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Agriculture Enhancement Using Raspberry Pi

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Abstract - *As the world is trending towards new technologies and implementations it is a necessary goal to trend up in agriculture too. Using old school methods in agriculture slows downs its process and also less productivity is obtained. Therefore we are proposing the Automated Fertilizer System, in which through the mobile application the command is directed by the farmer for processing the fertilizers in farmers. The farmers send a command to the Bluetooth module which starts the Raspberry Pi and Power Supply. The sensor attached with Raspberry Pi such as temperature sensor and moisture sensor is always on Even if the Relay is off. The values of the Sensor are displayed on LCD. When Received Command from Power Supply the Relay is ON and then goes to fertilizer tank to direct for flowing into fields. If the Fertilizers are not available in the tank the Relay will be switched off automatically.*

***Key Words*: Raspberry Pi, Fertilization Tank, Relay and Automated Fertilizer System, Android Application.**

1. INTRODUCTION:

Agriculture uses the eighty-fifth of accessible fresh resources worldwide. This share can still be dominant in water consumption as a result of growth and multiplied food demand. there's associate pressing got to produce methods supported science and technology for property use of water, as well as technical, agronomic, social control enhancements [1].

Wireless device network refers to a gaggle of spatially unfold and dedicated sensors for observance additionally for recording the physical conditions of the atmosphere, organizing the collected knowledge or info at a central location. WSN detects live environmental conditions like temperature, sound, pollution levels, humidity, wind, and so on. These are units like wireless unintentional networks within the sense that they believe wireless property and spontaneous formation of networks so device knowledge unit usually transported wirelessly. WSNs unit spatially distributed autonomous sensors to seem at physical or environmental conditions, like temperature, sound, pressure, etc. and handy and glove pass their data through the network to the foremost location. The voluminous modern networks square measure bi-directional, on facultative management of device activity. The event of wireless device networks was supposed by military applications like a piece of land surveillance; recently such networks square measure utilised in many industrial and shopper applications, like technique observance and management, machine health observance, and so on.

Our System uses Bluetooth Module together with sensor to integrate the fertilizers into fields. The farmer gives command through the mobile application. The mobile application then passes the message to the Bluetooth Module. Bluetooth Module then directs power supply and Raspberry Pi. Power supply then turns ON the Relay. The Relay then directs the fertilizer tank to dispatch the fertilizers into fields. The Raspberry Pi turns ON sensor such DTH11 and moisture sensor. The values of these sensors are displayed on an LCD. If the fertilizers are not available then the relay will be turned OFF automatically. But the Sensors are always on and moisture the soil conditions.

Fig -1: The Automatic Agriculture System

2. LITERATURE REVIEW:

After analysis among the farming field, researchers discovered that the yield at intervals the agricultural field is decreasing day by day. However, the use of technology among the sphere of agriculture plays dominant half in increasing productivity place on as reducing men. Form of the analysis tries a unit of measurement in straits the betterment of farmers that offer systems that use technologies helpful for rising the agricultural yield.

Many researchers made earlier use of the wireless system network (WSN) in farms. Later sensors are used in agriculture to improve environmental enforcement. It helps to irrigate farmers. The fertilization system in agriculture has been enhanced with the help of the wireless device network system and to boot with the sensors. The sensor device used mainly for soil matrix operation and ground-level meter level. Thereafter adjustment was made to sensors and with the mixture of a hyperbolic WSN system to support the farm fertilization method.

Joaquin Gutierrez et al [1] an automated farming system was developed to pave the way for the use of water in water-limited areas of the plants. Here sensors and a microcontroller-based algorithm are used for tracking the water quantity. This system was tested and a result of 90 per cent was obtained compared to conventional farming in water-conservative field agricultural system areas.

Ahmad Ashraf Abdul Halim et al [2] the proposed control system is being built to optimize output yield, size, quantity and consistency at the Harumanis mangoes plant greenhouse. A greenhouse can shield the plant from volatile ambient weather, and by incorporating this tool into the greenhouse, all plant phases can be controlled depending on the farmer's wish.

