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Smart Farm Intruder Detection System Using Cloud Based IoT

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***Abstract*: In agriculture, electric fence is used as one of the methods to protect the food crops, especially from wild animals. this paper proposed the IoT-based electric fence notification system that allows farmers to observe the status of the fence from their phone. In this work, the use of ACS 712 sensor is introduced to measure the current flows on the fence whilst a continuous current supply is assured by detecting the level of the battery via sensor this system allows the farmer to monitor the battery status remotely, which promote hassle-free farm supervision. In this paper we describe a robotic system for automatically herding humans in the absence of physical fences.**

***Index: Terms*—Arudino ,Animal Detection, human detection ,cloud based IoT, Embedded C ,Farm Field Protection**

I. INTRODUCTION

The target for our control algorithms, i.e., the cattle and humans, has natural mobility so that actuation is not an issue. Our goal is to constrain the location of the animal. We rely on the animal's natural mobility to move, and provide a system that controls this motion in a way that is applicable to herding. Herding is a very labor intensive activity. Cattle and sheep graze over large paddocks that are created using fences. A typical farm has several paddocks separated by fences. Animals are rotated frequently between paddocks to prevent overgrazing of any one pasture. This is a very labor-intensive activity that has not benefited from the technical revolution in automation, computing and communication. Farmers spend huge amounts of time and money fixing and maintaining fences. Herding the animals is done with large teams of humans over long periods of time. This is physically hard work, often carried out in extreme weather conditions. We have developed algorithms and physical experiments that combine sensor networks with motion planning in order to eliminate the need for physical fences on farms. Our work can be viewed as some first steps toward automatically controlling the location of individual animals as well as the herd. Intuitively, virtual fences have the functionality of the wired dog fences but do not use wires and can be easily moved by networked programming. Our virtual fence methodology can also be used to monitor the grazing behavior of these animals in order to create models that will lead to better land and pasture utilization.

II. EXISTING WORK AND SYSTEM

Often solar-powered, such fences were used extensively in the Panhandle to prevent cattle from wandering onto farm lands .One major disadvantage of an electric fence is that it might slow down emergency services from reaching you .There is a possibility of electric fences posing the risk of fire when bushes or trees grow in close proximity .In this case there will be loss of animal life and it is very dangerous to human being also.

It is a burden for biologists to analyze to detect whether there exist animal in field, or identify which species the objects belong to. Making this costly, time consuming manual analyzing process automated thus could dramatically reduce a large amount of human resource and quickly provide research findings. Hence it is ideal to find out a suitable , reliable and a trustworthy framework of animal detection in crop field .The system would gain more weight age if the same has a subsequent alert facility to alert the farmers or the land owners of the threat from the wild animals or any other human interruption can be fully automatic captured and collected from man power.

III .PROPOSED SYSTEM

The Proposed system constitutes the Arduino Controller, PIR Sensor , Sound Alert Buzzer and a voice playback for the Hardware module and utilizes the embedded c Processing Concepts for the Software Module.

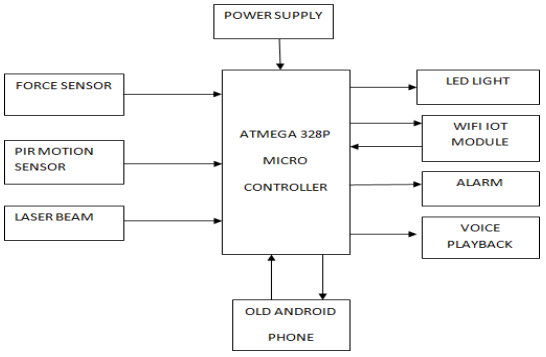

Fig 1. Block Diagram of the Proposed System

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This project proposed a virtual fence system that enables any individual to secure and surveillance his agriculture field in real time. The designed system is capable of detecting passages and providing early warning regarding intrusion. Laser Virtual fence is a boundary without a physical barrier on the landscape via laser pointer

