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IoT-Based New Methodology For Animal Tracking System

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ABSTRACT

Agriculture is the basis of the economy, but crops suffer serious damage due to livestock. This article provides a comprehensive review of the various practices farmers employ to protect their crops. The country's crops are repeatedly destroyed by animals such as cows, buffalos, goats, birds and wild elephants. This caused farmers to suffer heavy losses. Farmers cannot stay in the field 24 hours a day to protect their farms. To overcome this problem, animal detectors have been developed that detect the presence of animals, give warnings and remove non-dangerous animals. A good pest control system consists of hardware using PC based Python programming for display, Arduino NANO connected to PC, audio speaker to display farmer's voice and software product developed by Python and Open CV library for pets. Features know.

1. INTRODUCTION

Monitoring migratory species and populations is an important research tool for monitoring ecosystems and identifying climate issues that may directly affect humans. Until now, counting animals in large populations has relied on more expensive and inaccurate methods that rely on human observations.

1.1 Image Processing

Image processing is a method of converting images into digital form and doing some work on them to get a better image or to extract some fixed information. It is a signal distribution system in which the input can be an image, such as a video frame or image, and the output can be an image or an image-related feature. In general, image processing involves processing images as two-dimensional characters and applying a set of presets to them.

Many techniques for creating digital images, or digital images as they are often called, were developed in the 1960s by the Jet Propulsion Laboratory, MIT, Bell Labs, the University of Maryland, and other research institutions for satellite imagery, cable conversion for photo standard applications, medical imaging, video telephony, digital signage and photography. Images can be processed on the fly to solve specific problems, such as conversion to TV format.

1.2 Open Cv

OpenCV library has many functions, some functions are shown in Figure 1.1.

- **Open source**
- **Fast**
- **Easy to integrate**
- **Easy to code**
- **Rapid prototyping**

Fig 1.1 Features of CV

1.1 Challenges faced by computers

Computer vision is the science that enables computers to understand digital images or a group of images. It is very easy for humans to identify objects by looking at them, but with computers this is not an easy task.

First understand how computers interpret images. To represent images on computers we use the grid model, where each pixel in the grid has the color of a particular pixel. Each color is represented by 3 values (c1, c2, c3), red, green and blue, and the values vary between 0-255 depending on the intensity of each color. For example - Red can be represented as (255,0,0) and Green can be represented as (0,255,0). We can create the color we want by using different values for different colors.

1.2 Color Perception Study

Now imagine that we have pictures of different people and we need to determine which picture is which person. Computer vision algorithms accomplish this task by processing data and finding patterns to help classify problems. Human eyesight has evolved over thousands of years.

Images projected onto our retina are converted into neuron signals. Computer vision understands how human vision works and then we apply this knowledge to computers. Designing robust applications becomes difficult because a small change in one parameter of the image can change the results. The way our machines perceive an image varies depending on lighting conditions, rotation of the image, and even the perspective of the image. Therefore, it is a difficult task to pay attention to small details when using computer solutions.

2. EXISTING SYSTEM

Current SystemsLeaves are the most prominent and comprehensive choice for tree identification, but botanical classification is not based on their attributes. They can be seen almost every year, are easy to photograph, and although their images are not important, they provide good subjects for identification. Digital image processing will improve image quality and extract more information from the image by removing noise and other unnecessary pixels. Image segmentation is an intermediate technique used to analyze images. Grayscale, color, texture, etc. It can group pixels into homogeneous areas according to pixel properties. features.

Sometimes the interaction can be laborious and time-consuming, and sometimes the interaction between image sections can be faulty when the automatic method comes. The wrong product is given voluntarily. The use of machine learning and artificial intelligence in agriculture serves many purposes. IoT combined with machine learning can also help manage farm equipment and create a smart farm. The simple way to get complete information along with manual control will be useful for farmers and even remote access to farm equipment. A current model diagram is shown in Figure 2.

Fig 2 Existing system of animal detector

Agricultural products are produced by local animals such as cows, buffalos, goats and birds, causing huge losses for farmers. Farmers cannot fence entire fields and be in the field 24 hours a day to protect the field. Therefore, we propose here an automatic animal-derived plant protection system. This is a microcontroller based on PIC series microcontrollers. The system uses sound sensors to detect wildlife coming to the area. In this case, the sensor tells the microcontroller to operate. Now the microcontroller creates an alarm that attracts the animals to leave the field and sends an SMS to the farmer, who understands the problem and runs there if the animal does not move due to the alarm. This ensures that crops are fully protected from animals, preventing damage to farmers.

