ISSN: 2395-7852

International Journal of Advanced Research in Arts, Science, Engineering & Management

Volume 10, Issue 2, March 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 6.551

+91 9940572462 +91 9940572462 ijarasem@gmail.com www.ijarasem.com

International Journal of Advanced Research in Arts, Science, Engineering & Management (IJARASEM)

| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 6.551 |Bimonthly, Peer Reviewed & Referred Journal|

| Volume 10, Issue 2, March 2023 |

Solar Powered Smart Irrigation System Using Arduino

Prof.Shankar Pai[1], Divya J[2], Pratheek Suvarna[3], Rakshitha Shetty[4], Mohammed Mahroof [5]

Assistant Professor, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India[1]

Students of 8th semester, Department of Electrical and Electronics Engineering, Yenepoya Institute of Technology, Moodbidri, Karnataka, India[2 3 4 5]

ABSTRACT: The use of automated systems in irrigation provides precision and efficient watering for crops, leading to higher yields and reduced water usage. An automatic irrigation system utilizes various sensors and controllers to automate the irrigation process, reducing the manual labour required and ensuring efficient water usage. The solar panel captures energy from the sun and converts it into electricity which is stored in the battery. The water pump is powered by the battery and draws water from a water body and pumps it through the irrigation system to water the crops. The development of an animal detection system using sensors and microcontrollers to help prevent human-animal conflicts in farm areas. The IR sensors detect motion and will alert the property owner or a security monitoring service if an animal is detected within the sensor's range.

KEYWORDS: Automatic irrigation, Animal detection, Moisture sensor, Smart irrigation.

I.INTRODUCTION

Watering irrigation fields presents its own unique set of challenges. One of the primary issues is ensuring that crops receive the right amount of water at the right time and the other one is over-watering and under-watering Automated irrigation systems are technological systems designed to water plants automatically. These systems are increasingly being used in agriculture, landscaping, and gardening to efficiently manage water usage and improve crop yields. An automated irrigation system typically consists of a network of pipes, valves, and sensors that work together to deliver water to plants based on their specific needs. The sensors can detect moisture levels in the soil and adjust the water flow. Animal detection systems can play a crucial role in reducing wildlife-human conflicts, protecting crops and property, and promoting wildlife conservation. Animal detection systems can be used to protect crops from wildlife damage by triggering alarms when animals enter crop fields.
This can help farmers take appropriate measures to protect their crops and prevent crop damage.

II.LITERATURE REVIEW

[1]Yunseop (James) Kim, Member, IEEE, Robert G. Evans, and William M. Iversen. In this paper a distributed wireless sensor network for remote sensing and control of an irrigation system. It likely discusses the design, implementation, and evaluation of a wireless sensor network-based irrigation system, including the use of sensors to gather data related to soil moisture, temperature, and other relevant parameters, and the use of remote-control mechanisms to adjust irrigation based on the collected data.

[2] Narayut Putjaikal, Sasimanee Phusarel, Anupong Chen-Iml, Dr. Phond Phunhongharn, and Dr. Khajonpong Akkarajitsaku.This paper presents how Arduino, an open-source microcontroller platform, can be utilized in a farming setting to automate various tasks such as monitoring environmental conditions, controlling irrigation systems, and managing livestock. The paper highlights the benefits of using Arduino in farming, such as cost-effectiveness, scalability, and ease of use.

[3] Kriti Taneja Department of Computer Science Engineering Thapar University Patiala, India.In this paper the development of an automatic irrigation system using Arduino UNO, which is a popular open-source microcontroller platform. The design and implementation of the system, which aims to automate irrigation in agricultural fields based on various parameters such as soil moisture, temperature, and humidity.

[4] K. Shresta, N. Uprety, and H.K. Dhunge. This paper focuses on the use of infrared thermography for estimating crop water use efficiency (WUE). The paper highlights the advantages of using infrared thermography for WUE estimation, such as non-destructive and non-invasive measurements, high spatial and temporal resolution, and the ability to detect water stress in crops.

