriculture in India mainly. Since more than half of the farmlands in use are maintained by manual labor of the farmers and the man power that is currently doing it is estimated to decrease greatly in the years to come and hence, adopting automation and smarter ways to improve the way we cultivate and grow crops can prevent the country from facing a dark time of crisis when the manual methods tend to fall short all of a sudden. Right now, in case of small and marginal farms, the wasted human labor is very high and the yields are found to be very low per capita labor force. This makes the situation of the farmer in this case even worse than before since the money made from the already low yield is now split to be given to the labors, hence, leaving almost nothing to the farmer. With smart and advanced techniques such as our model, the labor force can be cut by a great amount without decreasing the yield, but increasing it greatly. This proposed model can be used for various purposed combined with the right components and coded with the required programming based on anything the farmer requires.

IX. REFERENCES

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