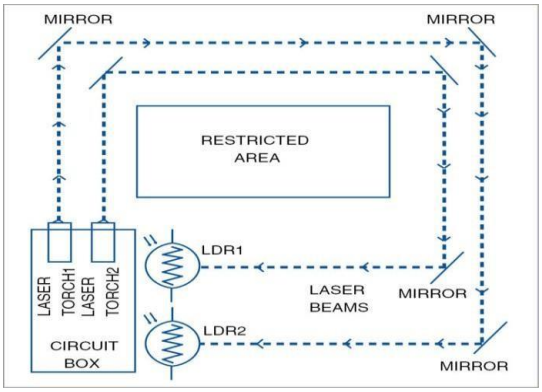

Fig 2. Demo diagram for the proposed system

A .SENSOR DETECTION AND PROCESSING

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR is fundamentally made of a pyroelectric sensor, which can detect levels of infrared radiation. For numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are flat control and minimal effort, have a wide lens range, and are simple to interface with.The output of the sensor can be set by shorting any two pins on the left of the module as shown below. You can also notice two orange color potentiometers that can be used to set the sensitivity and time which will be explained further below.

The PIR sensor stands for Passive Infrared sensor. It is a low cost sensor which can detect the presence of Human beings or animals. This sensor has three output pins Vcc, Output and Ground as shown in the pin diagram above. Since the output pin is 3.3V TTL logic it can be used with any platforms like Arduino, Raspberry, PIC, ARM, 8051 etc

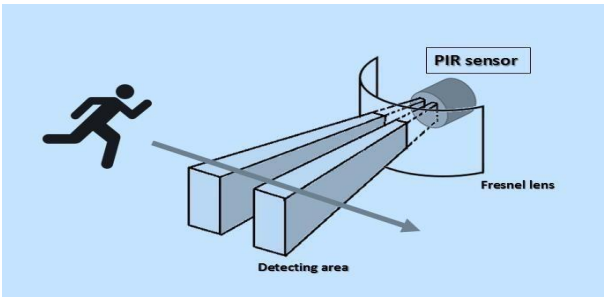

Fig 3. Process flow diagram of the Proposed System

B. SOUND ALARM AND VOICE PLAYBACK

The Sound alarm alert system provides a sound alarm upon detection of the cattle and humans within the limit of the crop field. This sound alarm system comprises of the Sound Module at this prototype and the voice playback giving some command to the intruder. In real world scenarios, this might be some sort of sounding system that can cover to the range of kilometers. Control ignition from the Raspberry Pi controls the Buzzer. Once the sensor detects the intrusion of crop field then the Sound Module is set to sound. This will serve to panic the animal out of the crop field. Two Sounds are stored in the sound module one that of Bees and the other of crackers.

The Message alert system forms the subset of the Alarm system. This is achieved via the IoT Protocol. Abbreviated for the Internet Of Things Protocol . It enables resource-constrained IoT devices to send, or publish, information about a given topic to a server that functions through mobile.. The broker then pushes the information out to those clients that have previously subscribed to the topic.

Fig 4. Snapshot of the Sound Module Alarm

C .IOT UPDATED OUTPUT

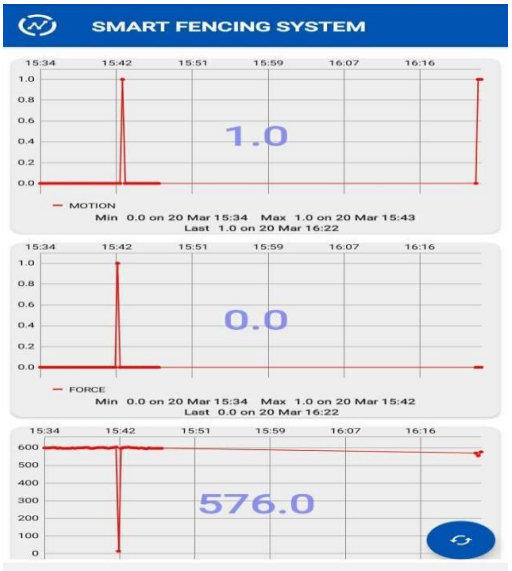

Fig 5 IOT updated output

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The ESP8266 is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as an Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making Internet of Things as easy as possible. It can also fetch data from internet using API's hence your project could access any information that is available in the internet, thus making it smarter.