III. PROBLEM DEFINITION

In the case of traditional irrigation system water saving is not considered. Since, the water is irrigated directly in the land, plants under go high stress from variation in soil moisture, therefore plant appearance is reduced. The crop gets destroyed when an animal enters the field and there is a huge loss to farmers. The consumption of water increases day by day that may lead to the problem of water scarcity. Now a days, farmers are struggling hard in the agriculture field and the task of irrigating field is becoming quite difficult for the farmers due to lack of regularity in their work and negligence because sometimes they switch on the motor and then forget to switch off which may lead to wastage of water. Similarly, they even forget to switch ON the irrigation system, which again leads to damage to the crops.The absence of automatic controlling of the system results in improper water control system. The major reason for these limitations is the growth of population which is increasing at a faster rate. This proposed system consists of solar powered water pump along with an automatic water flow control using a moisture sensor. It is the proposed solution for the present energy crisis for the Indian farmers.

IV. METHODOLOGY

This system derives power from solar energy through photo-voltaic cells. Hence, dependency on erratic commercial power is not required. In this project we use solar energy which is used to operate the irrigation pump. The circuit comprises of sensor parts built using op-amp IC. Op-amps are configured here as a comparator. Two stiff copper wires are inserted in the soil to sense whether the soil is wet or dry. A microcontroller is used to control the whole system by monitoring the sensors and when sensors sense dry condition of soil, then the microcontroller will send command to relay driver IC the contacts of which are used to switch on the motor and it will switch off the motor when the soil is in wet condition. The microcontroller does the above job as it receives the signal from the sensors through the output of the comparator, and these signals operate under the control of software which is stored in ROM of the microcontroller. The condition of the pump i.e., ON/OFF is displayed on a display which is interfaced to the microcontroller and also sends the notification to the farmer. In our proposed work, when the animal enters into the farm area, the IR sensor detect the presence of the animal and send an input signal to the controller. Immediately, the Buzzer will be on, and the sound is played to divert the animal and also it is the indication to farmer. It alerts the farmer that some animals or birds try to enter into the farm.

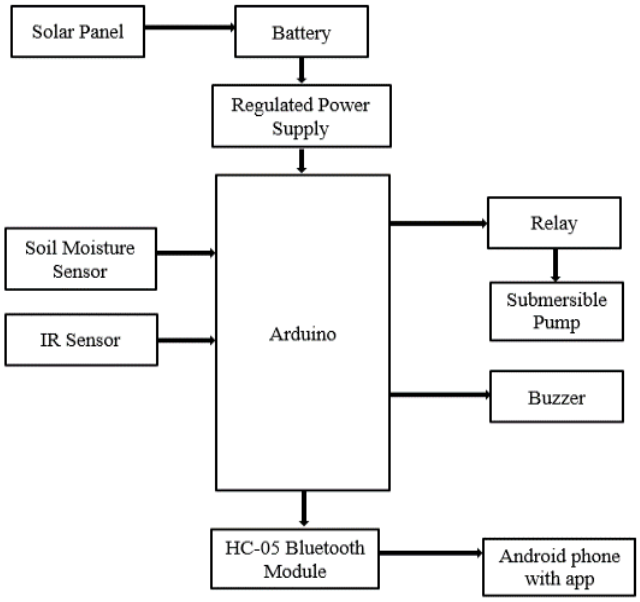


Fig.1 Block diagram

| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 6.551 |Bimonthly, Peer Reviewed & Referred Journal|

| Volume 10, Issue 2, March 2023 |

A.IR SENSORS

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment.These sensors are most commonly used in motion-based detection, such as in-home security systems. When a moving object that generates infrared radiation enters the sensing range of the detector, the difference in IR levels between the two pyroelectric elements is measured. The sensor then sends an electronic signal to an embedded computer, which in turn triggers an alarm.

Fig 2. IR Sensor

B. SOIL MOISTURE SENSOR

A resistive soil moisture sensor works by using the relationship between electrical resistance and water content to gauge the moisture levels of the soil.This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity). The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent.

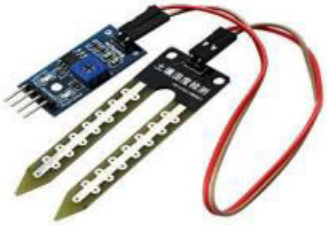


Fig 3. Soil moisture sensor

C.BLUETOOTH MODULE

A Bluetooth module is an electronic device that enables wireless communication between devices using Bluetooth technology. Bluetooth is a short-range wireless technology that allows data to be exchanged between devices without the need for cables or wires.

Fig 4. Bluetooth Module

D.SOLAR PANEL

Solar panels (also known as "PV panels") is a device that converts light from the sun, which is composed of particles of energy called "photons", into electricity that can be used to power electrical loads. Solar panels can be used for a wide variety of applications including remote power systems for cabin systems, telecommunications equipment, remote sensing etc.

