

Virtual Fencing Using Yolo Framework in Agriculture Field

Mr. Surendranath H.

Assistant Professor, Dept. of Electronics and Communications Engineering, Rao Bahadur Y Mahabaleswarappa Engineering College, Ballari, Karnataka, India.

Mrs. Manasa K. Chigateri

Assistant Professor, Dept. of Electronics and Communications Engineering, Rao Bahadur Y Mahabaleswarappa Engineering College, Ballari, Karnataka, India.

Mrs. Kavyashree S. N.

Student of 4th Sem., M.Tech., Dept. of Electronics and Communications Engineering, Rao Bahadur Y Mahabaleswarappa Engineering college, Ballari, Karnataka, India.

Article Info

Page Number: 1315-1325

Publication Issue:

Vol. 71 No. 3s (2022)

ABSTRACT

The Internet of Things (IoT) is a physical thing with an ecological connection that is reachable online. IoT is used in many different ways, including smart agriculture, smart healthcare, smart retail, smart homes, cities, energy commitment, poultry, farming, smart water management, and other contemporary purposes. Human-animal conflict poses a serious problem in the agricultural sector, as it can lead to the loss of major resources and the threat to human life. The farmer loses their crops, livestock, property, and perhaps their lives as a result. In order to prevent the presence of wild animals, this area must be regularly examined. This research offered a framework for monitoring the field in relation to this problem. This entails first locating the intruder in the area by using a sensor, following which a camera will take a photo of the intruder and classify it using machine learning and image processing, after which the raspberry pi will support the right action based on type of intruder. Finally, the notification is received. Keywords— IOT, Raspberry-pi, IR sensor, LCD, Web Camera, Speakers.

Article History

Article Received: 22 April 2022

Revised: 10 May 2022

Accepted: 15 June 2022

Publication: 19 July 2022

I. INTRODUCTION

The venture targets depicting - Yolo Framework in horticulture field, which address the issue of vandalization of harvests by wild animals and issues that are looked by our ranchers from wild animal assault on farming fields and plantations alongside the ongoing arrangements and techniques that have been taken on to tackle this issue. The principal point of this undertaking is to give a successful answer for the financial misfortunes caused by our ranchers. Likewise, to have a decent harvest yield.

One of the key contributors to the development of the national economy is agriculture. The primary requirement for producing food and raw materials needed for human survival is agriculture. Agribusiness has a significant role in providing a tonne of opportunity for employment. The development of agriculture is essential for national advancement. Agriculture continues to play a significant role in the growth of economies. Agriculture and its related fields employ three-fourths of the working population in India. The ultimate goal is to create a better world for people where things react naturally to our desires without needing any explicit commands. The Internet of Things is a conglomeration of hardware and software technologies, including embedded devices, that enables the provision of services.

The venture targets depicting - Yolo Framework in horticulture field, which address the issue of vandalization of harvests by wild animals and issues that are looked by our ranchers from wild animal assault on farming fields and plantations alongside the ongoing arrangements and techniques that have been taken on to tackle this issue. The principal point of this undertaking is to give a successful answer for the financial misfortunes caused by our ranchers. Likewise, to have a decent harvest yield.

An observation camera and vibration sensors are used in this project. Without physically being in the field, the farmer can see and assess the interruption of an animal in his agricultural field. The farmer can inspect it using a notice sent via his cutting-edge mobile phone from a remote area.

The paper is organised as a survey: Section II illustrates the literature Survey, Section III illustrates the system analysis, Section IV illustrates the Requirement Specifications used in the proposal, Section V illustrates Working, Results, and Section VI concludes the paper.

II. LITERATURE SURVEY

The paper pointed to check field using IoT devices giving ongoing clamminess, temperature, soil dampness of field to ranchers. An individual have choice to recuperate information to manage field subject to data assembled from field. By using Arduino microcontroller close by stickiness, soil, temperature sensor used toward recuperate data from field on fly from a far off region. The data are dissected.

This work summoned to extend benefit of reap to take proactive measure for loss of yield. Checking field reliant upon IoT. IoT helps ranchers in noticing fields effectively using fast and strong structure. This urges the ranchers to take powerful measure for securing yield of reap. Checking vegetation fields from far away regions not only assistants in that frame of mind of work yet likewise nature of gather.