D.CONTROL UNIT

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments.

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Fig 6. Snapshot of the Arduino Unit

IV. SENSOR INTERFACING

The PIR Sensor is mounted on a place which is Predominantly nearer in proximity to the crop field . The visibility of the crop field in the entire scenario has to be taken care of . utmost priority has to be taken care in the mounting location of the camera.

The circuit diagram below is the replica of the proposed system . The same circuit has to be put in the crop field with the closer proximity to the field.

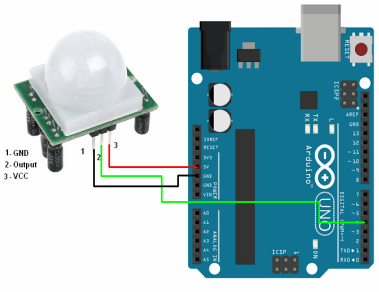

Fig 7. arduino interfacing with PIR sensor

Connect pins 7 and Gnd of Arduino to pins 1 and 3 of KY-008 module, respectively. Run the first sketch (onoff.ino) to turn the laser on and off every second. Next, connect pin A0 (ADC channel 0) of Arduino to pin 2 of the laser module. The second sketch (laser_status.ino) outputs the voltage status on pin 2 of the module to Arduino's serial monitor.

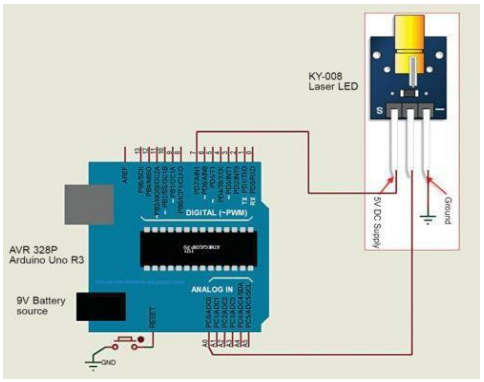

Fig 8.. Arduino interfacing with laser beam

Force Sensing Resistors are also known as Force Sensitive Resistors or Force Sensors or just FSRs. Shape and Size.Sensing Range. When there is no pressure, the sensor looks like an infinite resistor (open circuit). Notice that the graph is generally linear from 50g and up, but not below 50g.

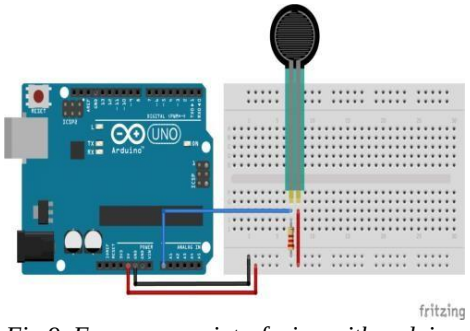

Fig 9..Force sensor interfacing with arduino

V .OUTPUT

The Hardware of the paper is enclosed below. As in the case here , the hardware modules were mounted near by the crop field and proper calibrations taken. The results of the same are listed.

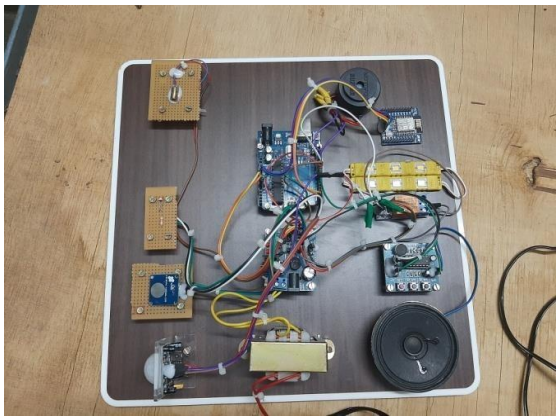

Fig 10. Final result for the Proposed System

Results of the same while receiving messages will be of the following format

VI .CONCLUSION

In this study, a novel method for smart farm intruder detecting system using cloud based IoT is presented. The detecting and extraction process are done by using sensors and lasers. In detecting process the intrusion is captured by the input module. Arduino microcontroller received the entire input signal from the sensors and it gives the output through buzzer and voice playback. The datum are displayed through android mobile

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