3. PROPOSED SYSTEM

For each video input model, a number of candidate difference regions are created by the selection method. It is recommended that antibiotics have hardware, that is, computers for image processing. Arduino connected to PC. Software developed using python and Open CV libraries for animal science. The server processes the data and based on the data sends music to inform farmers and also sends messages from MCU node to farmers and field office forest to be careful about security.

3.1 PROPOSED BLOCK DIAGRAM

HARDWARE REPELLENT SECTION

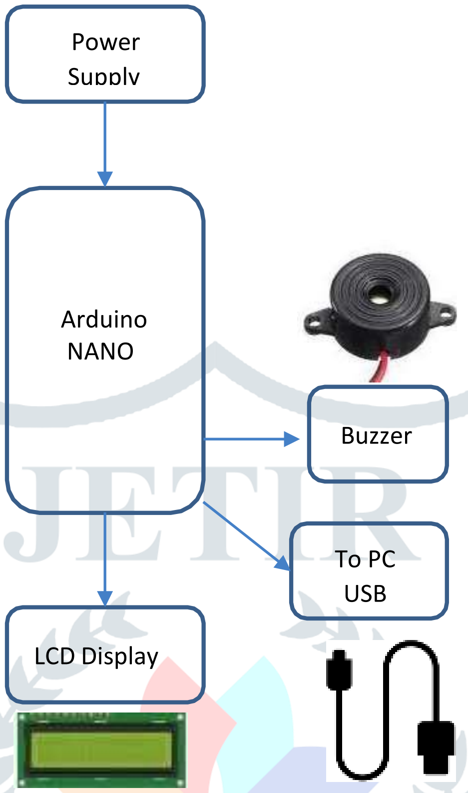

Fig 3.1 Block diagram hardware section

This block diagram, Figure 3.1, represents various hunting-related activities. The Animal Environment section contains sensors for animal detection and animal detection. Data from these sensors is processed and analyzed by a microcontroller or computer. The system then communicates with the control logic and process to activate the sanitizer or trigger the process, such as a sound or alarm.

The communication link between the detector and the control/driver system allows instant monitoring and intervention of found animals. The specific components and sensors used will vary depending on the design and the type of animal you are targeting.