The paper zeroed on giving a remote detection of farming issues, control framework to the nursery horticulture. The course of action controls temperature, light, soil sogginess and CO₂. Considering the soil soddenness, controlling movement is refined for nursery entrances reliant upon crops. The objective defines regular developing to extend crop yield. The result demonstrates regulator of temperature, soil dampness, light, CO₂ for nursery.

The paper points using advancement in IoT, brilliant agribusiness utilizing computerization. Noticing regular components is the important to work on the yield of useful harvests. Also checks dampness and temperature for horticultural field through sensors. The farm check framework fills in as a powerful, trustworthy system and therapeutic move. Remote checking diminishes human leftover job needing to be done and it also allows client to see simultaneous changes in crop yield. Cost is low, gobbles up less power. The system is used in green house temperature dependent plants.

They investigated a few conventional purposes of Agriculture IoT Sensor Monitoring Network progresses using Cloud figuring as spine. The audit is used to appreciate various advancements. IOT is applied in various spaces of agribusiness. In light of broken water framework structures, inefficient field application procedures and planting of water serious yields in unseemly creating region wastage of water is finished. For its movement Pumps, promoters, lighting, etc.

need electrical energy. Water is used for cultivating by changing water volume, region, timing, length of stream are conceivable IoT.

III. SYSTEM ANALYSIS

EXISTING METHOD

The study describes a security system that monitors industries. This architecture for valuable security is simple to introduce and is straightforward. The indicator is recognised utilising readily available, inexpensive parts. One of its numerous applications is in a moving screen monitor for workplaces and shops. The indicator will detect vibration brought about by exercises like boring and switch on the associated load (bulb, piezo ringer, and so forth) to alarm you.

.Drawbacks:

In this cycle just neighbors will be cautioned and there is no picture catch of the hoodlum to follow him later.

PROPOSED METHOD

This project is focused on this venture is centered around the location of wild creatures close to the boundary of the fields. For perceiving the creatures we use camera which is connected to Raspberry Pi. It ceaselessly screens the field. In the event that anything identifies it will give through speaker. Message cautions will be given and mail alarms will be sent. the detection of wild animals near the border of the fields. For recognizing the animals we use camera which is attached to Raspberry Pi. It continuously monitors the field. If anything detects it will give through speaker. Message alerts will be given and mail alerts will be sent.

BLOCK DIAGRAM

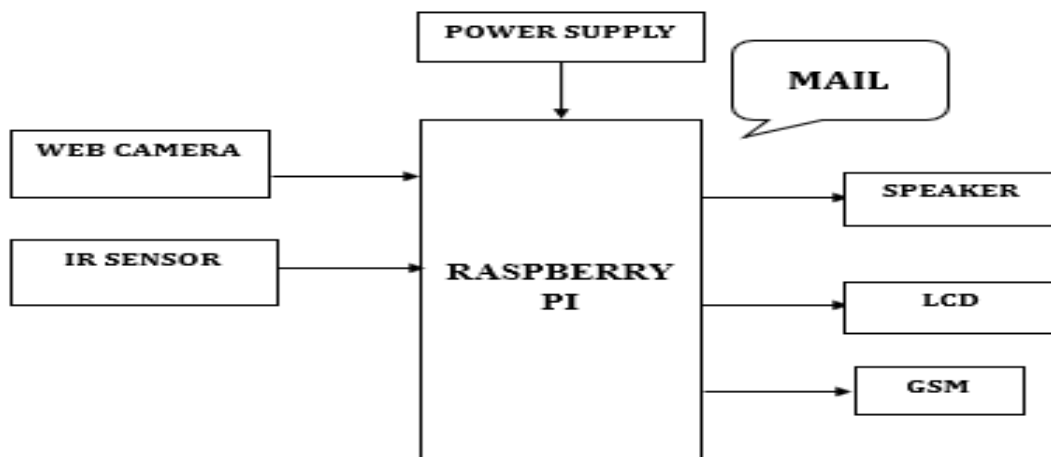


Figure 1: Block Diagram

IV. REQUIREMENT SPECIFICATIONS

HARDWARE REQUIREMENTS

1. Raspberry Pi 4
2. IR Sensor
3. Speakers

4. GSM
5. LCD
6. Web Camera

Raspberry Pi 4

Single board computers in the Raspberry Pi 2B family are about the size of a credit card. Due to the Raspberry Pi's effectiveness in cloud computing, we used it for calculations. It supports a functional framework with full edges. Raspberry Pi is a little estimated PC utilized Linux working framework. It is smaller than expected size PC utilized generally to run bigger and savvy projects to rapidly accomplish yield. Raspberry Pi 4 B+ endured model developed by organization, that has every one of expected most recent wired remote correspondences frameworks utilized in the vast majority of the brilliant ventures. Raspberry Pi allows for hardware device embedding. It contains few pins that allow us to connect sensors and other devices to it for easy computation.

