

Arduino Based Automatic Irrigation And Fertilization For Improved Agricultural Practices

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ABSTRACT

In the domain of farming, utilization of appropriate means of irrigation and fertilization is significant. The unplanned irrigation leads to lots of water wastage and improper fertilization leads to poor growth of crops. The aim of our project is to minimize the human intervention by farmers and save their time and resources using automated systems to irrigate land and fertilize the crops. The benefit of employing this technique is that it saves both water and time and reduces the constant supervision required for plants. This project is intended to create an automatic irrigation mechanism by sensing the soil moisture content and also to turn ON/OFF the fertilizer pump as required. The system consists of a soil moisture sensor which senses the moisture content of the soil and sends the status to arduino. The arduino processes the signal and sends the proper triggering signals to turn ON/OFF motors and simultaneously sends the status of motors and soil moisture level to the farmer via mobile application. The farmer accordingly controls the motor as per the requirements.

Keywords: Arduino, Soil moisture sensor, Irrigation and fertilizer pump

I. INTRODUCTION

The increasing demand for food requires rapid improvement in agriculture. Irrigation and fertilization plays an important role in improving the quality and yield. The farmers have been using manual control for both irrigation and fertilization these years. This process consumes more water or sometimes water supply to crops may be delayed due to which the crops get dried, and sometimes if the farmer doesn't fertilize the crops properly, the growth of crops slows down. This automated irrigation and fertilization system helps the farmers to save the time, money and resources. The irrigation and fertilizers pumps are turned ON and OFF according to the need. This system consists of soil moisture sensor, arduino, mobile app and pumps. The soil moisture senses the soil moisture content and sends the status of the soil to arduino. The arduino senses the signal, processes it and automatically turns ON/OFF the irrigation pump. The fertilizer pump can be turned ON/OFF whenever required through mobile app. Whenever the fertilizer pump is turned ON, the fertilizer and water mixes thoroughly in the mixing tank and then is sprayed to the entire field through sprinkler system.

II. METHODOLOGY

Soil moisture sensor is used to sense the requirement of water in the field. Next, the arduino process the information and operates irrigation and fertilizing pumps which supplies water and fertilizer through sprinkler system in the field. The water is supplied only when the moisture in soil goes below required value, which saves a lot of water. The mobile application is used to access the arduino and in turn relay. Mobile application saves time and manual labour and gives effective control over automated irrigation and fertilization system

III. WORKING

The user after he logs into the mobile application gets access to the notifications regarding the status of soil and system. He can also control irrigation and fertilization pumps through the application. The soil moisture sensor senses the soil moisture content and sends the information to arduino. The arduino processes this signal and accordingly switches ON/OFF the irrigation pump and

simultaneously sends the information about the status of motor and soil moisture level in soil to user via the application. This automatic turning ON/OFF of irrigation pump can be overruled by the control through application. When the farmer wishes to fertilize the farm he can turn ON the fertilizer pump just by accessing the mobile application. Once the fertilizer pump is turned ON, the fertilizer and water mixes completely in the mixing tank and from the mixing tank, it is sprayed to the crops. If fertilizer pump is not turned ON, only water is sprayed to the farm from the mixing tank.

Once both irrigation and fertilizer pumps are turned ON, the fertilizer and the water are pumped to the mixing tank where they get mixed, and from there it is pumped to the field. If fertilizer pump is not turned ON, only water is pumped to the mixing tank and from there the water is sprayed to the field through sprinkler systems.

