

## CROP PROTECTION AND ANIMAL DETECTION SYSTEM

Shashank H N<sup>1</sup>, Subash S<sup>2</sup>, Suhas R<sup>3</sup>, Vithesh Gowda A R<sup>4</sup>, Savitha M M<sup>5</sup>

<sup>1,2,3,4</sup>Student, Department of Electronics and Communication, SJCIT, Chikkaballapur, Karnataka, India

<sup>5</sup>Professor, Department of Electronics and Communication, SJCIT, Chikkaballapur, Karnataka, India

\*\*\*

**Abstract** - In forest zone agricultural fields humans and animal conflict is a major problem where large amount of crops is lost and farmers life is in danger. Because of this farmer lose their crops, farm equipment, and sometimes farmers live. So this zone is to be watched continuously to protect the agricultural field from the entry of wild animals. With regard to this problem, we have developed the system which will monitor the field. That is at first it will detect intrusion around the field using camera system capture the image if there is an unauthorized entry and classifying them using image processing and then takes suitable action by detecting the type of the intruder. Finally sends notification to farm owner and forest officials using Message.

### 1. INTRODUCTION

India is mainly depended on agriculture and 70% of India's income is from agriculture. In this project we are developing the model which prevents damage to crops caused by heavy and uneven rainfall. This system is developed with the help of embedded System design using WIFI technology. The main aim of this project is protecting the crops from heavy rainfall by covering the field from heavy rain automatically with the help of rain sensor and also to store the collected rain water. The saved water can be used for other purposes such as feeding animals, washing, drinking, cooking etc. India is an agricultural based country. Agriculture is India's most important economic sector. Though maximum population of India depends on agriculture, there are many problems faced by farmers. Problem caused by wild animals is a major problem where large amount of are increasing. So this zone is to be watched continuously to prevent entry of the animals or any other unauthorized entry. Human animal conflicts arise due to encroachment and illegal hunting,

humans enter into the forest to satisfy their livelihood, for claiming of land for agricultural practices and rapid industrialization thereby reducing forest area and animals enter the nearby villages for water during the summer due to scarcity of water body. Elephants or wild boar enters agricultural field in search of nutritious food. Need of the animal or human imposes real danger, in this process, crops are spoiled and sometimes even there is a death. Human-elephant conflict is more in south Asia and in Africa. Usually the technique used to protect farm is painful to the animals. Which makes animals behave abnormal and causes serious damage to resources.

### 2. OBJECTIVE

Crop protection and animal intrusion system helps to develop a security system for the protection of farm and prohibit the entry of animal to the farm, system use IOT module for alerting the farmer. It also helps in Protecting crops from Wild Animals The system ensures that the alarm is not triggered by the presence of a human in the field, or via any random motion.

The system is capable of turning on/Off automatically and warding off the animals thus protecting the fields from any damage. Also, we can setup a timer as per farmer's requirement. In addition, this system avoids damage caused to crops from heavy rainfall and extreme weather conditions, generating the power from rain water and solar panel, sending information to the authorized person.

### 3. METHODOLOGY

Literature Survey will be made to understand the designs and developments made in Rain water, Humidity and Infra-red sensors. Pre-requisite data