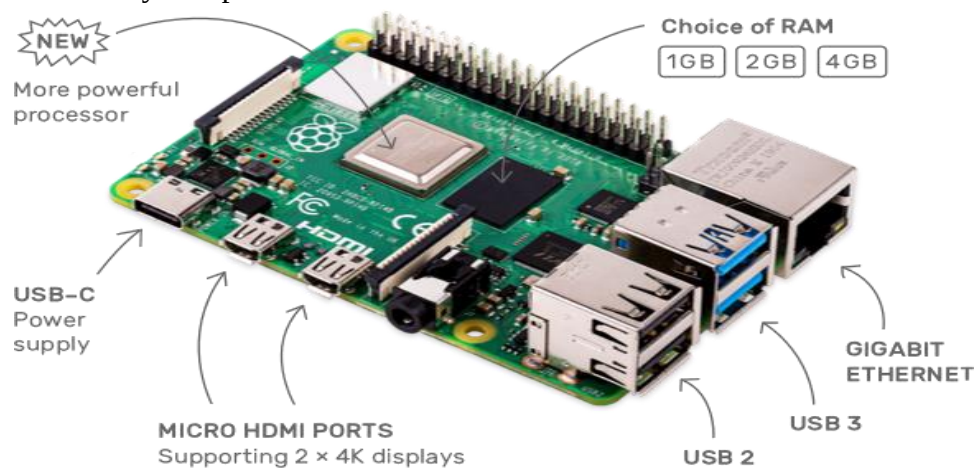


Figure 2: Raspberry Pi 4 Board

Modern Communication Support

Raspberry Pi 4 has generally present day correspondence frameworks. It has inward Wi-Fi and Bluetooth for remote information correspondence. It very well may be utilized with inner at anyplace with next to no aggravation. The Pi can be moved effectively inside a similar organization because of quick WiFi support. The gadget likewise has LAN support in the event that Wi-Fi isn't accessible and organization is following wired specialized strategy to convey.

- LAN
- Bluetooth
- Wi-Fi

Raspberry pi - Main Peripherals

1. Display
2. USB
3. PoE Header
4. Camera
5. SD Card
6. Audio

USB: The Raspberry Pi 4 has four USB ports. Users of 3.0 can transfer data swiftly and 2.0 users can use two ports.

PoE Header: Result of Raspberry Pi's growing use in IoT and other smart projects. PoE Header is now available for Pi. Through Ethernet Wire, users can supply device with power thanks to PoE.

Camera: The gadget supports cameras. It contains a two-lane MIPI CSI camera connection that may be used to directly connect the Raspberry Pi to cameras and use them without the requirement of a third interface.

Display: An external LCD is attached to the Raspberry Pi 4. Unlike other devices, it doesn't communicate with LCDs using extension header.

Audio: Although the HDMI port on the Raspberry Pi can be used to transmit and receive audio data, it also features a separate 4 pole audio port.

SD CARD: SD card will contain Raspberry Pi's operating system, and the card will be utilised in the SD Card slot.

IR sensor

An infrared sensor is piece of electronic equipment that emits light to pick up on specific environmental elements. An IR sensor can measure an object's intensity and detect movement. These sensors are referred to as detached IR sensors since they estimate infrared radiation rather than transmitting it. Articles typically transmit some heated radiations in infrared spectrum. These radiations are invisible to human eye but can be detected by an infrared sensor. An IR photodiode, which is sensitive to IR light frequency emitted by an IR LED, serves as both producer, identifier. When IR light strikes a photodiode at precise moment, the safeguards voltages that result change according to size of IR light.