Fig 5. Solar panel

E. SUBMERSIBLE PUMP

This motor is small, compact and light. It can be controlled from a micro controller/Arduino. It is usually used to pressurize, circulate, or pump water for different uses.Electric submersible pumps are multistage centrifugal pumps operating in a vertical position. Liquids, accelerated by the impeller, lose their kinetic energy in the diffuser, where a conversion of kinetic to pressure energy takes place. This is the main operational mechanism of radial and mixed flow pumps.

Fig 6. Submersible pump

V.RESULTS AND IMPLEMENTATION

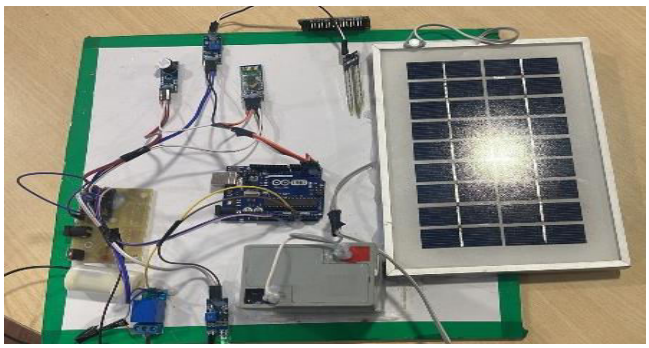


Fig.7Solar powered automatic irrigation system using Arduino

The system is able to detect the water level in the soil and accordingly the pump turns ON/OFF automatically. The farmer gets notified regarding the state of the pump.Power supply will be given by the solar panel or from regulated power supply.On the other hand, by using Arduino project for irrigating plants right amount of water is provided by calculating moisture content of plant soil therefore no water wastage at all. IR sensor is also used to detect any objects coming near to the farm or trying to enter the farm. A buzzer alarms, hence the animal moves away from the farm. In this project Bluetooth module is used to send a text message to the farmer or owner of the land regarding the water motor pump status This system helps in irrigation in areas with low water level and leads to sustainability. This system is very volatile and low maintenance and could be adjusted according to various types of crops without much human efforts. The system requires minimal maintenance and attention as they are self- starting. This system demonstrates the feasibility and application of using solar PV to provide energy for the pumping requirements for sprinkler irrigation.

| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 6.551 |Bimonthly, Peer Reviewed & Referred Journal|