3.2 ANIMAL DETECTION

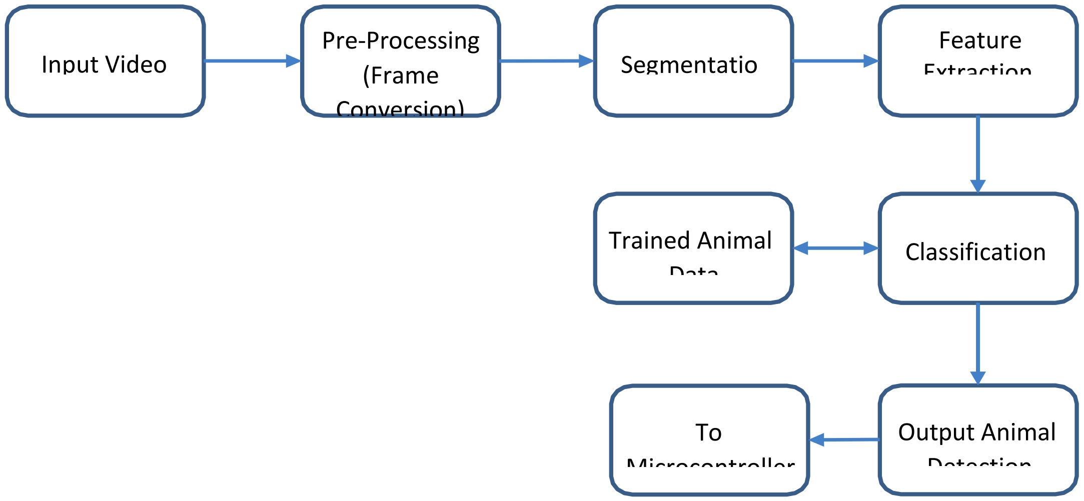

Fig 3.2 Animal Detection

Animal Detection Block Diagram Figure 3.2 is a diagrammatic representation of a system designed to detect animals. The first level of animal search block photography is the video input that may come from the camera device. The video contains a series of images or frames that need to be analyzed for the presence of animals. Most photo ideas are pre-processed to improve their quality. This step may include resizing or color correction to normalize the input for appropriate analysis. Videos are divided into frames or images. Each frame represents a static shot of the scene, making it easy for the system to analyze the details in each image. At this stage, the main features of the segmented framework are extracted.

These features may include shape, pattern, texture and color information. Feature extraction is important for distinguishing animals from background. When animals are detected, the system separates them into different groups or species, such as dogs, cats, birds or wild animals. This step usually involves a deep learning model, such as a neural network trained on different datasets of animal images. Once the search and classification is completed, the video footage is saved with boxes or labels indicating the presence and type of animals. These video descriptions can be analyzed in more detail or used for targeting purposes.

3.3 FEATURE EXTRACTOR

Previous versions of YOLO used Darknet-19, a custom neural network architecture written in C and CUDA, as a custom extractor with, as the name suggests, 19 layers. YOLO v2 adds 11 more layers to Darknet-19, reaching a total of 30 layers of architecture. Still, the algorithm faces problems in detecting small objects due to the reduction of input images and loss of good objects. YOLO V3 proposes a better solution where the specific tools used are a combination of YOLO v2, Darknet-53 (a network trained on ImageNet) and others. The network uses 53 convolutional layers (hence the name Darknet-53); where the network consists of consecutive 3x3 and 1x1 convolutional layers followed by cross-connections (represented by ResNet to help propagate activations from deeper layers without causing gradient degradation).

4. HARDWARE REQUIREMENTS

4.1 HARDWARE PARTS

- Arduino NANO
- Webcam
- PC
- Power Supply

4.2 ARDUINO

4.2.1 Introduction

Arduino is an open source development platform based on consumer software. It provides a flexible framework for engineers trying to create interactive environments. They can be programmed for specific applications to create systems that can be controlled and understood in real time. Card peripherals are shown in the table 5.1.

4.2.2 List On-Board Peripherals

Function	Peripheral	Pin number
LED Output	1 LED	13
Digital Input/output	-	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

PWM Output	-	3, 5, 6, 9, 10, 11
Serial Tx and Rx	-	0,1
Analog Input	-	A0, A1, A2, A3, A4, A5

Table 4.2 List On-Board peripherals

4.2.3 The Microcontroller

The Arduino R3 comes with an ATmega 328 Microcontroller with an Arduino Uno Bootloader. The Bootloader facilitates the Programming of the ICfrom within the Arduino IDE. Pin diagram shown in Fig 4.2.3

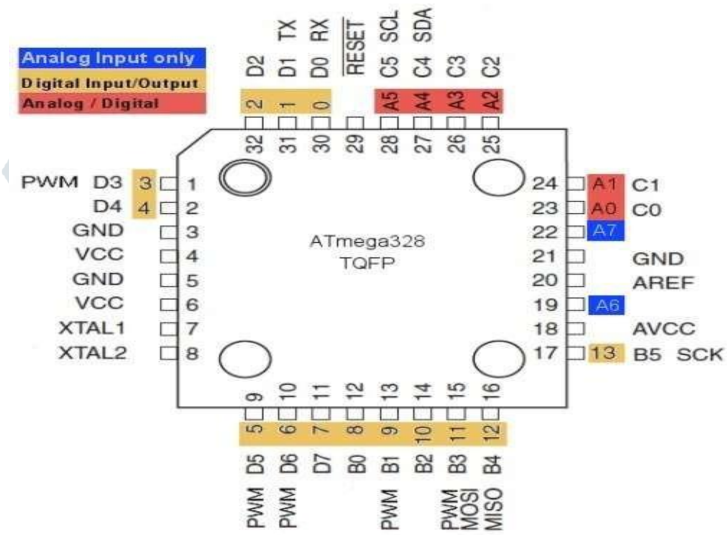

Fig 4.2.3 Microcontroller AT328-Pin diagram

4.3 SUMMARY

Microcontroller : ATmega328

Operating Voltage : 5V

Input Voltage : 7-12V

Digital I/O Pins : 14 (of which 6 provide PWM output)