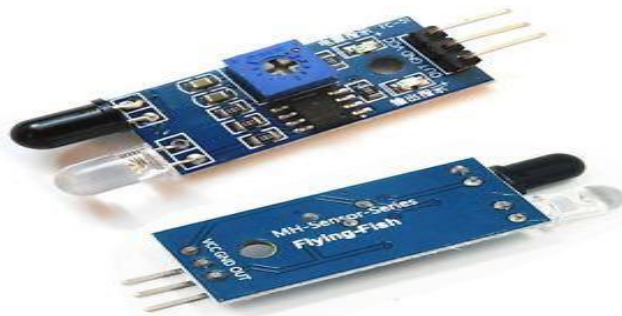


Figure 3: IR Sensor

IR Sensors of Various Types

Depending on the usage, IR sensors are classified into several types

- Speed Sensor
- Temperature Sensor
- PIR Sensor
- Ultrasonic Sensor

Speakers

The most popular output devices for PC systems are speakers. While some speakers can be connected to sound framework, some are used specifically to operate with computers. No of the strategy, the goal of the speaker is to produce a sound effect that the audience can hear. Electromagnetic waves are transduced into sound waves by speakers. A computer or other device, like as a sound beneficiary, provides sound to the speakers. Sound waves are created

by basic speakers by enhancing electromagnetic radiation. Because sound waves have a basic structure, modern speakers.



Figure 4: Speakers

Global System for Mobile Communication

GSM stands for the global foundation for mobile communications and is a portable correspondence modem (GSM). Bell Laboratories began working on GSM in 1970. GSM is an open and computerised mobile technology that operates at 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands and is used to communicate portable voice and information services. As a computerised framework using time division different access, the GSM framework was developed (TDMA). A GSM reduces and digitises information before sending it via a channel in two distinct floods, each with its own allotted amount of time for transmission. The cutting-edge architecture can transmit information at rates ranging from 64 kbps to 120 Mbps.

Different cell sizes, including full-scale, miniature, pico, and umbrella cells, are used in the GSM architecture. Depending on the execution space, each cell is unique. The GSM network uses big, small, pico, and umbrella cells, which are the five different cell sizes. According to the execution climate, each cell's inclusion zone changes. The GSM framework's security methods have been standardised, making it the current de facto media communications standard. This is an important step in achieving start to finish security, even though categorization of a call and mystery of a GSM supporter are only ensured on the radio channel. A GSM modem is a device that may be cell phone or modem that enables a PC or other CPU to communicate with a network over a company. A SIM card is necessary to use a GSM modem, which operates within the range that the organisation administrator has purchased for the organisation. A normal GSM cell phone with the proper programming driver and link can function as a GSM modem and connect to a PC's serial port or USB port. A wide range of applications for the GSM modem include exchange terminals, store networks across the board, security software, weather stations, and GPRS mode remote data logging.

LCD

LCD (Liquid Crystal Display) is the development used in scratch cushion shows and other smaller PCs. Like development for light-creating diode (LED) and gas-plasma, LCDs grant introductions to be much more slim than advancement for cathode bar tube (CRT). LCDs use extensively less power than LED shows and gas shows since they function instead of radiating it on the rule of hindering light.

LCD is either made with a uninvolved grid or a grandstand network for dynamic system show. In like manner suggested as a pitiful film semiconductor (TFT) show is unique structure LCD. The uninvolved LCD grid has a lattice of guides at each crossing point of organization with

pixels. Two guides on cross section send a current to control light for pixel. A working structure has semiconductor arranged at each pixel.

16x2 LCD show is a fundamental module that is by and large used in different contraptions and circuits. LCDs are reasonable; successfully programmable; have no limitation. In 16x2 LCD, there are 2 lines with 16 characters each. In this LCD, a cross section of 5 x 7 pixels is used to show each character. Both Command, Data registers are present in LCD.



Figure 5: LCD display

Web Camera

A webcam is a camera that gradually feeds or transfers a picture or video to or over a PC network, like Internet. Webcams are often tiny cameras that attach to a client's screen, sit on a work surface, or are built into the apparatus. When participating in a video visit meeting that involves at least two people and talks using real-time audio and video, webcams may be used.



Figure 6: Web Camera

SOFTWARE REQUIREMENTS

1. Noobs
2. Advanced IP Scanner
3. VNC Viewer
4. Python 3 IDLE

V. WORKING AND RESULTS

Power up the raspberry pi board by connecting an USB to the laptop. Also, make sure the laptop is connected to the power supply. Install Advanced IP Scanner and VNC Viewer in the laptop. Connect speakers and web camera to the raspberry pi board. Switch ON the mobile

Hotspot and ensure that the MAC address of the raspberry pi is detected in the hotspot connected devices in the mobile.