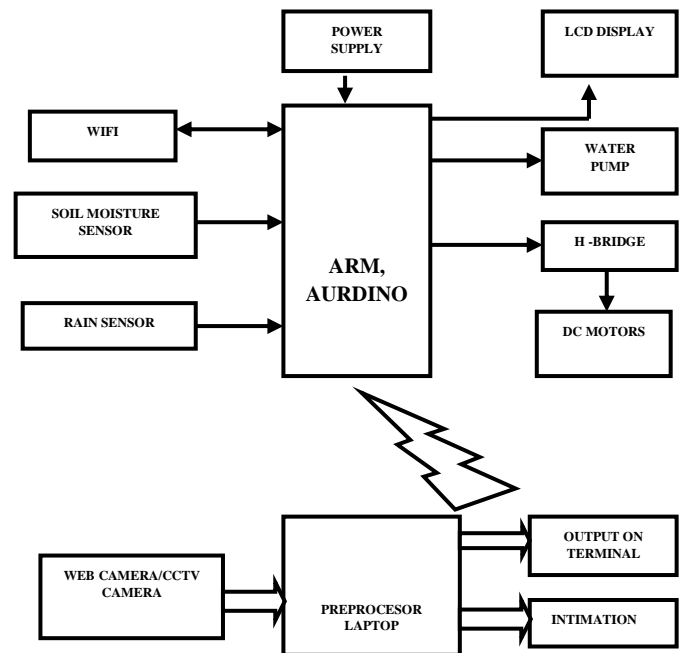
for the design specifications of Rain water, Humidity and Infra-red sensors unit is extracted from the available reference journal publications meeting the desired specifications.

The Rain water, Humidity and Infra-red sensors units will be developed with discrete components on printed circuit board after choosing the appropriate components to match the obtained design as closely as possible. The interfacing of microcontroller with the hardware is done for processing of signals. The functioning of rain sensor, humidity sensor and infrared sensor is observed and recorded. The power is supplied using renewable energy sources as solar power.

#### 4. LITERATURE SURVEY

This chapter explains existing agricultural problems faced by the farmers in the society. This project provides automatic watering machinery which will work based on humidity and temperature sensor. Rain water sensors are implemented to get information regarding rain, so desired or undesired crops can be covered. Weather condition may vary from place, water requirement varies from crop, excessive rainfall or scarcity of water damage crop. To make the system more effective drip lines can be laid down so water directly reaches to roots. This design will sense when motion is detected the controller will initiate the camera to take a picture and send the image to farmer according to program written in python environment. In motion detection system there is process of detecting changes related to objects and surrounding environment. The video based surveillance system generally useful for identification of the animals or human images or frames whenever they enter the agricultural field by ringing the alarm. A new procedure is used to identify and analyze the period of motion as detected from both static camera and moving camera. By using motion detection, it saves the monitoring time and cost. A real time device has been developed to detect and classify the objects periodically. We can use frequency analyses to detect the regular motion. we can also capture the image and classify them based on image processing algorithm.

#### 5. BLOCK DIAGRAM



The entire overview of the system is shown in the above figure. The major components are classified as sensing unit, control unit, display unit, identifying unit and alerting unit. The sensing

unit comprises of humidity sensor and rain sensor. Control unit consist of Arduino Atmega 328 which is heart as the framework and controls the operation of the other sensor, furthermore, the DC motor are driven using H bridge motor driver. Camera interfaced with raspberry pi 3 is used for detecting animals or unauthorized human entering the field. Alerting is based on cloud which make use of IOT to inform the farmer about the situation in the agriculture field.

## 6. FLOW CHART

### 6.1 Irrigation Control System

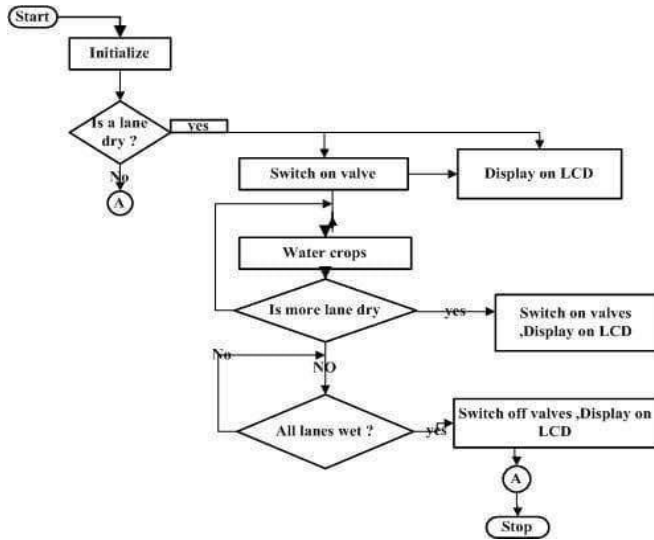


Fig: Irrigation Control System

This flow chart explains how the irrigation process takes place in the agricultural field. Periodically the moisture in air and in the soil will be monitored using the sensors. The field will be watered, if the moisture content goes below the pre-defined value. Even rain water harvesting is done in this project.

