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Fully Advanced Water distribution System from River to Farm land Using Sensors with Motor Pump Based on Need Using IoT

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ABSTRACT: In this system, we proposed a fully advanced water distribution system from river to agriculture land by using motor pumps based on need. In this system, we not only distribute the water from the river, and also we did an agriculture automation system by using different types of sensors. The motive of the proposed system is to reduce the work of the farmers, and control the water management of land from long distances using IoT technology, and habitude the whole agricultural system. In this system many types of sensors used to monitor the soil like temperature, humidity, and Ph value. Here we used to monitor soil's condition, moisture and Ph sensor is used. To monitoring the temperature of the atmosphere temperature sensor is used. To monitor the status of air, humidity sensor is used. Further here water level detection sensors are used to detect the water level in well, and a water pump is used to transport the water from one place to another place. From well, the water is distributed to agricultural land through solenoid valve based on need. These all the factors are done by using the Internet of Things. By using this project work load of the farmers will be reduced, water will be managed perfectly.

KEYWORDS: IoT, Arduino, water level sensor, temperature sensor, humidity sensor, Ph sensor, moisture sensor, solenoid valve, and motor pump.

I. INTRODUCTION

Day by day, technology gets developing in this world. The developed technology reduces the human need and time also. Agriculture is the job of cultivating plants, raising domestic animals, and managing the natural resources. It provides food, vegetables, fruits, pulses, spinach, fibre, and other essential products for human survival. Agriculture makes the environment clean. Agriculture is the key source of income for many countries. The economic benefits of the agriculture are job creation, food security, rural development, and economic growth. In the past, it was observed. that there is much crop development in the world, but now, Day by day, agriculture will be decreased because many Industries replace the agriculture land for future development. Due to destroying the agricultural land there is no crop output, so prices of rice, pulses, vegetables, and Fruits will be increased. In present days, the government giving more subsidies for doing farming like, agricultural loan, and tariffs. The main benefits of agricultural subsidies are increased food production and increased job creation in rural areas, environmental conservation, and enhanced food security. The government is always ready to give subsidy but people are ready to do agriculture so only Agriculture practice will be decreased. In current days main reason for not doing agriculture is water issue because there no water source in their land. Those who are near the river side they can be able to take the water from river by government order with motor service. While taking water from the river, when the farm is distance from the river to making ON/OFF the motor pump, human effort will be needed. In order to conquer this, we proposed a new system that takes the water from the river based on need. Based on need, the water is taken and filled into a well, when the well reaches such a level the river motor gets stopped by Arduino and further agriculture automation systems also provided with this system, which uses different types of sensors to monitor temperature, humidity, moisture, and pH of the soil, when these all the factors are low, the water gets pumped from wells and distributed to agricultural land by drip irrigation method. This proposed system reduces the human efforts, and water management is good.

II. LITERATURE SURVEY

We started to research the advanced trends in the advanced farming techniques. We did a brief literature survey on others published works in this field.

[1] The paper “IoT in agriculture” uses different types of sensors like temperature sensor, humidity sensor, moisture sensor, for the operation. Water level sensor is used for operation for specifying the water level in the tank, based on need water get pumped into agriculture land.

[2] The paper “A research paper on smart agriculture using IoT” which consists of the moisture sensor, water level sensor, and buzzer for alarming. In this system buzzer get alarmed when soil moisture level low then the water gets pumped into farm land.

[3] The paper named “Smart agricultural system” which also contains moisture sensor, temperature sensor, ultrasonic sensor, and image processing. Ultrasonic sensor is used to detect the water level in the land. Image processing is used to detect the disease of the plant. These all the factors are controlled by Internet of Things.

[4] Our system not only sensing and here in our system, increases the water management and also habituates the surrounding environment.

III. PROBLEMS IN PRESENT AGRICULTURE

- Lack of power supply
- Lack of water
- Climate problem
- Low fertility of soil
- Diseases, which affects the plant growth.
- Lack of labours
- Losses in biodiversity
- Prices of fertilizer
- Problems in cropping pattern
- Land issue

IV. OBJECTIVES OF THE PROPOSED SYSTEM

- To reduce the costs
- To increase the sustainability
- To improve the crop efficiency
- To improve the management of water
- Livestock management
- To reduce the environment issues
- To enhance the crop quality
- To increase the yield
- To monitor farm and greenhouse conditions
- To boost the crop health

V. PROPOSED METHOD

We proposed an advanced smart farming system with fully advanced smart irrigation system. In this we took water from river by using motor pump after taken that is fed to well, well is used for storing the water for smart irrigation system. In well, we used two water level detection sensors one is fixed at top and another one is fixed at bottom. The top fixed sensor is used to stop the flow of water from river when it reaches the maximum level. The below fixed sensor is used to indicate the low water level in the well. When water get very low, the sensor fixed at bottom sends the control signal to microcontroller the microcontroller triggers the river motor pump through relay then the water will start filling. Once it reached maximum the water level sensor fixed at top sense it and sends a control signal to microcontroller to stop the river motor pump. At well motor pump is fixed to transport the water from well to farm land. The water from well to land based on need. Different types of sensors are used to monitor the soil. When the moisture content is very low the sensor sense and sends a control signal to microcontroller then the microcontroller triggers the motor pump fixed at well through solenoid valve then the water gets transported from well to farm. At

solenoid valve drip irrigation tube is fixed after that the water get flows to land by drip irrigation method. Here 2 to 3 solenoid valves used to split the land to equal flow of water. Here IoT plays an important role to controlling this whole via mobile phone through cloud. Here Blynk app is used for controlling process.

