

Self-Intrusion Detection System for Protection of Agricultural Fields Against Wild Animals

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Abstract

This paper discloses the method for Man-Animal conflict by using laser fencing system which is based on IoT Technology. The project also takes care of the financial condition of farmers so that the project is operating on solar energy. The system detects the presence of animal and alerts the owner of the field. The system is working through ESP-8266. The sound creating devices and high intensity lights are used to distract the animals from the field and the day-night vision camera used to capture the image. The fire alertness is also given to the system if in case such kind of fire situations observed. The ThingSpeak server is used in the system to access the data information and a mobile application is maintained.

Keywords: IoT Technology, Laser, ESP-8266, Day-night vision camera, sound creating devices, flashlights, ThingSpeak

1. Introduction

The Indian Agricultural sector is the widest growing sector across all the corners of country. Most of the India's population depends on agriculture. Agriculture is one of the finest and essential sector for living beings as this sector is the livestock for humans. Still this sector of the country faces a lot many problems generally faced by farmers like problems of pests, natural calamities, and damages by animals and theft in farm resulting in lower and poor yields. Though it is the most economic sector of the India. Man-Animal conflict is the biggest issue in the agricultural sector till today's time as wild animals enters into field in search of prey, eat cultivation of farmers, destroy crops and affect the cultivation and livelihood of small marginal farmers. The traditional method which is still used to be followed till today are the most dangerous practices for the living ones as it is the riskiest method for the living. Since it is not possible for the field owners to guard the field for 24 hours. So, there is the urgent need to implement a intrusion detection system to automatically escape the animals from the field without letting their life in danger through eco-friendly method.

2. EXISTING SYSTEM

The existing system, still being used today by the people, farmers etc. mostly has the electrical fencing covering all around the field which gives electrical shocks to the animals when came in contact which is dangerous. There are many manual prevailing methods to escape the animals till today's time are the use of flambeaus, burning of fire crackers, use of egg repellents, fish smell etc.

Many organizations and people have been working on this problem to detect the animals present in the fields through use of various motion sensors but as these sensors being so sensitive in nature, there will be a barrier to detect the exact animal entrance into the field because a sudden movement can too detect the motion due the fact whether if animals are present in the field or not.





Fig 1: Figures showing the existing methods

3. PROPOSED SYSTEM

In our proposed system, when the animal enters into the field, the laser fencing continuity gets break and the image has been sent to the server through day-night vision camera. The irritating sounds starts from the sound creating device and the high intensity flashlights flashes to the direction of animal presence.

To alert the owner and provide information regarding the intrusion, the owner gets alert notified via messages about the intrusion and the whole data will be visible at the hybrid application platform which gets updating through server.

The whole system is solar based system which works on sun energy. The underground fencing is built under the ground in order to avoid underground attack. When the wild animal if detected, the whole system work process comes into the play.

The field also regulates the crop monitoring and detecting the temperature and humidity around the field.

The system also takes care of the fire sometimes taking place in the field or alert them before fire starts into the field.