### 6.2 Irrigation Control System

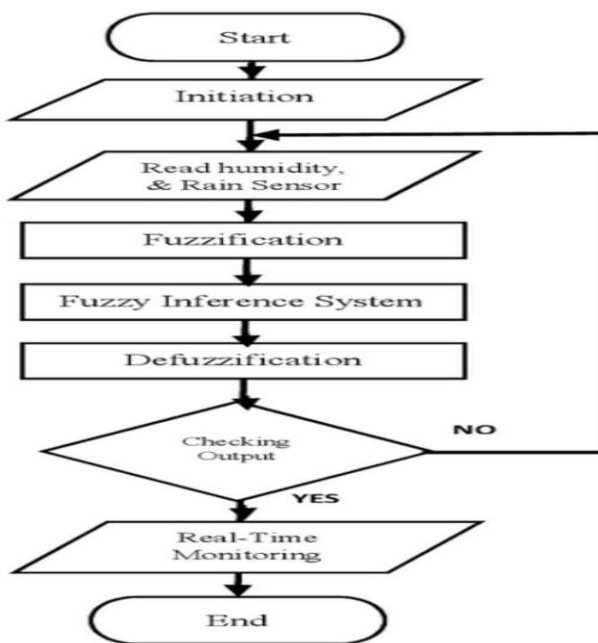


fig: Irrigation Control System

The main reason for crop loss is over rain fall or no rain fall. To overcome the loss of crops due to over rain fall a system has been developed. The flow chart for this system is given above. The system detects rain fall if it is more than required then a sheet is covered over the field with the help of motors.

### 6.3 Intruder Detection System

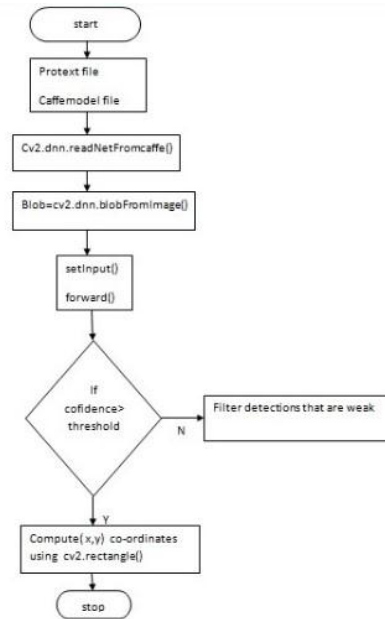


fig: Intruder Detection System

It is expensive to monitor the field with help of any workers and there may be chance of human error. To avoid this a system has been developed, in this the camera automatically detects the motion in the field. If there is any motion then it finds for an intruder, if found then necessary action will be taken.

## 7. HARDWARE AND SOFTWARE COMPONENTS

### 7.1 HARDWARE COMPONENTS

- **ARM PROCESSOR**

ARM is one of the famous micro-controller family used in embedded application. LPC2148 is well known IC from ARM-7 family. The LPC214\* microcontrollers are based on a 16-bit and 32-bit CPU it has real-time emulation and embedded support; this

also has a high-speed flash memory ranging from 32 to 512 KB.

- **WIFI MODULE**

ESP8266 WIFI module it is a low cost wireless receiver and transmitter this can be used in IoT development system. With the help of this module connectivity can be established between the system and internet. The protocol used to communicate between server and client is TCP/UDP. Communication will be done with the help of AT commands. Controller and wifi module communicates using UART.