Analog Input Pins : 6

DC Current per I/O Pin : 40 mADC Current for 3.3V Pin : 50 mA

Flash Memory : 32 KB (ATmega328)

SRAM : 2 KB (ATmega328)

EEPROM : 1 KB (ATmega328)

Clock Speed : 16 MHz

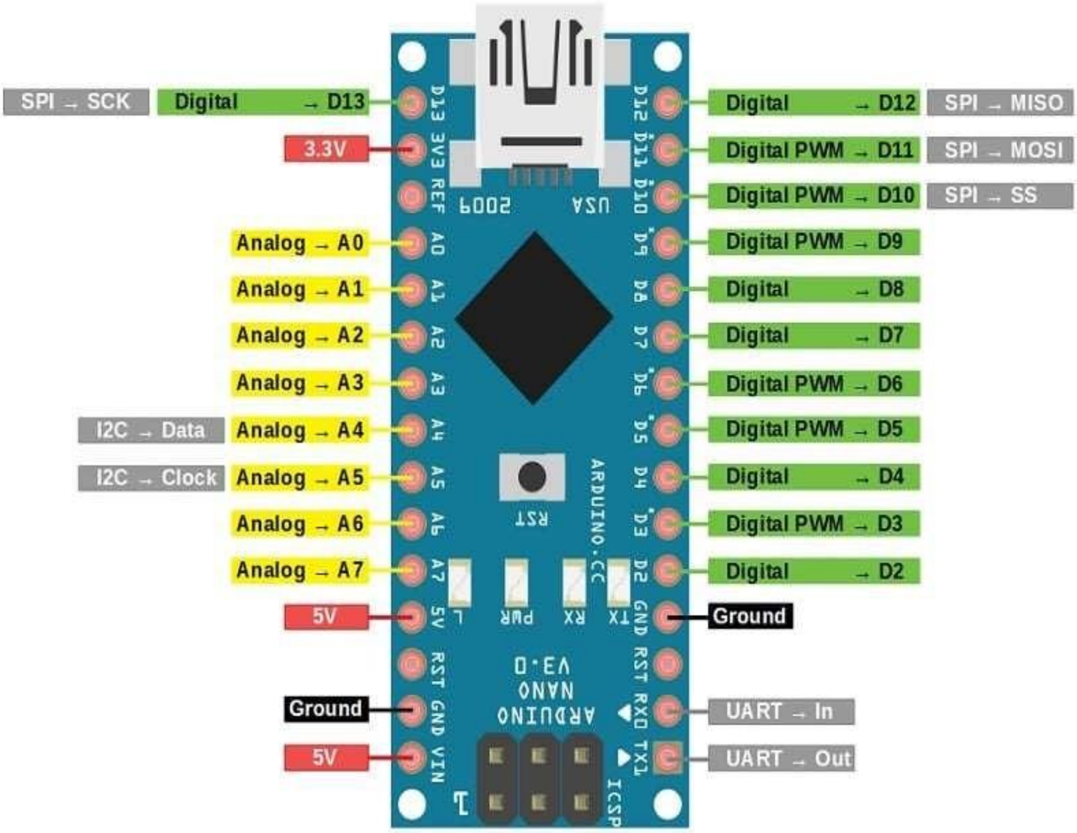

Fig 4.3 Arduino Pin mapping

5. CONCLUSION

Protection of agriculture is our fundamental responsibility as it forms the backbone of the Indian economy. Here the app works using motion sensors and infrared sensors that can detect every movement of the intruder. Additionally, since cameras are used here, entry and exit times are also recorded. This plant protection concept is easy to use and can be used without harming animals or humans. Additionally, the components used in this system are not very expensive, making it very effective. Therefore, these products can be used to protect the farm's crops. It could benefit agriculture instead of current regulations. This is an easy way to gather information and focus on agriculture-related topics. While motion detection detects movement in images without distinguishing between animals, flying objects and other moving objects, the animal detection algorithm can distinguish between flying objects and animals because it learns the characteristics of animals.

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