Mengzhen Kang et al [3] a summary of the growth (the crop model), prediction, and the prescription were provided for the three steps towards parallel plant management. This explores the possibilities of transferring information from seasoned farmers to younger generations and the application of parallel plant breeding through this approach.

Maheswari R et al [4] Both descriptions and information relating to soil fertilization and climate alerts shall be given in accordance with their native language/language of interest in promoting the understanding of farmers. This program will help its participants work together and take it to a specific level of need to maximize their capacity for production. Such IoT devices are operated correctly, either by solar panel or electrical supply, to balance the power requirement across the sector.

Rekha Prabha et al [5] the work seeks to establish an efficient method of irrigation and fertilization. The proposed fertilisation approach directly distributes fertilizers to the heart. It decreases the number of necessary fertilizers and thus lowers costs and increases the quality of the soil. It has developed a user-friendly mobile app to provide farmers with this information in their local or zonal language. The generic chilli farming method was checked using a case study.

Pratap Tokekar et al [6] For Sampling, they present an O (r max rm in) approximation algorithm, where rm in and r maxes are the minima and maximum radii of the input disks. Second, they demonstrated how to use a metric graph to model the UAV planning problem and formulate an orientation instance to which a known approximation algorithm can be applied.

F. Viani et al [7] the proposed approach is incorporated into the network gateway which makes the system a truly smart and autonomous wireless decision support system. The empirical confirmation and the experiments carried out in a vineyard in northern Italy demonstrate significant water saving relative to other state-of-the-art methods based on parameter thresholding and increased use of irrigated water due to reduced percolation without affecting crop quality.

Alex Martinez-Agiree et al [8] Soil roughness affects microwave dispersal. So this paper was proposed to find the scale of roughness used in the backscattering process for the soil in agriculture. Eight different forms of ruggedness have been tested and reviewed. As a result, components of medium frequency roughness were observed as a required one for the soil.

Lokesh.K et al [9] it has a random forest algorithm and apriori gen algorithm for crop prediction and a recommendation for fertilizers.

D S Suresh et al [10] this is the microcontroller-based device used for automated soil testing equipment necessary for agriculture.

3. SYSTEM OVERVIEW:

The proposed program is for the creation of an automated farming system. Since this system consists of sensors as part of automation it reduces the efforts of farmers taking into account the physical labour needed in fields such as fertilizing and watering the farm. Instead of this, the time when the sensors run is that rather than manual. The excessive amount of fertilizers in this system may be that which can malfunction during manual service. It can then benefit from a high crop yield and fewer harm & side effects on the human body (the farmer's body). This also helps to ensure fair distribution of both the fertilizers and water to the crop. The proposed block diagram to the structure, as follows:

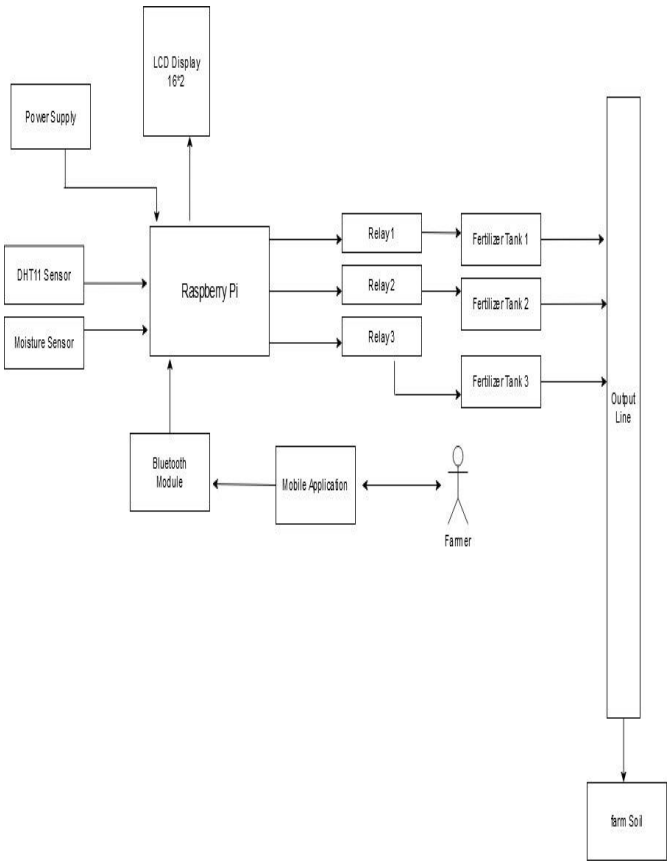

Fig -2: System Overview

The System embraces one master unit and other slave units. The slave units can use to sense the various parameter like temperature, moisture, etc. This data collected by the sensors is processed by the raspberry pi and this information is showed to the farmer or the user on displays utilized inside the system. As per the values of the info, the farmer then decides the proportion of fertilizers and water to provide to the farm for a given time. The relays connected to the motor starts the distribution and provided to the farm with the assistance of motors. We have a bent ought to be compelled to do to try to system protocol for that thus will we tend to induce the system diagram.

4. PROPOSED ALGORITHM:

4.1 Algorithm:

1. Start
2. Farmer's mobile
3. Android app
4. Bluetooth module ON
5. Fertilizer details send to Raspberry Pi
6. Raspberry Pi send the command to relay
7. Command executes on tank if relay is ON
8. Command does not execute if relay is OFF
9. Stop

4.2 Flowchart:

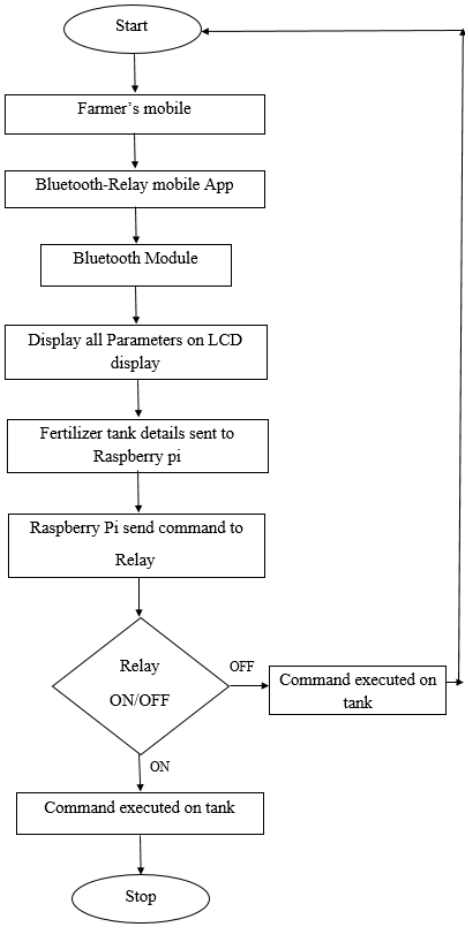

Fig-3: Flowchart

As per the flowchart, first, there will be the start of the model which tends to ON of the system. Then an android app of the proposed system should be installed in the farmer's mobile phone namely Bluetooth-Relay app. Then make ON the Bluetooth of the farmer's mobile. Due to the Bluetooth model farmer's mobile will get connected to the hardware system. Here we get a successful connection of the hardware system to the software system. Then by using the app farmer sends the data/amount of the fertilizer required to supply to the farm. This data is further connected to the motors required for the supply of the fertilizers send to the Raspberry Pi which is built on the system. Then Raspberry Pi sends the command to the relays which are.

If the relay is OFF, then the command will not get executed so there will be no further process of supply of fertilizer and the process will do not show any results. So the process starts from the first again. If the relay is ON, then the command will get executed by the tanks containing fertilizers and the fertilizer will get supplied to the farm by motors. Then the system stops after this execution and repeats again from the first.

5. RESULT SECTION:

5.1 LED Display Results:

The results are shown on the LCD (digital display). It will make the status of the methodology which operates the program easier to say.