- **H BRIDGE**

An H bridge circuit that is used to apply voltage across a load in opposite direction. These circuits are mostly used in the application where DC motor needs to be rotated forward and backward. The graphical representation of the circuit resembles the letter 'H', so it is called an H bridge. It consists of four switches. Switch S1 and S3 are closed and S2 and S4 are opened in this condition the motor rotates in the forward direction. When S2 and S4 are closed and S1 and S3 are open in this position the motor rotates in the reverse direction. The H-bridge is used to reverse the direction of the motor; it can also be used to stop the motor by disconnecting it from the supply hence the motor comes to a stop.

- **DC MOTOR**

A motor is a machine that converts DC energy into mechanical energy. It is mainly used for two purposes; one purpose is to pump water to the field whenever moisture is below the threshold limit and the other purpose is for closing and opening of panels.

- **LIQUID CRYSTAL DISPLAY**

Liquid Crystal Display it is formed by an array of tiny elements called as pixels which are manipulated to display information. It

works based on the light modulating property. Information will be displayed by modulating the light. LCD is one of the best mediums to communicate between the controller and human. Most commonly used displays are 16x2 and 20x2. It means it can display 16 characters and 20 characters at a time respectively.

- **RAIN SENSOR**

This sensor works as a switch when there is a rain fall switch is turned on if there is no rain fall then the switch is turned off. This sensor is used to protect crops from heavy rain fall. It can also be used in the rain water storing project. It is built with the help of mica and connecting wire. Mica is made completely flat and wire are connected below.

- **HUMIDITY SENSOR**

It is a device which is used to measure the amount of water content in the atmosphere or in soil. The main application of this is to water the field without the help of human. It automatically detects the water level in the ground and waters the field with the correct amount of water required. By using this sensor, wastage of water can be majorly reduced and the cost of human labor is also eliminated.

- **CAMERA**

Camera is a device which is used to capture a photo or record a video. It has a wide variety of applications in the current world. Motoring of all kinds of medium can be done using a camera. The captured image can be produced as a main source of proof if needed.

## 7.2 SOFTWARE COMPONENTS

- **ARDUINO IDE**

The Arduino integrated development environment (IDE) is a cross-platform application for (Windows, macOS, Linux). The Arduino IDE supports the languages C & C++. Arduino also simplifies the process of working with microcontrollers.

- **OPENCV**

Opencv is a language package which has wide verity of option to monitor. It is used to detect object human and animals. Main advantage of this is it can be trained based on the requirement of the user.

## 8. RESULT

The device automatically controls all the function. The necessary action will be taken based on the program. Timely watering to the field is done automatically with help of controller and program. This system will help farmer to protect their crop from damaging.

## 9 ADVANTAGES AND APPLICATIONS

### 9.1 ADVANTAGES

- By this system need of human can be eliminated and hence saves lot of time and cost included in it.
- The farmer can monitor the field remotely. It works in real time to detect animal's intrusion.
- Type of animal and also the count can be given
- This system is ecofriendly which does not cause any harm to human or animals. It requires very low voltage to operate. There is no risk of electric shock.
- This system is a flexible system it can also be used in the places where continuous monitoring is required.
- The cost included in development of this system is minimal compared to the application it has to offer. It provides accurate information about the field. This system even can be trained to detect various kinds of animals. This system can also be trained to detect owner and labor, so that unwanted alerts can be reduced.

### 9.2 APPLICATIONS

- User can monitor their Large fields, forests, gardens from anywhere, this can be used in agricultural fields which is very helpful and useful for the farmers.
- Saves Rain water and promotes Rain water harvesting

- Crop Losses Can be Avoided Easily

- It optimizes the power usage through water resource management and also saving government's free subsidiary electricity and this proves an efficient and economy way of irrigation and this will automate the agricultural sector.

