iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** IV **Month of publication:** April 2020

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IV Apr 2020- Available at www.ijraset.com

Development of Agricultural Plant Watering ECU

Snehal Patil[1], Mamata Ingale[2], Janhavi Joshi[3]
[1, 2, 3]*BE Student, Dept of Electronics and Telecommunications, PCCOE, SPPU University, INDIA.*

Abstract: ***India is a country with agriculture having paramount significance. Hence it is important to irrigate the plants in an astute way to get good production by maximizing the yield per unit space. Watering is the supply of an appropriate amount of water to the plants at a precise time. The objective of this endeavour is to irrigate the plants using the smart Agricultural electronic control unit called "AgriECU" in our smart watering system. To achieve this, using an open source platform we create an android application to manage, control and monitor all the processes taking place in the farm. This app is connected to our AgriECU over Wi-fi. Hence connectivity of the AgriECU and the android app is done. In this system, solar panels are used to capture solar energy and then it is converted into electrical energy which is used to charge the battery, which then gives the necessary power to our "Electronic control unit". Water is supplied to the plants at regular intervals of time by controlling a solenoid valve. The entire watering system can be monitored and managed by the android app. This app has a facility for controlling the watering of plants, both in manual and automatic mode. Our central unit is monitored and controlled over an app which gives our farmers to operate a watering system remotely. This brings an ease in the daily tasks of the farmers. Wastage of water and energy of the farmer is saved. The hardware in the AgriECU is all interconnected and configured to the app. Only the farm owner or the farmer has access to his account and can monitor and control his own space field crops and thereby save time and increase efficiency in the overall productivity and accuracy. This app may also contain several other features of controlling the pesticide control, monitoring the climate, predictions of the crops for maximum productivity using weather sensors. Every farmer may have their own accounts on the app to manage their farms.***

Keywords: Agriculture, Electronic Control Unit, Smart Farming, Solar energy, Android application, Watering system.

I. INTRODUCTION

We are the second most populated countries in the world and India is an agriculturally based prime country since around 61% of its available land is cultivated using various crops round the clock to feed the ever-growing population. Agriculture is one of the most fundamental income sources for all the farmers around the nation. Thus, agriculture can be deemed as the backbone of the nation economy contributing enormously to the GDP. In order to increase the productivity per yield there is a need to maximize the efficiency of various mechanisms replacing the traditional manual methods or techniques, some of which have long been practiced by traditional farmers. Agricultural implements and machinery are a crucial input for efficient and timely agricultural operations, facilitating multiple cropping and thereby increasing production. Agriculture consists of several methods and depends on a number of factors for a high yield like watering methods, soil moisture and content, manures, fertilizers, transportation facilities, seeding, irrigation, weeding, sowing and many more.

Out of all watering is one of the most important factors in the farming sector. There are two main methods through which farmers can water their agricultural land i.e. Rained farming and manual watering. Rain fed farming depends on direct rainfall where the risk of contamination is less. But it faces inadequacy of water levels when there is no or very scarce rainfall. On the other hand, when there is excessive rain, we need to implement water storage of the excess of water systematically rather than flowing through our fields and damaging our crops.

Also, watering refers to the artificial application of water through different methods. Watering system helps to grow crops with a minimum required amount of water, protecting the plants from frost and dust suppression. As a result of advancements in technology and a seemingly sharp decline of available manual labour adversely affecting the agricultural yield, the need for a proper utilization of available resources is imminent.

Internet of things (IOT) helps in the remodelling of agriculture enabling farmers to access a wide range of techniques which include monitoring the water supply to the fields. The entire watering system can be monitored and managed by the android app. This app has a facility for controlling the watering of plants remotely, both in manual and automatic mode. Online crop monitoring involves detection of weed, the quantity of water available, pest detection, soil moisture monitoring, weather monitoring, crop selection and so on. Android app enables the farmers to stay connected to events going on in the farm from any place and at any time. This brings an ease in the daily tasks of the farmers. Wastage of water and energy of the farmer is saved.

A. *Needs*

1) In our system farmers will be able to observe the operation even at home. Farmers don't need to be available on the farm for taking field updates and for monitoring purposes. They can get field information on their android app.
2) Amount of water required in the agriculture field needs to be maintained for healthy crops and good production. Watering system helps to grow crops with a minimum required amount of water, protecting the plants from frost and dust suppression.
3) As a result of advancements in technology and a seemingly sharp decline of available manual labour adversely affecting the agricultural yield, the need for a proper utilization of available resources is imminent.
4) Internet of things (IOT) helps in the remodelling of agriculture enabling farmers to access a wide range of techniques which include performing operations by controlling hardware.

