

# e-Farmer: IOT Based Ultimate Guide to Farmer

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## Abstract

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. Soil, rainfall, temperature, and cropping system are the characteristics of Indian agriculture. Intensive cultivation as a result of introduction of high yielding requires higher energy inputs and better management practices. Land preparation, harvesting, threshing and irrigation are the operations, which utilize most of the energy used in agriculture. Now a days, irrigation water is a big issue. Therefore proper harvesting and efficient utilization of water is much important. Automating the maintenance process is of high importance. The proposed system is very helpful for the farmers who have huge agricultural lands. In agricultural lands automating the process of maintenance is by using lamps, motor, vibration sensor and soil induction sensor. Major source of light are near the entrance, near the pump house and lamps. Water pump sets are fitted in the agricultural lands for supplying the water to the soil and crops. Placing vibration sensors in and around the land helps to records the vibrations continuously for 24/7. Place sensors to sense the wetness/dryness of soil using soil induction. Thus agriculture automation is very helpful for the farmers who have huge agricultural lands.

## Keywords

IOT, RFID, Google Cloud Messaging, Automation, Agriculture, Raspberry pi.

## I. Introduction

Agriculture is the key backbone of the Indian economy and it will continue to remain so for a long time. It is need to support approximately 17 per cent of the population of world from 2.3% of geographical area and 4.2% of water resources. The characteristics of the Indian agriculture are soil, rainfall, temperature and cropping system. Intensive cultivation needs higher energy inputs and good management practices. As we know, all the irrigation system cultivated in India is operated manually. These all techniques can be replaced by semi automated and automated techniques. Ditch irrigation, terraced irrigation, drip irrigation and sprinkler system are some of the available techniques. The current situation can be categorized based on increased demand for good agricultural productivity, poor performance and less availability of water for agriculture. These issues can be eliminated by using automated irrigation system.

The present age group lives in the world of automation. Here the controlling and operation of all the things are done automatically. But there are lots of areas in this country where automatic systems are not yet been implemented and made feasible to farmers. The main reason behind this issue is cost. One of the fields where automation has to be implemented is agriculture. There are lot more demand on the side of food production which need improvement in food technology. As we all know agriculture is the backbone of our country, but it suffers from lack of water and scarcity of land water. It results in the decrease in volume of water which makes it difficult for farmers for irrigation. Irrigation can be considered as the artificial application of water to the soil. It mainly depends on the quality of soil. First we have to look at two things while agriculture comes into picture. One thing is the fertility of water. Second is the moisture content in the soil.

In the current trend, many irrigation systems are available which is used to reduce the dependency of rain. This system is operated by electric power and on/off control of motor.

Irrigation is nothing but the artificial application of water to the soil for the crops. India mainly depends on monsoon. It depends on the nature. It is not reliable so automatic irrigation system have its high importance in India. This system provides water to forms based on moisture content, temperature and soil types. Proper irrigation system must be implemented in agricultural fields. Because of this

it helps in reduction of human intervention and produces good irrigation system. Preparation of land, harvesting and threshing is main operations which makes use of much energy. To turn on/off of the irrigation valves are used. By using controllers and solenoids valves are automated. It means that farmers apply the right amount of water at proper time without considering the turn on/off of the valves by labors.

Thus we can say that automatic irrigation is the best tool which provides accurate soil moisture control in an efficient manner. This is the simple method. It also helps in saving time and helps in reduction of human error while adjusting moisture content levels in soil. Its maintenance is an important task.

## II. Literature survey

Lot of work has been carried in agriculture field. Some of the methods are discussed here.

- [1] Temperature, humidity and soil moisture content is monitored by greenhouse management system. Comparison of scheduled and automated system is carried out. By using this at right time the water is provided to the crops.
- [2] Growing of plants is recognized by cloud computing by pattern identification technology and by performing dynamic monitoring. Huge amount of data is collected using RFID, wireless communication and automatic control.
- [3] Introduction of the mobile application gives intimation to sensor kit and it suggests the farmer for proper irrigation. Also helps in cost savings. The database provides the explanation about the crop, its production in each state. This model provides big data analysis.
- [4] Farm management system (FSM) ia a framework which provides basic functions for service providers. But Farm management information system (FMIS) is independent software runs under user's computer. It has database connectivity. Self configuration, self healing and self protection are some of the characteristics. It helps in agriculture.
- [5] From many years remote sing wireless sensor network technology. By measuring temperature, this system monitors irrigation to the land. Automatic scheduling of system is also succeeded by using thermal imaging together with embedded

sensors and microcontroller.

- [6] The already installed systems deals with controlling of the drip irrigation based closed circuits automatically. The experiments are carried out for three irrigation lateral lines under three circuits: a) one manifold for lateral lines or closed circuits with one manifold of drip irrigation system (CM1DIS); b) closed circuits with two manifolds for lateral lines (CM2DIS), order to compensate for ETc and salt leaching requirement and take more power.
- [7] Grip irrigation system is proposed which is controlled automatically and it is GSM based. It helps in automation in green house too. The solution is adapted which contains data acquisition card PCL-812PG which is controlled by PC. This system is provided by hydraulic circuit based on electric pump. Water needs are calculated by measuring soil water status by soil humidity sensor.

