

Farm House Safety from Wild Animals using Arduino Based System

Mr. Girish R. Shinde¹, Shakambhari Govind Sonawane², Sudiksha Sunil Deore³, Rakhi Dnyaneshwar Deore⁴, Pranjal Sunil Moule⁵

¹. Lecturer, Computer Technology, K. K. Wagh Polytechnic, Nashik.

². Student, Computer Technology, K. K. Wagh Polytechnic, Nashik.

³. Student, Computer Technology, K. K. Wagh Polytechnic, Nashik.

⁴. Student, Computer Technology, K. K. Wagh Polytechnic, Nashik.

⁵. Student, Computer Technology, K. K. Wagh Polytechnic, Nashik.

Abstract- Farmhouse safety in rural and forest-adjacent regions is increasingly threatened by wild animal intrusions that cause severe crop damage, livestock loss, and risks to human life, resulting in significant economic hardship for farmers. Conventional protection methods such as fencing and manual guarding are costly, labor-intensive, and often ineffective, particularly at night. This project presents an Arduino-based automated security system designed to detect and deter wild animals in real time. The system employs Passive Infrared (PIR) sensors to identify motion and heat signatures within a restricted area. Upon detection, the Arduino microcontroller activates deterrent mechanisms such as alarms and flashing lights to scare animals away before damage occurs. The system can be further integrated with wireless communication modules to send instant alerts to farmers, enabling prompt action even in their absence. By combining sensor technology, microcontroller-based control, and automated response, the proposed solution offers a cost-effective, reliable, and scalable approach to reducing crop loss, minimizing human-animal conflict, and improving farm security.

Key words- *Arduino, Passive Infrared, GSM Module, Security, PIR sensor*

1. INTRODUCTION

The safety and protection of farmhouses and agricultural land have become a significant challenge in recent times, especially in rural and forest-adjacent regions where intrusion of wild animals such as wild boars, deer, monkeys, elephants, and other species is a common occurrence. These animal intrusions often lead to large-scale destruction of crops, harm to livestock, and in extreme cases, even pose direct threats to human life, thereby causing heavy economic losses and constant fear among farmers. Conventional preventive methods like

fencing, watch towers, or manual guarding are not always reliable, as they require high cost, continuous human effort, and still fail to ensure safety during the night or when farmers are away from the fields. To overcome these limitations, the Farm House Safety from Wild Animals using Arduino based System provides an intelligent, automated, and cost-effective solution that ensures real-time monitoring and quick response to intrusions. The system primarily utilizes Passive Infrared (PIR) sensors, which are capable of detecting motion and heat signatures of animals when they cross into a predefined restricted zone. Once an intrusion is detected, the Arduino microcontroller processes the signal and immediately activates countermeasures such as loud alarms, flashing lights, or other deterrent mechanisms that can scare the animals away before they cause any harm. Moreover, the system can be further extended to send instant alerts to farmers via wireless communication modules, thereby allowing rapid action even when the farmer is not physically present at the site. By combining the benefits of sensor technology, microcontroller-based automation, and responsive safety mechanisms, this system not only reduces the risk of crop damage and property loss but also minimizes human-animal conflicts, ensures the well-being of farmers and their livelihood, and promotes sustainable agricultural practices. Thus, the project represents a practical, affordable, and innovative approach to modern farm security, providing peace of mind to farmers while effectively addressing one of the most persistent problems faced in agricultural communities.

2. LITERATURE SURVEY

1. *Muneera Begum H, Janeera.D.A, Aneesh Kumar.A.G "Internet of Things based Wild Animal Infringement Identification, Diversion and Alert System"*

In places with high population and human mobility, intrusion of wildlife is lethal for humans as well as the animals. Due to the diverse nature of movement and physical sizes of wild animals, it is a challenging task to track these animals or perform surveillance. As a solution to this issue, this paper proposes a system that can help in identification of intrusion of wild animals at agricultural farms by means of Internet of things and a Wi-Fi based wireless microcontroller unit. Prototyping is performed using Energia IDE for transmission of information to the forest officer from the transmitter node. Pillars consisting of an electronic unit with buzzer, vibration sensor, laser detector, laser diode, RF transceiver and ultra-low power microcontrollers are placed at the corners of the field. On infringement, an alert message is transmitted by the Wi-Fi module. An animal database is used for testing of the proposed system. The forest officer is alerted by means of a Python server. Prevention of casualties in areas where there is a higher rate of interaction between humans and wild animals is enabled through this system.[1]