Open Advanced IP Scanner in laptop and click on the scan icon. Copy IP address of raspberry pi and paste it on VNC Viewer. Raspberry pi OS appears. Click on the icon and select yolo_test.py. Select Python 3 IDLE and run the code by clicking on the run module. Show animal images to the web camera. The name of the animal will be displayed on the LCD. Insert a sim card into the GSM module. A message will be sent to the respective mobile.

RESULTS

The Below Figure displays prototype of the project with title. It consists of all the hardware components that are described in the previous chapters, that is a combination of both hardware and firmware.

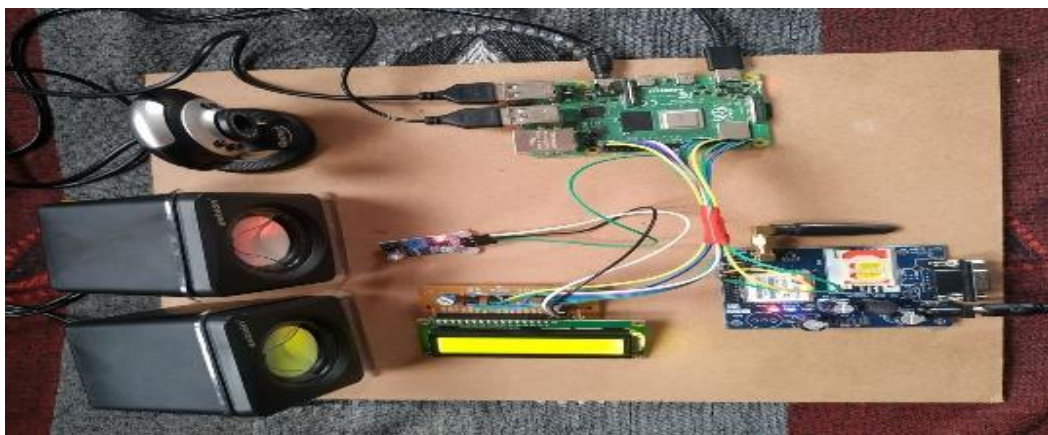


Figure 7: Prototype



Figure 8: Result displayed on LCD

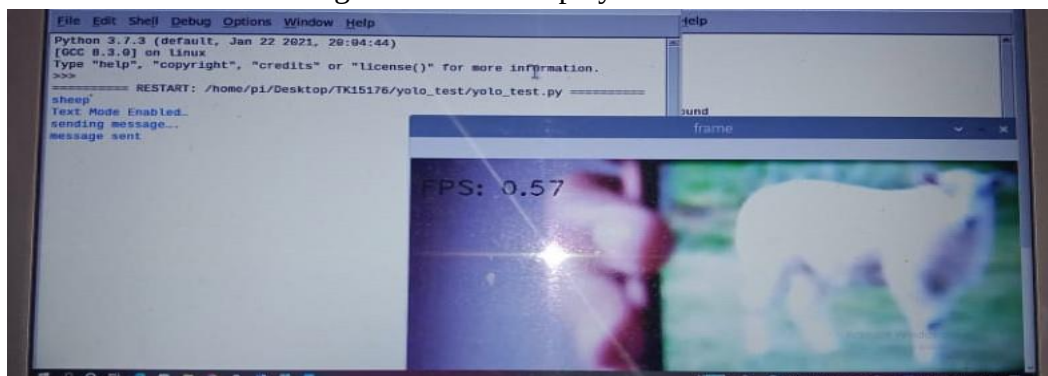


Figure 9: Result displayed when animal is detected

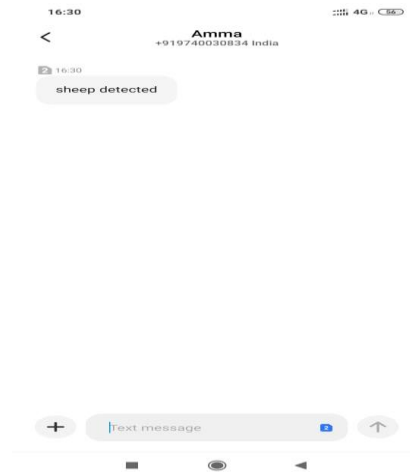


Figure 10: Screenshot of the result obtained using GSM

ADVANTAGES

- Profoundly adaptable
- Fit and Forget System
- No need of human exertion
- High security is given
- High in productivity

APPLICATIONS

- Historical centers
- Gardens
- Home/Office security
- Business Stores
- Nurseries

CONCLUSION

In project, we introduced an integrative methodology in field of WSN for savvy Agriculture in view of low power gadgets and open source frameworks. The objective is to give a repulsing and observing framework for crop security against creature assaults. The paper rapidly reviews structure which is created will screen field using IR sensor camera got picture of interloper. The agriculture monitoring system and Yolo framework used to create suggested virtual fencing are both very user-friendly and extremely reliable.

