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IMPLEMENTATION OF CROP PROTECTION SYSTEM AGAINST WILD ANIMALS ATTACK

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ABSTRACT

In the field of agriculture, the crop yield is getting reduced by the wild animals attacks. The important thing is to prevent the animals which moves from the forest into the agricultural land, has become one of the rising factor that affects agriculture. The farmers are suffered a lot by the animal attacks. Sometimes people also lost their lives while they try to banish the animals out of their place. The animals enter into the agricultural land because of the lack of water resources in the forest areas and deforestation. To improve agriculture as the survival of the fittest, wild animals that enter into the Agricultural land can be monitored and a repeller device is used to produce the ultrasound that irritates the animals and redirect them. Along with this a fire sensor is added to avoid the spreading of fire from the forestry areas to the agriculture. With the help of IoT an alert can be given regarding the animal entry and the forest fire.

Keywords: *Internet of Things (IoT), Arduino kit, fire sensor, PIR sensor, Repeller device, web camera.*

I. INTRODUCTION

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino board designs use a variety of microprocessors and controllers.

The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.

The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

II. LITERATURE SURVEY

1. IoT solutions based crop protection against wild animal attacks

Technology plays a central role in our everyday life. There has been a surge in the demand of Internet of Things (IoT) in many sectors, which has drawn significant research attention from both the academia and the industry. In the agriculture sector alone, the deployment of IoT has led to smart farming, precision agriculture, just to mention a few. This paper presents the development of Internet of Things application for crop protection to prevent animal intrusions in the crop field. A repelling and a monitoring system is provided to prevent potential damages in Agriculture, both from wild animal attacks and weather conditions.

2. Smart crop protection system with image capture over IoT

The problem of wild animal attacks on crop fields i.e. crop vandalization is becoming a very common phenomenon in the state of Himachal Pradesh, Punjab, Haryana and many other states. Wild animals like monkeys, estray animals especially cows and buffaloes, wild dogs, nilgais, bisons, elephants deer, wild pigs and even birds like parakeets cause a lot of damage to crops either by running over them or eating them and vandalizing them completely. This leads to poor yield of crops. These animals attack on fruit orchards and destroy the flowerings and fruits. In both cases, this leads to significant financial loss to the farmers and orchard owners. The problem is so pronounced that sometimes farmers decide to leave the area barren due to these animal attacks.

III. PROPOSAL METHOD

Here, we decide to monitor the wild animals where the PIR sensor detects the presence of object and the camera starts capturing images. The type of animal is found by the use of image processing. If an animal is identified, the repeller devices start producing sound at three different frequencies based on the type of animal detected.

1. PIR sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector".

What is actually detected is the broken field for a “normal” temperature. The sensor detects the change in the infrared radiation and triggers an alarm if the gradient of the change is higher than a predefined value. Thus the field does not have to be broken by an object with a different temperature in order to register change, as sensors will activate from the configuration change of the environment.

2. Fire Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include an indication through the IoT and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit; in these cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.

3. Web camera

Webcams typically include a lens, an image sensor, support electronics, and may also include a microphone for sound. Various lenses are available, the most common in consumer-grade webcams being a plastic lens that can be screwed in and out to focus the camera. Fixed-focus lenses, which have no provision for adjustment, are also available. As a camera system's depth of field is greater for small image formats and is greater for lenses with a large f-number (small aperture), the systems used in webcams have a sufficiently large depth of field that the use of a fixed-focus lens does not impact image sharpness to a great extent.

3.1. Image processing

Image processing is the technique to convert an image into digital format and perform operations on it to get an enhanced image or extract some useful information from it. Changes that take place in images are usually performed automatically and rely on carefully designed algorithms. Image processing is a multidisciplinary field, with contributions from different branches of science including mathematics, physics, optical and electrical engineering. Moreover, it overlaps with other areas such as pattern recognition, machine learning, artificial intelligence and human vision research. Different steps involved in image processing include importing the image with an optical scanner or from a digital camera, analysing and manipulating the image (data compression, image enhancement and filtering), and generating the desired output image.

The need to extract information from images and interpret their content has been the driving factor in the development of image processing. Image processing finds use in numerous sectors, including medicine, industry, military, and consumer electronics and so on. In medicine, it is used for diagnostic imaging modalities such as digital radiography, positron emission tomography (PET), computerized axial tomography (CAT), magnetic resonance imaging (MRI) and functional magnetic resonance imaging (FMRI).

3.2. MATLAB

MATLAB is a general purpose programming language. When it is used to process images one generally writes function files, or script files to perform the operations. These files form a formal record of the processing used and ensures that the final results can be tested and replicated by others should the need arise. MATLAB is a multi-paradigm numerical computing environment and proprietary programming language developed by Math Works. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, Fortran and Python.

Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine, allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems. As of 2018, MATLAB has more than 3 million users worldwide. MATLAB users come from various backgrounds of engineering, science, and economics.

4. Hearing range

Hearing range describes the range of frequencies that can be heard by humans or other animals, though it can also refer to the range of levels. The human range is commonly given as 20 to 20,000 Hz, although there is considerable variation between individuals, especially at high frequencies, and a gradual loss of sensitivity to higher frequencies with age is considered normal. Sensitivity also varies with frequency, as shown by equal-loudness contours. Routine investigation for hearing loss usually involves an audiogram which shows threshold levels relative to a normal.