VI. SCHEMATIC OVERVIEW DIAGRAM FOR SMART FARMING SYSTEM:

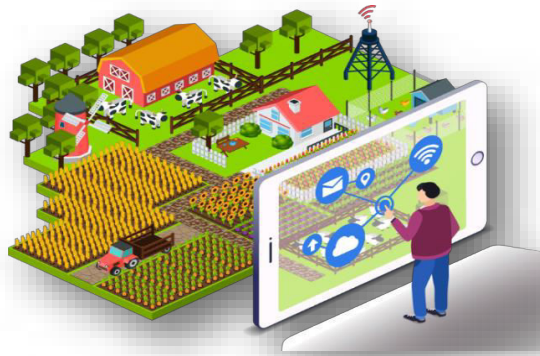


Figure-1: Mobile controlled smart agriculture

VII. BLOCK DIAGRAM

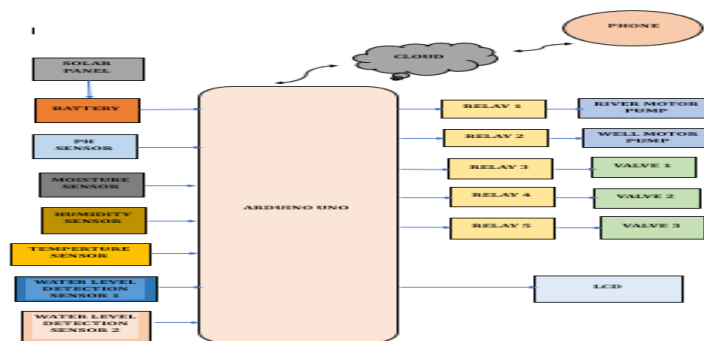


Figure-2: Block diagram

I) The main components in block

- ✓ Arduino
- ✓ Solar panel
- ✓ Battery
- ✓ Ph sensor
- ✓ Moisture sensor
- ✓ Temperature sensors
- ✓ Water level detection sensor
- ✓ Relay
- ✓ Motor pump
- ✓ Solenoid valve
- ✓ LCD

7.1. Arduino UNO



Figure-3: Arduino UNO

Arduino UNO is the advanced microcontroller. It is used to do some specific job based on the application. An Arduino consists of an AT-mega microcontroller; it is the brain of Arduino. It's clock speed is about 16 M Hz. It consists of 32 KB. flash memory, SRAM 2KB, and EEPROM 1KB. It consists of 14 digital input output pins, apart from these 6 pins used as PWM. It can support UART serial communication standard. The input voltage to power the Arduino is (7-12V).

7.2. Solar panel



Figure-4: Solar panel

Solar panels, which are also known as photovoltaic panels (PV). It is used to convert sunlight (photon energy) into proper electrical signal. Solar panels, which are made up of silicon. The advantage of using solar panels is renewable energy source, zero emissions, lower energy bills, and energy independence.

7.3. Battery



Figure-5: Battery

Batteries are an essential part in our daily lives. It is used to convert the chemical form of energy into electrical energy signal. There are so many types of batteries in electronic system that are alkaline-based batteries, nickel-Cadmium-based batteries, lithium-ion batteries, lead acid batteries etc. Advantages of using batteries are energy storage, mobility, and convenience.

7.4. Ph sensor:



Figure-6: Ph sensor

A pH sensor is an electronic device that is used to measure the alkalinity or acidity of a solution. It is a key tool that is used in biology, medicine, environment monitoring, and industrial purposes. There are more types of Ph sensors, like glass Ph electrodes, polymer Ph electrodes, etc.

7.5. Moisture sensor:

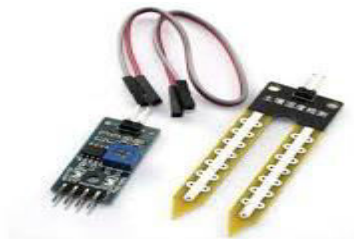


Figure-7: Moisture sensor

A moisture sensor is an electronic device that is used to convert moisture content in soil into a proper electrical signal. There are many types of moisture sensors, which are capacitive sensors, resistive sensors, etc. It is mainly used in agricultural land, industrial automation, smart homes, etc.