## 10. CONCLUSION

The crop protection system can be developed in many ways for various agricultural application. This system can be implemented in any environmental application it works accurately. This system can be powered with the help of solar system which even reduces the working cost.. Using IOT has made this system even more helpful for the former because the farm can be monitored remotely, hence it is more profitable and efficient. Crop protection will create change in the way farming in India. This system is powered by a solar panel it should be placed in a correct angle to get maximum output from the cell. Purest form of water that is rain water can harvest with help of this system, sensor used in this system help in collecting rain water and storing it. Rain water can be used to water the field or for drinking and many other activities. By this application wastage of rain water can be eliminated and it can be supplied to the need. Large amount of water will be stored from this technique which is pure and and does not contains any kind of salt in it.

To conclude, this project met our expectations and all the futures worked how exactly it should be working. It was a challenging and enjoyable experience doing this project. This technology will make the change in the way of farming in India. Farmers can access the farm remotely and can get all the information about the farm. The farm will be protected from fire, animals, unauthorized intrusion. The stage of crops can be informed to the farmer.

## AKNOWLEDGEMENT

We express our sincere thanks to our Department and our Institution for fostering an excellent

academic environment which made this endeavor fruitful.

We express wholehearted gratitude to Savitha M M. We wish to acknowledge his help in making our task easy by giving us his valuable advice and encouragement.

We would be very pleased to express our heart full thanks to the teaching and non-teaching staff of the Department of Electronics and Communication Engineering, S J C Institute of Technology for their motivation and support.

## REFERENCES

- [1]. R.Shanmugasundaram, S.Pavithra, V.Sangeetha, S.Tamilselvan, A.H.Thanveer Ahmed, "IoT based animal tracking and monitoring system in zoo", South Asian Journal of Engineering and Technology Vol.3, No.2 pg. 162-168 (2017).
- [2]. Dr. P. Uma Maheswari and Anjali Rose Rajan, "Animal intrusion detection system using wireless sensor networks", International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST), Vol. 2, Special Issue 10, March 2016.
- [3]. Pampapathi B S, Manjunath P C, "Intrusion Detection Using Passive Infrared Sensor (PIR)", Asian Journal of Engineering and Technology Innovation, Volume 4, Issue 7.
- [4]. So-Hyeon Kim, Do-Hyeun Kim, Hee-Dong Park, "Animal Situation Tracking Service Using
- [5]. RFID, GPS, and Sensors", 2010 Second International Conference on Computer and Network Technology, pg. 153 - 156, 2010.
- [6]. Shobhit Kumar Nagpal, P. Manojkumar, "Hardware implementation of intruder recognition in a farm through Wireless Sensor Network", 2016 International Conference on Emerging Trends in Engineering, Technology and Science (ICETETS), pg. 1 - 5, 2016.
- [7]. Chapinal, N., et al. Using gait score, walking speed, and lying behavior to detect hoof lesions in dairy cows. *Journal of Dairy Science* 92.9, 4365-4374, (2009).
- [8]. Dairy Cow Mobility and Lameness - AHDB Dairy. Accessed on 1st Nov 2016 from <https://dairy.ahdb.org.uk/technical-information/animal-health-welfare/lameness>
- [9]. Poursaberi, A.; Bahr, C.; Pluk, A.; Berckmans, D.; Veermae, I.; Kokin, E.; Pokalainen, V Online lameness detection in dairy cattle using Body Movement Pattern (BMP), *Intelligent Systems Design and Applications (ISDA), 2011 11th International Conference on*, Issue Date: 22-24 Nov. 2011
- [10]. M. Alsaad , J.J. Niederhauser, G. Beer, N. Zehner, G. Schuepbach-Regula, A. Steiner Development and validation of a novel pedometer algorithm to quantify extended characteristics of the locomotor behavior of dairy cows, *Journal of Dairy Science* Volume 98, Issue 9, Pages 6236-6242, September 2015.
- [11]. Garca-Muoz, A., et al. "Evaluation of two methodologies for lameness detection in dairy cows based on postural and gait abnormalities observed during milking and while restrained at headlock stanchions." *Preventive veterinary medicine* 128, 33-40, (2016).