### III. Proposed System

The main goal of this project is to automate the process of maintenance in agricultural lands. Under every abnormal situation alerts need to be sent to the land owner. This owner knows about his land and also crops even if the farmer is away from the land. This project is very helpful for the farmers who have large amount of agricultural lands. In agricultural lands there will be lamps. We are automating the process of maintenance.

- **Lamp** – near the entrance, the light is provided by lamps. During the sunlight this lamp should be turned off and turned on during sunset. The complete turning on/off of lamp is automated here.
- **Motor** – In the agricultural lands water pump sets are fitted to supply water to soil and crops. As it is designed pump set should be turned on when the soil is dry and when the soil is wet it should be turned off. This is automated here.
- **Vibration Sensor** – By placing the vibration sensors in and around the agricultural land helps in recording the vibrations continuously for 24/7. The limit is set called threshold above which the vibrations are to be noted and should immediately alerts to the owner of the land. When the wild and cruel animals enter the land it exceeds the threshold and alerts the owner. Then it broadcast sounds to send them away.
- **Soil indication** – Sensors are placed in order to sense the wetness or dryness of soil. When the land owner is not in the town and no one present nearby land then by sensing the dryness level in the soil owner can turn on/off the pump to water the crops.

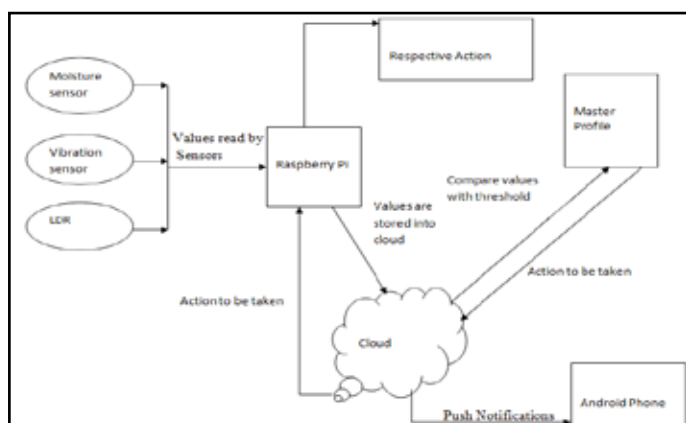


Fig. 1: Proposed system view

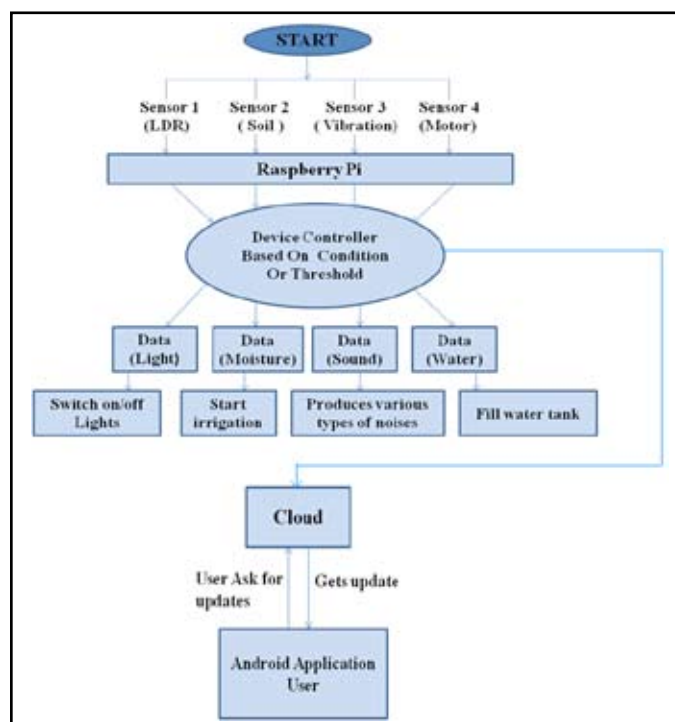


Fig. 2: Data flow diagram

During the automated process of maintenance of the agricultural land the vibration sensor, soil sensor and LDR are used. The motor also turns on to put water when soil is dry. These all devices connected to the raspberry pi board which in turn also connected to the controller where it makes the decision based on threshold. Based on the data such as light, moisture content, sound and amount of water controller just indicate the corresponding devices to response for the same. Based on the obstacles present around on/off control of the light is automated. All the values which are obtained are stored in the cloud. When the android application user asks for the updates cloud gives the proper results to user. Thus the system is said to be automated.