7.6. Temperature sensor:



Figure-8: Temperature sensor

A temperature sensor is an electronic device that converts environmental temperature or room temperature into a corresponding electrical signal. There are many types of temperature sensors, like thermostats, thermocouples, temperature transducers, etc.

7.7. Water level indication sensor:



Figure-9: Water level detection sensor

A water level sensor is an electronic device that is used to monitor the water level in the tank or others. There are many types of sensors, like float switch sensors, ultrasonic sensors, radar sensors, pressure sensors, and capacitive sensors. It is mainly used in water tanks, industrial purposes, irrigation systems, etc.

7.8. Motor pump:



Figure-10: Motor pump

Dc motor pump is a one type of pump which uses DC power supply to do pumping process. It is used to carry the water from one place to another place. There are many types of water pumps like, BLDC motor pump, and PMDC pump. etc. Advantages of using DC water pumps are high efficiency and compact design.

7.9. Solenoid valve:



Figure-11: Solenoid valve

It is also known as an electromechanical valve, which is controlled by a proper electric signal. It is used to inject fluids like water, oil, petrol, and diesel, etc. There are many types of solenoid valves that are 2-way valves, 3-way valves, 4-way valves, normally closed, normally open, and bistable.

VIII. STRUCTURE OF THE PROPOSED SYSTEM

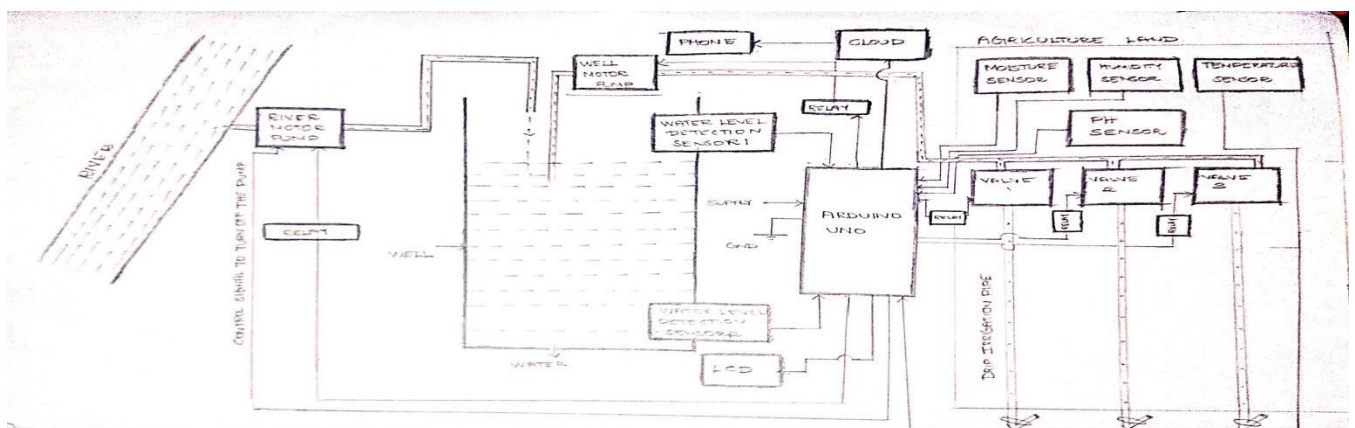


Figure-12: Structure of the proposed system

IX. ALGORITHM FOR THE PROPOSED SYSTEM

- Step 1:** Water level is sensed.
Step 2: If water below 20% the river motor pump gets “ON”.
Step 3: If water reaches the required level the river motor pump gets “OFF”.
Step 4: The sensors sense the status of soil, temperature, Ph value, and humidity of air.
Step 5: If sensors output value not lower than the required level. The well motor pump didn't get “ON”.
Step 6: If sensors output value is lower than the threshold, the well motor pump gets “ON”.
Step 7: After irrigation the soil gets required water level, then the sensor senses the soil, if the value ok then automatically well motor pump gets “OFF”.
Step 8: This process is repeated.

X. ADVANTAGES

- ❖ Reduced cost
- ❖ Efficiency will be improved.
- ❖ It boosts crop health.
- ❖ Good sustainability
- ❖ Fully automatic
- ❖ Yield will be increased.
- ❖ Livestock farming
- ❖ Reduced pollution
- ❖ Reduced human effort
- ❖ Time will be managed easily
- ❖ Weather also monitored.
- ❖ Good connectivity
- ❖ Cost savings

XI. NEED OF AUTOMATIC IRRIGATION

- Easy to install.
- Saving of energy and resources.
- Current bill will be avoided due to using solar panel.
- Time saving

XII. CONCLUSION

In India 75% people earns money in agricultural sector in recent days. Our Indian economy is fully based on agriculture. The progress of development in science and technology is not stop. The main motive of the proposed is to reduce the human effort, and manage the water level. Our system not only sense the agricultural land and also habituates the agricultural environment. This system is fully cost effective and feasible. It also focuses on optimizing the water source and it improves the productivity of crops, improving farming methods.

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