FUTURE SCOPE

In future work, a farming robot is an automated airborne vehicle applied to outlining to assist with expanding security yield creation screen crop advancement. Sensors computerized picture capacities can provide ranchers with a more lavish image of fields. This information might exhibit significant in further developing harvest security, noticing as opposed to camera at fixed region towards improved yield proficiency.

Horticulture drones permit ranchers investigate their homestead from sky (top view). This 10,000 foot perspective can uncover a few issues like water framework, soil variety, bug, parasitic invasions. Multi ghastly pictures show a nearby infrared view similarly as a visual

range view. The blend shows designers distinction between sound undesirable plants, a distinction isn't obviously noticeable to unaided eye. As needs be, this discernment improves to get harvest development efficiency, if drone-based pictures shipped off our current venture, we can make application more powerful got.

REFERENCES

1. Ram Krishna Jha, Santosh Kumar, Kireet Joshi, Rajneesh Pandey, "Field Monitoring Using IoT in Agriculture", International Conference on Intelligent Computing, Instrumentation and Control Technologies, 2017.
2. Varun, B. N. ., S. . Vasavi, and S. . Basu. "Python Implementation of Intelligent System for Quality Control of Argo Floats Using Alpha Convex Hull". International Journal on Recent and Innovation Trends in Computing and Communication, vol. 10, no. 5, May 2022, pp. 60-64, doi:10.17762/ijritcc.v10i5.5554.
3. Pallavi S., Jayashree D. Mallapur, Kirankumar Y. Bendigeri, "Remote Sensing and Controlling of Greenhouse Agriculture Parameters based on IoT", International Conference on Big Data, IoT and Data Science (BIGD) Vishwakarma Institute of Technology, Pune, Dec 20-22, 2017.
4. Gupta, D. J. . (2022). A Study on Various Cloud Computing Technologies, Implementation Process, Categories and Application Use in Organisation. International Journal on Future Revolution in Computer Science & Communication Engineering, 8(1), 09–12. <https://doi.org/10.17762/ijfrcsce.v8i1.2064>
5. Prathibha S R, Anupama Hongal, Jyothi M P, "IoT Based Monitoring System in Smart Agriculture", International Conference on Recent Advances in Electronics and Communication Technology 2017.
6. M. Ammad uddin, A. Mansour, D. Le Jeune, el. Hadi M. Aggoune, "Agriculture Internet of Things: AG-IOT", 27th International Telecommunication Networks and Applications Conference, 2017.
7. Mahammad Shareef Mekala, Dr P. Viswanathan, "A Survey: Smart Agriculture IoT with Cloud Computing", IEEE, 2017.
8. Nouby M. Ghazaly, A. H. H. . (2022). A Review of Using Natural Gas in Internal Combustion Engines. International Journal on Recent Technologies in Mechanical and Electrical Engineering, 9(2), 07–12. <https://doi.org/10.17762/ijrmee.v9i2.365>
9. Prosanjeet J. Sarkar, Satyanarayana Chanagala, "A Survey on IOT based Digital Agriculture Monitoring System and Their impact on optimal utilization of Resources", IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) Volume 11, Issue 1, Ver.II (Jan. - Feb .2016).
10. Hoda, S. A. ., and D. A. C. . Mondal. "A Study of Data Security on E-Governance Using Steganographic Optimization Algorithms". International Journal on Recent and Innovation Trends in Computing and Communication, vol. 10, no. 5, May 2022, pp. 13-21, doi:10.17762/ijritcc.v10i5.5548.
11. R. Shanmuga sundaram, 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 (2017) 162–168.

12. 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.
13. Chaudhary, D. S. . (2022). Analysis of Concept of Big Data Process, Strategies, Adoption and Implementation. International Journal on Future Revolution in Computer Science & Amp; Communication Engineering, 8(1), 05–08.
<https://doi.org/10.17762/ijfrcsce.v8i1.2065>