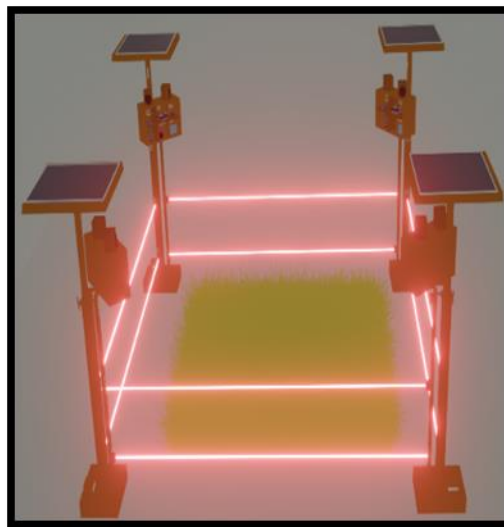


Fig 2: The image of proposed System

4. FLOWCHART SHOWING THE WORK FLOW OF SYSTEM

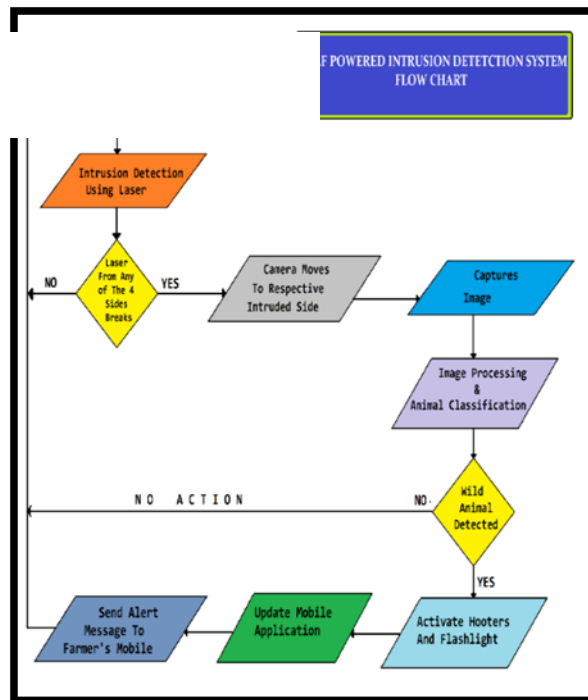


Fig 3: Workflow of proposed system

5. HARDWARE DETAILS

ESP8266- ESP8266 stands for Espressif Modules. It's a low-cost [Wi-Fi](#) microchip, with a full IP/TCP stack and [microcontroller](#) capability. Lua is a scripting language used in this type of firmware. It has been introduced by Espressif Systems. The nominal voltage can be applied for the module is around 3.3V and have a voltage range in between 2.5V (min.) – 3.6V (Max.).



Fig 4: ESP8266 microchip

Temperature and Humidity sensor - A humidity sensor and temperature sensor is used for monitoring the temperature and humidity (moisture) across its range. The range for this sensor is 0-50°C.



Fig 5: Temperature and Humidity Sensor

LASER – The Laser is used in the system for fencing and protection of the field from wild animals.



Fig 6: Laser beam emitted through LASER

6. HARDWARE RESULT

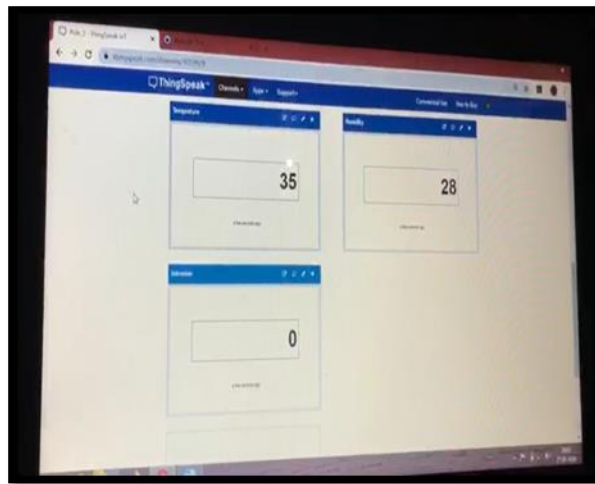


Fig 7: Figure shows the output on the ThingSpeak Server when the animal enters.

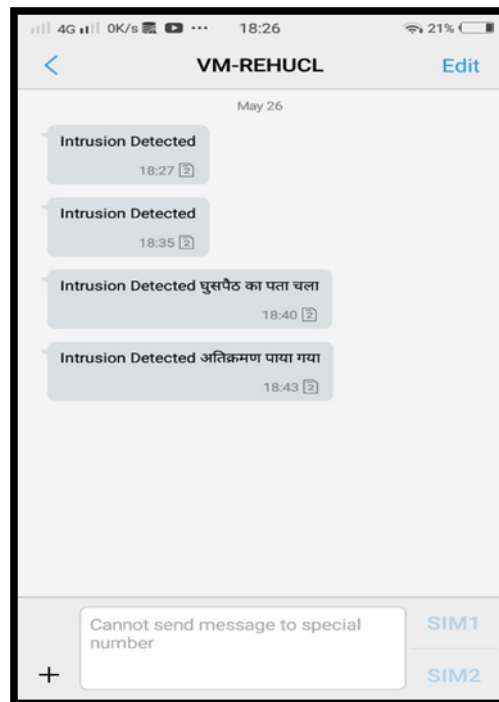


Fig 8: Screenshot of message on phone



Fig 9: Animal Image on phone

7. CONCLUSION

So, for the man-animal conflict, we have designed the system of detection of wild animals and prevention of cultivation and field, which is the eco-friendly solution for avoiding entry into the fields by playing irritating loud noises and throwing high intensity flashlights on animals and sending alert about the intrusion and fire to the owner. In order to save electricity, the whole system will be operating on solar panels.

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