B. *Objectives*

1) The main objective is to improve and stabilize the crop yields of smallholder farmers through the implementation of sustainable watering systems and the promotion of water management practices that optimize the volume of water distribution.
2) This system eases and gives simplicity for farmers to perform in fields and spend their extra or saved time in improving the yields or doing some other job.
3) As the system is operated using an android app it will reduce efforts and time. Farmers do not need to personally go and visit the farm frequently.
4) As we are using solar energy systems, we save electricity bills costing big numbers for AgriECU based watering systems which also attain the satisfaction of contributing towards the environment by using renewable sources of energy.
5) Agricultural electronic control unit optimizes usage of water in farming and kind of automates the process via android app. Similarly, along with watering we can automate other processes in the fields.

C. *Working*

In this system we aim to design and develop a control system using node sensors in the crop field with data management via an android app. The three main components are solar power energy, AgriECU controller and an android application.

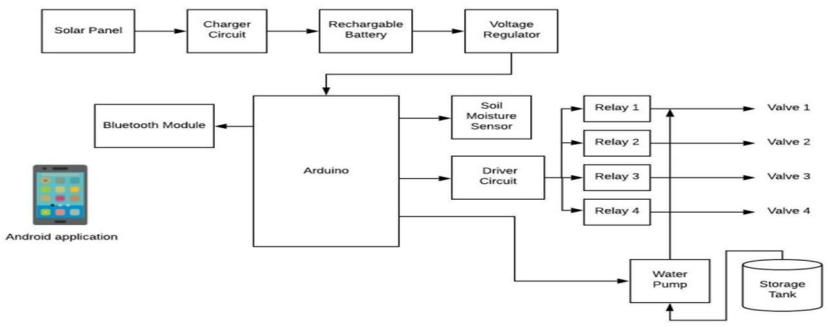
The first component is the generation and storage of solar energy in rechargeable batteries. This setup of 12v solar panel for energy harvesting is a good investment for farmers as they usually have the problem of high electricity bills. Though our AgriECU will need less power we will try and use renewable sources of energy so as to save the costing over electricity bills.

The second component was designed and implemented as AgriECU; a control box hardware connected to collect input data. A basic controller is used to control, analyse and pass on the data to the android app for further monitoring and controlling over Wi-fi. A controller is connected to all the sensors and actuators through digital input/output pins and hence the entire functioning takes place.

The third component is an android based application that was designed and implemented to manipulate the details of crop data, field information and various other activities. In this project we are focusing on the watering application of the agricultural system. Android app allows either automatic or manual control by the user. The automatic control uses data from soil moisture sensors for watering and automatically switches off the solenoid valve after a certain limit of soil moisture is attained. In manual control, the user is notified on the dashboard of the website to turn off the watering and then the user can click the button to turn off the valve. In this way, the user can opt for various options according to his needs.

II. BLOCK DIAGRAM

Figure 1



ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IV Apr 2020- Available at www.ijraset.com