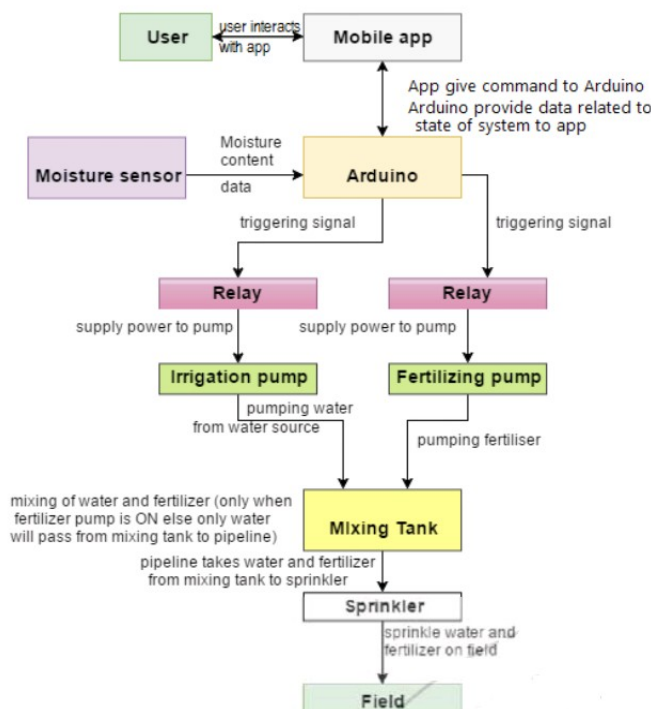


Fig1: Block diagram of working

Fig2: Present working

IV. COMPONENTS

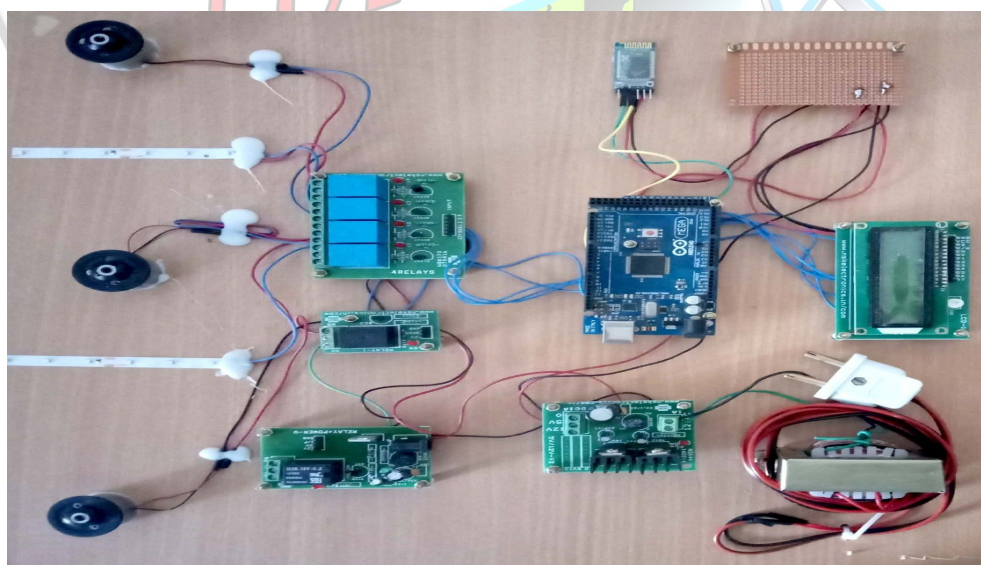
- **Soil moisture**
It is used to detect the soil moisture level. When the soil moisture drops below the required level, a signal is sent to the Arduino.

• Arduino

The Arduino receives the signal from the soil moisture sensor and accordingly turns ON/OFF the relay, which in turn controls the motors. Also, it sends the information about the status of the motor and soil to the user through the application.

• Mobile application

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model

USED

sensor
detect the content of soil. Whenever the content is marked or if the soil exceeds the required level, it sends a signal to the Arduino.



It is used to connect the user with the automated irrigation and fertilization system. A unique Id is provided to user using which he needs to login. Once logged in, he gets complete access and receives the information about time when irrigation pumps was ON, soil moisture content etc.

- **Irrigation and fertilization pump**

These pumps are used with relay which receives input from controller. Depending upon the input received by the relays, the pump are turned ON /OFF. The irrigation pump is turned ON/OFF automatically when the soil moisture level is above or below the required value. This can be overruled by controlling it through the app. The fertilizer pump is turned ON/OFF when the users call for it.

- **Relay**

It is an electrically operated switch. These are used where it is necessary to control a circuit by a separate low power signal. Arduino can't control high voltage and current but a relay can do this job.

- **Mixing tank**

When the fertilizer and irrigation pumps are turned ON, the fertilizer and water gets mixed in this tank, from here it is pumped and sprayed to field through sprinkler system. If fertilizer pump is not turned ON, only water comes into mixing tank and is sprayed to the field through sprinkler.

V. RESULT

- The soil moisture sensor accurately detects the soil moisture content and sends the signal to arduino accordingly.
- The arduino processes the signal and sends proper signal to relay to turn ON/OFF the irrigation pump and also sends the status of the motors and soil to the user via app.
- The user is able to control both the motors through mobile application and turn them ON/OFF as per the requirement.

VI. FUTURE SCOPE

This system can be used for organic farming (savayava krishi). Instead of fertilizers the organic manure in the liquid form can be pumped through the motor and mixed with the water and then sprayed to the field. This improves the yield, and the soil fertility which is reduced due to continuous farming is also replenished.

VII. CONCLUSION

In this busy life the farmers may sometimes find it difficult to irrigate and fertilize the field at regular intervals. This automatic irrigation and fertilization system helps them to get better yield as it supervises the field regularly and supplies ample amount of water as and when required. The fertilization also becomes easy as it eliminates the human intervention by farmers thus by saving their time and resource. Also through the mobile application the farmer can access the system easily.

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