| Volume 10, Issue 2, March 2023 |

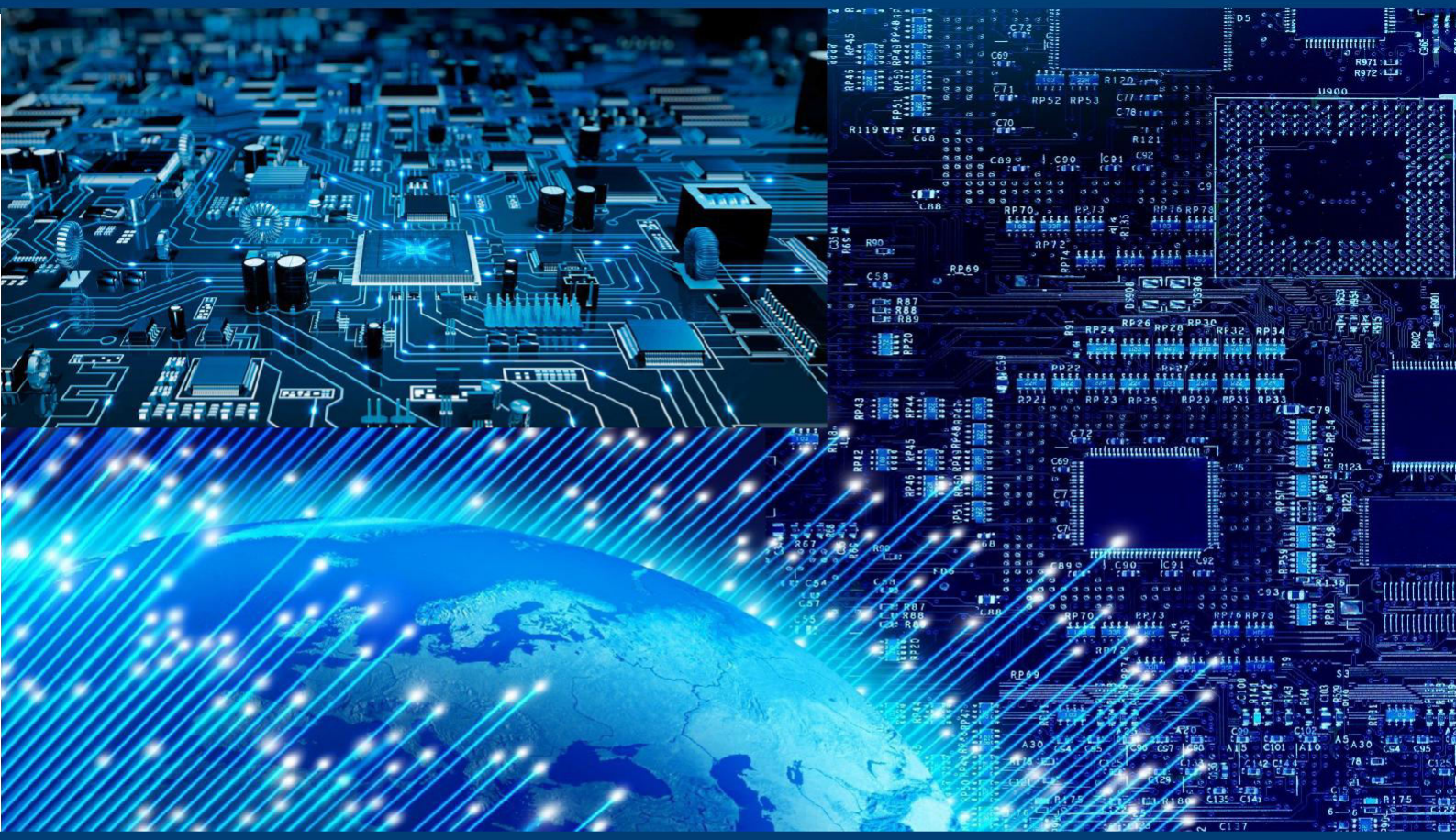
Even though there is a high capital investment required for this system to be implemented, the overall benefits are high and in long run this system is economical. In future this project can be extended to bigger level of agriculture as this project is only limited to farming at home.

VI. CONCLUSION

The Project 'Solar powered automatic irrigation system using Arduino' is used for the optimization use of water in agricultural field without the intervention of farmer by using soil moisture Sensor that senses the moisture content of the Soil using Microcontroller that turn ON/OFF the pump automatically according to the need of water for irrigation and hence helpful in saving water. Along with that IR sensor is used to detect any animal enters the field and protection is provided using the buzzer. This system is quite affordable and feasible. This system of irrigation is also helpful in the region where there is scarcity of water and improves their sustainability. And canalso be adjusted according to the need of varieties of crop to be irrigated

REFERENCES

[1] Yunseop (James) Kim, Member, IEEE, Robert G. Evans, and William M. Iversen Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network IEEE Transactions an instrumentation and measurement, VOL. 57, NO.7, JULY 2008.
[2] Mustapha, Baharuddin, AladinZayegh, and Rezaul K. Begg. "Ultrasonic And Infrared Sensors Performance In A Wireless Obstacle Detection System" Artificial Intelligence, Modelling and Simulation (AIMS), 2013 1st International Conference on. IEEE, 2013.
[3] Narayut Putjaikal, Sasimanee Phusarel, Anupong Chen-Iml, Dr. Phond Phunhongharn, and Dr. Khajonpong Akkarajitsaku. A Control System in an Intelligent Farming by using Arduino Technology 2016 Fifth ICT International Student Project Conference (ICT-ISPC).
[4] Kriti Taneja Department of Computer Science Engineering Thapar University Patiala, India Automatic Irrigation System Using Arduino UNO International Conference on Intelligent Computing and Control Systems ICICCS 2017.
[5] K. Shresta, N. Uprety, and H.K. Dhunge "Estimation of Crop Water Use Efficiency Using Infrared Thermography" IEEE Sensors Journal 2018.
[6] Samy Sadeky, Ayoub Al-Hamadiy, Bernd Michaelisy, Usama Sayedz," An Acoustic Method for Soil Moisture Measurement",IEEE2004



International Journal of Advanced Research in Arts, Science, Engineering & Management (IJARASEM)

| Mobile No: +91-9940572462 | Whatsapp: +91-9940572462 | ijarasem@gmail.com |