Several animal species are able to hear frequencies well beyond the human hearing range. Some dolphins and bats, for example, can hear frequencies up to 100,000 Hz. Elephants can hear sounds at 14–16 Hz, while some whales can hear infrasonic sounds as low as 7 Hz (in water).

Frequency range of hearing for humans and selected animals		
animal	frequency (hertz)	
	low	high
humans	20	20,000
cats	100	32,000
dogs	40	46,000
horses	31	40,000
elephants	16	12,000
cattle	16	40,000
bats	1,000	150,000
grasshoppers and locusts	100	50,000
rodents	1,000	100,000
whales and dolphins	70	150,000
seals and sea lions	200	55,000

Fig: Hearing range

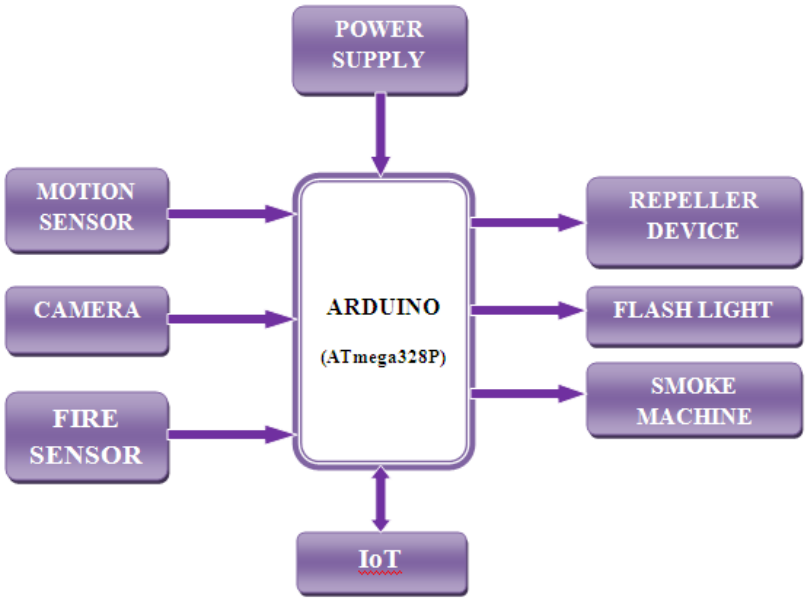
5. Repeller device

Repeller device tends to produce ultrasound. Ultrasound is sound waves with frequencies higher than the upper audible limit of human hearing. Ultrasound is not different from "normal" (audible) sound in its physical properties, except that humans cannot hear it.

This limit varies from person to person and is approximately 20 kilohertz (20,000 hertz) in healthy young adults. Ultrasound devices operate with frequencies from 20 kHz up to several gigahertz. Animals such as Dogs and cats hearing range extend into the ultrasound; the top end of a dog's hearing range is about 45 kHz, while a cat's is 64 kHz. It produces sound at three different frequencies such as,

- **40 KHz (Birds, Squirrels, Rabbits and Rats),**
- **23 KHz (Cats, Dogs, Cows and buffalos),**
- **17 KHz (Elephants, Deers, Large dogs and Foxes).**

IV .BLOCK DIAGRAM



Whenever the PIR sensor detects the presence of object, the camera starts capturing the pictures. The animal in the picture is identified by the use of image processing. The ultrasound can be produced from the repeller devices at three different frequencies according to the type of animal identified (In addition with that a flash light and fog machine can also be used). In case if two different animals that enter into the field is identified, first the sound can be produced to turn the animal which produces high risk. Along with this a fire sensor is used to indicate the forest fire and to avoid the spreading of fire from forest and alert message is send through IoT.

V.CONCLUSION

In this paper, we presented an integrative approach in the field of Internet of Things for smart Agriculture based on Low power devices. For the development of crop protection system awareness is needed regarding the product among the people**.** The crop can be protected effectively to get high yield**.** The conflicts between the humans and the animals can be prevented. The ultrasound produced only redirect the animals and does not produce much adverse effects on them.

REFERENCE

[1]Davide adami, Fabio Vigoli, and Stefano Giordano, "IoT solution from crop protection against wild animals attack", 2018.

[2] A. Veeramani, P. Easa, and E. Jayson, "An evaluation of crop protection methods in kerala," J. Bombay Nat. Hist. Soc, vol.101, pp. 255–260, 2004.

[3]"www.telegraph.co.uk/news/worldnews/europe/italy/12105887/tuscanwine- makers-back-cull-of-250000-wild-boar-and-deer.html."

[4] "www.reuters.com/article/us-italy-boar/italy-hunts-for-solutionto- wild-boar-emergency-iduskcn0su1jn20151105."

[5] B. Hamrick, T. Campbell, B. Higginbotham, and S. Lapidge, "Managing an invasion: effective measures to control wild pigs," 2011.

[6] A. R. Tiedemann, T. Quigley, L. White, W. Lauritzen, J. Thomas, and M. McInnis, "Electronic (fenceless) control of livestock," US Department of Agriculture Forest Service Pacific Northwest Research Station PNW-RP-510, 1999.

[7] M. Lenders, P. Kietzmann, O. Hahm, H. Petersen, C. G¨undo˘gan, E. Baccelli, K. Schleiser, T. C. Schmidt, and M.W¨ahlisch, "Connecting the world of embedded mobiles: The riot approach to ubiquitous networking for the internet of things," arXiv preprintarXiv:1801.02833, 2018.