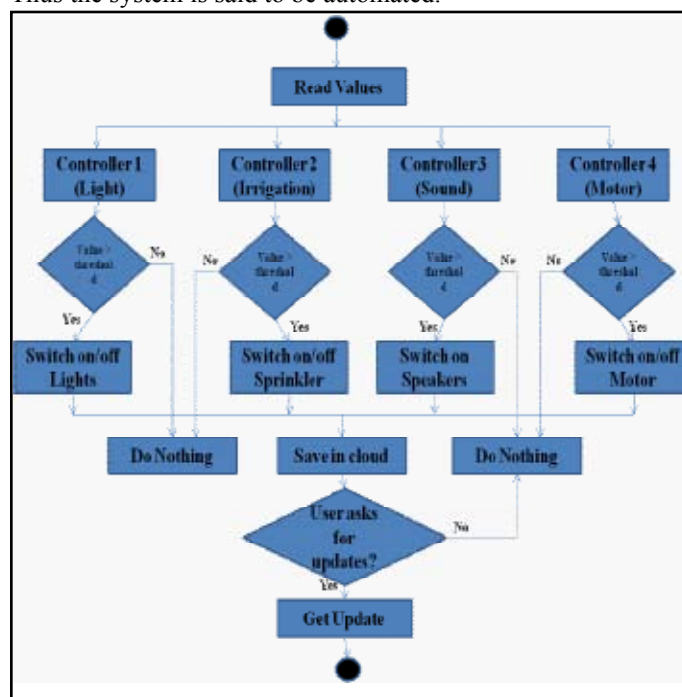
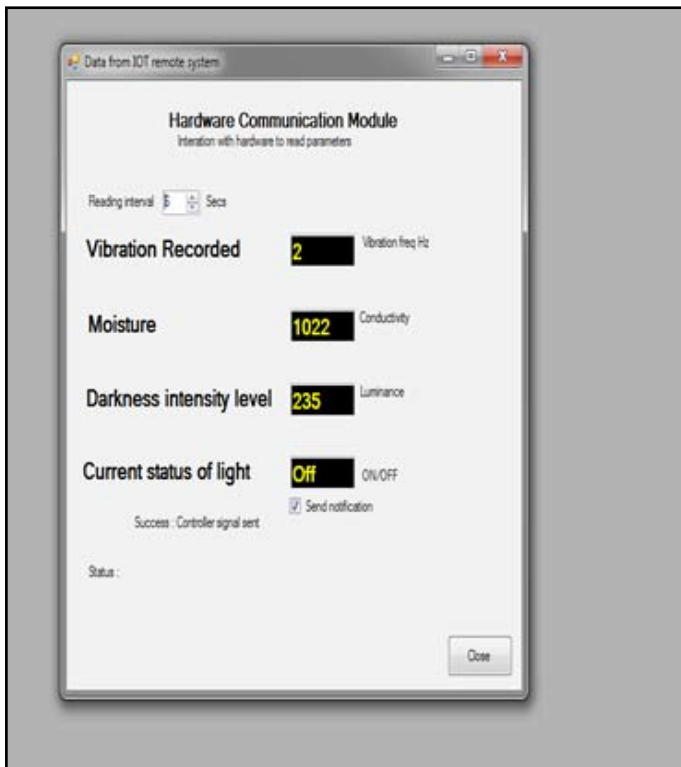


Fig. 3: Activate diagram

The logic behind the system is shown in the flow diagram. Raspberry pi board reads the values from the sensors and motor corresponding to light intensity, water level, vibrations and irrigation. If the values obtained crosses the threshold value then the corresponding results are stored in the cloud else it does nothing. If the user asks for the updates the cloud gives the proper updates to the user. Thereby it is said that the agriculture system is automated.

#### IV. Results

The novel system is designed which helps in automation of agricultural lands and farms. The front end picture of the results obtained is shown in the figure. It shows the values obtained from the cloud. The reading interval and checkbox “send notification” can be set as per requirement of the user.



Here you can adjust notification receiving interval. It has checkbox “Send notification” which gives an option to send notifications at mentioned interval. If this is not checked then user will not receive any notifications. It also displays values such as vibration recorded, moisture level, darkness intensity level, and current status of light which are uploaded into cloud. This window will appear only if the hardware is connected to raspberry Pi. If any changes occurred in the values it will send the notifications to the registered mobile.

#### V. Conclusions and Future Scope

Automating the process of maintaining the agricultural land and farms is of high importance in the current trend. The proposed system is mainly focusing on the automation. The developed modern technologies contribute to the business processes which help in the enhancement of the conventional farm management system. This is achieved by integrating processes like monitoring and operation of the farm management. It has specific capabilities which results in increased productivity. Based on the observed ideas this project is developed. The intelligent system is developed for automating this manual process. It monitors the conditions of the farm and keeps on telling the updates to the owner. The result

of this system is increase of product quality. This has resulted in improving product quality and business development in the farms field. Farm owners are able to access diverse set of information and data related to their farm, in an integrated and unified approach in order to take primary decisions. As a future scope we can think of adding the camera to the same system in order to capture the videos and images for the security purpose.

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