2. Muzamil Ahmad, Muhammad Shoaib, "An Efficient System for Human Detection Using PIR Sensor and Mobile Technology"

Personal security and safety of one's property is not just one's basic need but one's basic right, too. Had it not been for this fact, there wouldn't have been any laws, law enforcement bodies, system of justice, and any question of good governance and government. Apart from these highly sophisticated means for protection of human safety in terms of physical security including health, economic security, and social security, there have been other systems in place for safety purposes. These include home, shop, or office automation, deployment of security staff, installation of CCTV cameras, buying insurance policies, and so on. However, each of these measures costs great money to the security seeker. The system presented in this chapter, based on human (and/or animal) detection using passive infrared radial (PIR) sensor and mobile technology, is a cost-effective security solution to those who cannot afford large investments in their personal and property safety.[2]

3. Ibrahim Goni, Rufai Hassan "Intelligent Arduino Home Based Security System Using Global System for Mobile Communication (GSM) and Passive Infrared (PIR) Sensor"

With the advancement of technology things are becoming simpler and easier in every aspect of life. Automation is the use of control systems and information technologies

to reduce the need for human work. Security is an essential part of our life at this crucial moment, the problems of security in our home, industry, banks, schools, hotels and even offices cannot be tackled manually. The main aim of this research work is to design and implement an intelligent and reliable security system using Passive Infrared (PIR) and Global System for mobile communication (GSM) Module embedded on Arduino Uno board. C programme is uploaded on the board using Arduino IDE. The system has surveillance over the movement of people around the house premises 7m to approach the door the security system sends an SMS to a GSM phone (HTC) numbers included in the C programming codes.[3]

3. METHODOLOGY

The project "Farm House Safety from Wild Animals Using Arduino Based System" is designed to provide an automated, reliable, and cost-effective solution to protect farmhouses and agricultural lands from wild animal intrusions. In rural and forest-border areas, wild animals often enter farmlands in search of food, causing damage to crops, property, and sometimes posing a threat to human life. Traditional protective methods are either expensive, dangerous, or inefficient. This project aims to overcome these limitations using embedded system technology.

The implemented system uses an Arduino microcontroller as the central processing unit, integrated with various sensors and alert devices. Motion and distance sensors continuously monitor the surroundings of the farmhouse or farmland. When a wild animal enters the monitored area, the sensors detect the movement and send signals to the Arduino. The controller then activates warning mechanisms such as alarms and lights, and also sends an alert message to the farmer through a GSM module.

The system is designed to scare animals away without harming them, making it environmentally friendly and safe for wildlife.

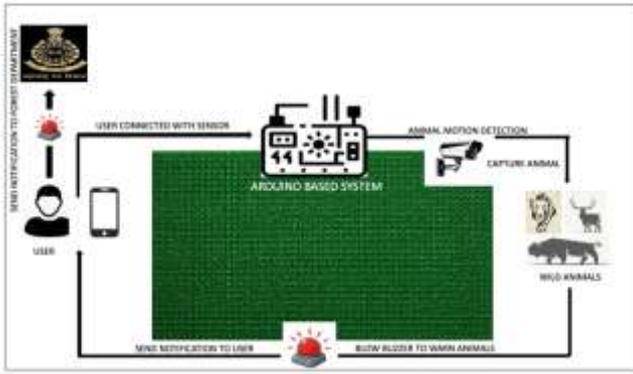


Figure 1: System Architecture

The purpose of this prototype is to provide an early visualization of the proposed Arduino-based safety system designed to protect farmhouses from wild animal intrusions. By simulating the core functionalities—such as motion detection, alert generation, and response mechanisms—the prototype allows stakeholders to understand how the system will operate in a real-world environment.

Additionally, the prototype serves as a platform to collect valuable feedback from potential users, farmers, and experts before full-scale implementation. This feedback will help identify design flaws, improve system efficiency, and ensure that the final product is cost-effective, reliable, and user-friendly.