Flowchart

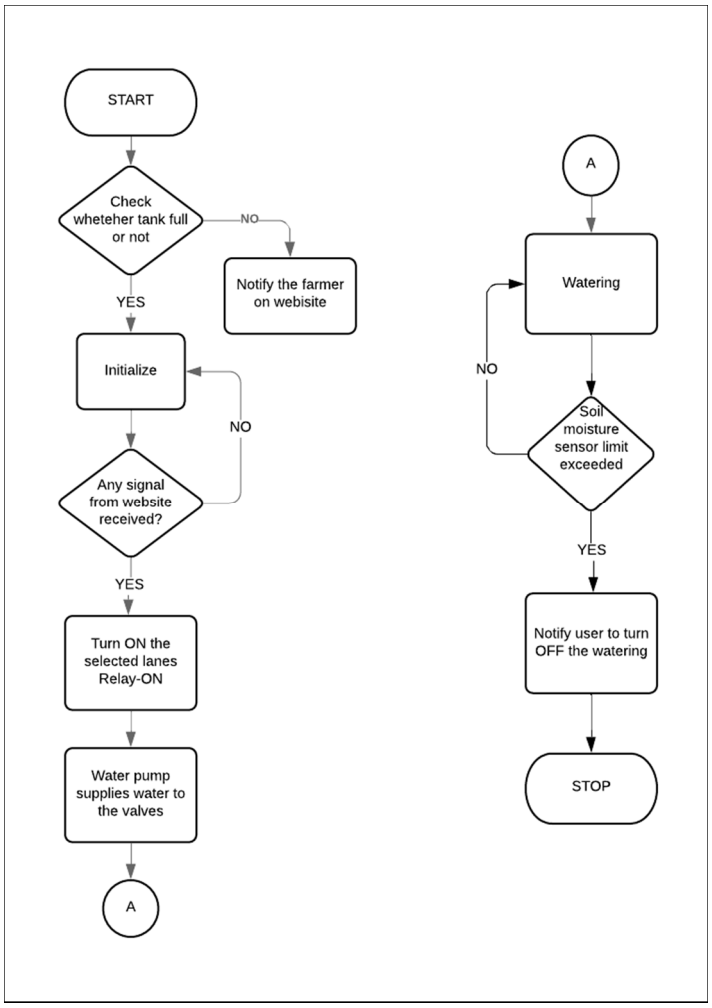


Figure 2

III. RESULTS AND DISCUSSION

The development of smart Agricultural ECU watering systems using android application is feasible and cost-effective. The system is completely automatic which turns on the solenoid valve using a relay. There is a facility of manual control of the valve in the app so that users can use the system more productively. The system is scalable with less modification to the core. This project creates awareness about automation in the agricultural field to increase the productivity. Here the manual intervention can be reduced by watering the plants automatically and the whole information about the agricultural field can be monitored and controlled using an android app smartly with the help of IOT.

A. Future Scope

1) The password-based android application can be developed in order to keep the individual farm systems in a secure way; and giving access to only authorized people to access the information.

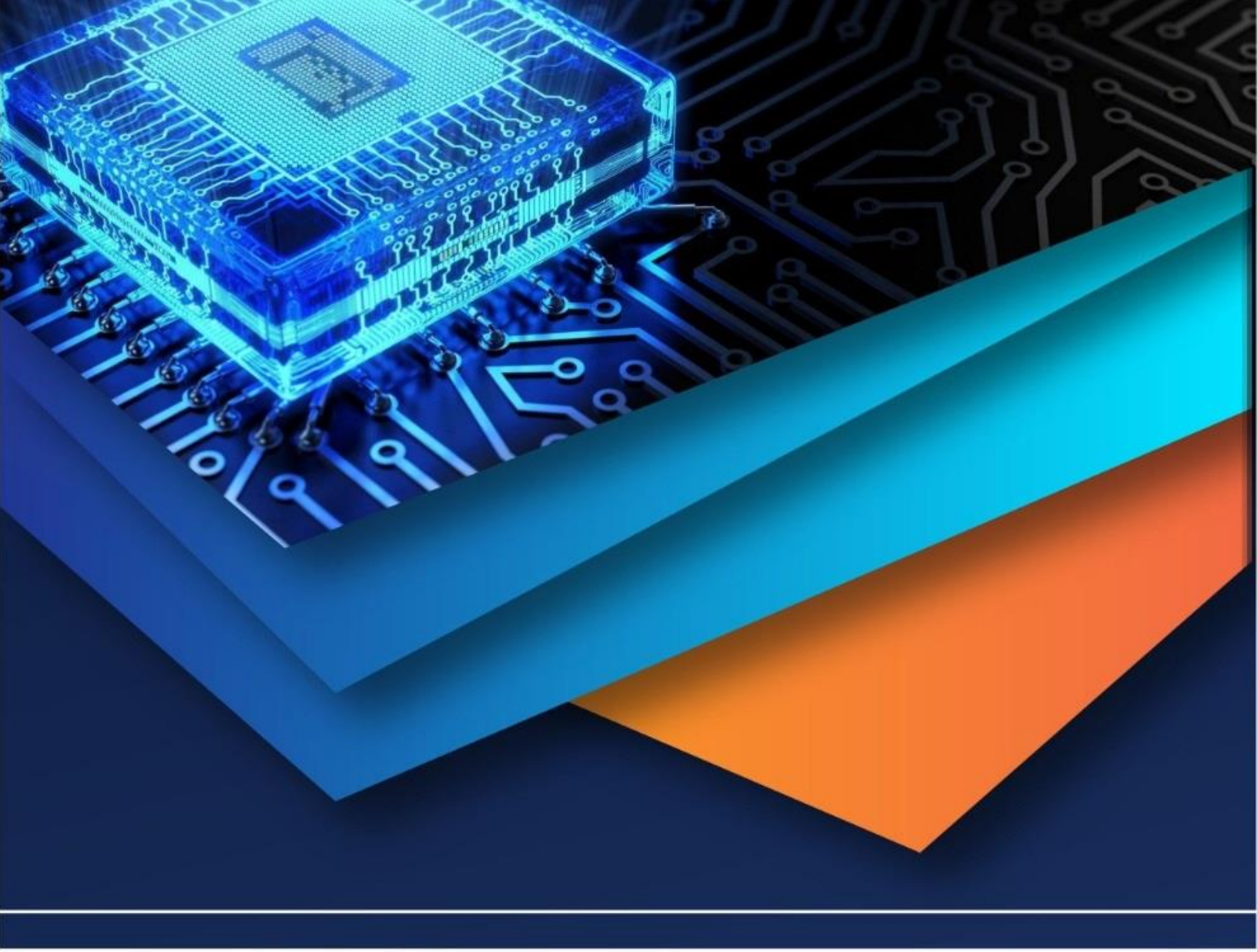
2) Database can be created in order to keep track of the sensor values and store the video recording of the field. Also, the need of water by each type of crops can be analysed by using Data Analytics and hence the farmer can decide every year which crop to sow according to the water and soil resources available to him.