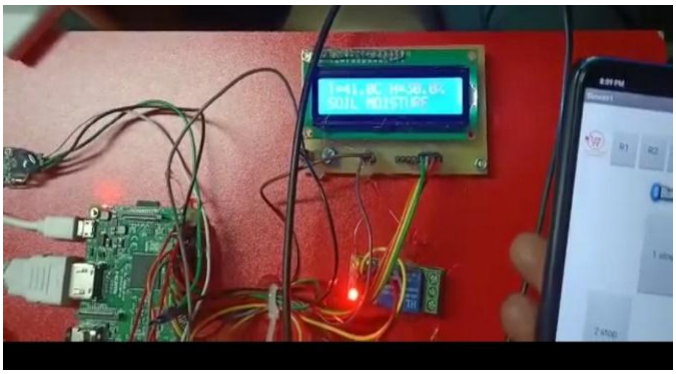

Fig -4: LED Display

5.2 Display of Android App:

The program features the result as follows. In these timings R1, R2, R3 is set at 30.60, 90 seconds for 3 different forms of fertilizer, namely N, P and K.

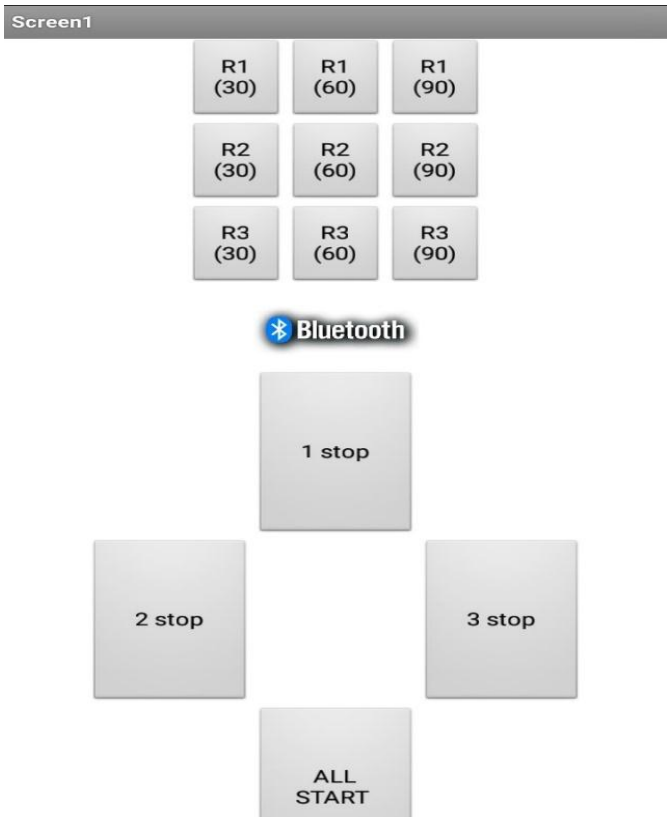

Fig -5: App Display

'All-start' helps to power the supply motors. The blocks, namely 1 stop, 2 stop, 3 stop, appear to stop motors 1, 2, 3 depending on the requirement, respectively.

5.3 Output of Working System Module:

The middle section, according to the machine view, consists of the machine-hardware parts mounted on the wall. This board have the raspberry pi screen, LCD monitor, moisture sensor, relays, motor and battery. On the right side are tanks of fertilizers which then supply the fertilizer to the crops. There are two separate bottles in one bottle on the left-hand side, filled with wet soil, and dry soil in another. The moisture sensor may be placed in each of them to count the soil's moisture, and the senor is mobile to measure it.

Fig -6: System Output

6. CONCLUSIONS:

Here we have discussed further elements that can be put into the development of automatic farming. Such a system is used to controls excessive and unnecessary use of fertilizers, to circumvent the hazardous effect on crops as well as on the human body. It can also help to control the richness of the soil. In this system, fewer fertilizers are used which tends to minimize the nutrient losses. By the use of various sensors, we monitor the soil moisture and environmental temperature, Humidity. These analyzed values are used to get efficiency in the agriculture field. This project can undergo further research to improve the functionality of the device and its application areas and attach more sensors. The benefits of this work are more efficient and accurate information is fetched, reduced manpower. The applications of this work are in farming fields, land and water division.

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