By developing this prototype at an early stage, we aim to reduce development risks, validate our design assumptions, and enhance the final deployment's overall effectiveness and acceptance.

4. WORKING MODULE

The working module of the Farm House Safety from Wild Animals Using Arduino-Based System operates through sensing, processing, alert, and communication stages. Motion and distance sensors continuously monitor the protected area for any intrusion. When a wild animal enters the predefined zone, the sensors detect movement and send signals to the Arduino microcontroller. The controller analyzes the input and activates deterrent mechanisms such as alarms and flashing lights to scare the animal away without causing harm. Simultaneously, a GSM module sends an alert message to the farmer. After the threat is cleared, the system automatically resets and resumes monitoring.



Figure 2: Working System

Used modules and devices in implemented system are as follow:

1. GSM Module: For SMS alerts
2. Wi-Fi Module (ESP8266 / ESP32): For IoT/web-based alerts
3. Relay Module: To control lights or activate larger devices
4. PIR Motion Sensors: Detect movement (for nearby areas)
5. Ultrasonic Sensors: Detect objects or animals from a distance
6. Buzzer / Siren: –Scare wild animals or alert people
7. High-powered LED lights: Trigger on motion to scare animals
8. Noise Maker: For deterrent action

5. CONCLUSION

In this project, we successfully developed an Arduino-based security system aimed at protecting farmhouses from wild animal intrusions. The system integrates motion sensors (such as PIR sensors), infrared or ultrasonic modules, and sound/light deterrents to detect and deter wild animals approaching the premises. Upon detection, the system triggers alarms or deterrents (e.g., flashing lights, sirens), and can also notify the farmer via GSM module or mobile-based alerts.

This project demonstrates how cost-effective and easily available microcontrollers and sensors can be combined to create a real-time, automated, and scalable solution to enhance rural safety. It significantly reduces human effort in monitoring and helps in minimizing crop or livestock

loss due to animal threats, especially during night-time or in remote locations.

6. REFERENCES

1. Muneera Begum, H., & Janeera, D. A. (2024). Internet of Things based Wild Animal Infringement Identification, Diversion and Alert System. *International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)*.
2. Muzamil Ahmad, Muhammad Shoaib, Aizazul Haque (2019): An Efficient System for Human Detection Using PIR Sensor and Mobile Technology. *Computer Science*. 1-3.
3. Goni, I. and Hassan, R., (2019). Intelligent Arduino Home Based Security System Using Global System for Mobile Communication (GSM) and Passive Infrared (PIR) Sensor. *Communications*, 7(2), 45-49.
4. Adagunodo T.A., Ajigbotosho J.J., Obafemi L.N., Usikalu M.R., Akinwumi S.A., Ayara W.A. (2018). Construction of an in-situ Smart Device that Measures some Basic Environmental Factors for Agricultural Monitoring. *IOP Conference Series: Earth and Environmental Science*, 173: 012023.
5. Wibowo, Pristisal, Solly Aryza Lubis, and Zuraidah Tharo Hamdani (2017). Smart Home Security System Design Sensor Based on PIR and Microcontroller. *International Journal of Global Sustainability* 1(1) 67-73.
6. Omotosho T. V., Abiodun D. T., Akinwumi S. A., Ozonva C., Adeyinka G., Obafemi L. N. (2017). Design and Construction of a Pure Sine Wave Inverter". *International Conference on Science and Sustainable Development (ICSSD 2017)*. *Journal of Informatics and Mathematical Sciences*. Vol. 9, No. 1, pp.397-404.
7. Pema Chodron, Devi Maya Adhikari, Gopal Chandra Nepal, Rajen Biswa, Sangay Gyeltshen, Chencho (2013). Passive Infrared (PIR) Sensor Based Security System. *International Journal of*
8. S. Yuvaraj Prof. and Ramesh S., "Improved Response Time on Safety Mechansim Based on PIR sensor," *International Journal of Emerging Technology and Advanced Engineering*, vol. 2, no. 4, April 2012.

Electrical, Electronics and Computer Systems.(IJECS) 14(2):1-6.