3) In the presence of poor internet connection, the control of the system can be done through SMS or last updated information may be used as reference.

4) Deep learning and AI can be implemented to detect pest and disease in the soil or field through various algorithms and image processing.

REFERENCES

[1] Capello, F., Toja, M., Trapani, N., 2016. A real-time monitoring service based on industrial internet of things to manage agrifood logistics. In: 6th International Conference on Information Systems, Logistics and Supply Chain, pp. 1–8.
[2] Chen, K.T., Zhang, H.H., Wu, T.T., Hu, J., Zhai, C.Y., Wang, D., 2014. Design of monitoringsystem for multilayer soil temperature and moisture based on WSN. In: International Conference on Wireless Communication and Sensor Network (WCSN). IEEE, Wuhan, pp.425–430. https://doi.org/10.1109/WCSN.2014.9.
[3] Diedrichs, A.L., Tabacchi, G., Grünwaldt, G., Pecchia, M., Mercado, G., Antivilo,F.G., 2014. Low-power wireless sensor network for frost monitoring in agriculture research. In: Proceedings of IEEE Biennial Congress of Argentina, pp. 525–530.
[4] Fang, S., Da Xu, L., Zhu, Y., Ahati, J., Pei, H., Yan, J., Liu, Z., 2014. An integrated system for regional environmental monitoring and management based on internet of things. IEEETrans. Ind. Inform. 10, 1596–1605.
[5] Fourati, M.A., Chebbi, W., Kamoun, A., 2014. Development of a web-based weather station for irrigation scheduling. In: Information Science and Technology (CIST), 2014 Third IEEE International Colloquium in IEEE, pp. 37–42.
[6] Han, J., Kamber, M., 2006. Data Mining Concepts and Techniques, second ed. Morgan Kaufmann Publishers.
[7] Hashim, N., Mazlan, S., Aziz, M.A., Salleh, A., Jaafar, A., Mohamad, N., 2015. Agriculture monitoring system: a study. J. Teknologi 77, 53–59.
[8] https://doi.org/10.11113/jt.v77.4099.Kaewmard, N., Saiyod, S., 2014. Sensor data collection and irrigation control on vegetable crop using smart phone and wireless sensor networks for smart farm. In: Conference on WirelessSensors (ICWiSE). IEEE, pp. 106–112.
[9] Kamilaris, A., Kartakoullis, A., Prenafeta-Bold, F.X., 2017. A review on the practice of big data analysis in agriculture. Comput. Electron. Agric. 143, 23–37.
[10] Kanoun, O., Khriji, S., El Houssaini, D., Viehweger, C., Jmal, M.W., Abid, M., 2014. Precision irrigation based on wireless sensor network. IET Sci. Meas. Technol. 8, 98–106. https://doi.org/10.1049/iet-smt.2013.0137..



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY