

# Automatic Bird Pest Repellent System in Rice Farming Land

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## Abstract

The importance of advancing sustainable rice farming is because rice is a staple food whose production must be increased to meet the basic needs of the community. The problem that occurs to rice farmers is that thousands of bird pests look for food in fertile rice fields, causing great losses for farmers. The way farmers efficiently repel bird pests is by developing technology that can monitor bird activity around rice fields in real time remotely and is able to repel bird pests by using the Internet Of Things (IoT) development. which aims to design IoT or tools that can monitor bird activity in real time around agricultural areas remotely, by utilizing PIR sensors to detect bird pests, LDR resistors detect light, ESP32-CAM to monitor rice fields and utilizing solar panel power as a sound signal generator that will sound disturbing the bird's hearing system so that the birds fly away and move the DC motor to repel bird pests automatically and the data collected from the ESP32-CAM (1) sensor will be sent to the IoT platform with the Telegram application connected via an internet connection, allowing farmers to monitor remotely via smart devices such as smartphones or computers.

**Keywords**— Bird Pests; Iot (Internet Of Things); Sensors; Surveillance Cameras; Telegram

## 1. Introduction

This document serves as a template for the Word (doc) version. It can be used as a reference when writing your manuscript. The complete paper should include the following sections: 1. Introduction, 2. Methods, 3. Results and Discussion, 4. Conclusions, and 5. Acknowledgements and References. Each section's content is detailed within the document.

Submissions must be complete, final versions and must not have been previously published in other journals. Manuscripts should be no longer than 12 pages (including tables, figures, appendices, and references), written in English, using Times New Roman font, size 11 pt, single-spaced on A4 paper. The entire manuscript (including figures, tables, and appendices) should be printable in black and white.

Articles published in this journal include research findings, conceptual ideas, theoretical studies, and applications. The journal is published quarterly in January, April, July, and October. References should follow the American Psychological Association (APA) 7th Edition format. Examples are as follows:

MariaDB is an enhanced version of MySQL, with new functionalities added; however, command lines, documentation, and more still bear the name mysql (Forta, 2011).

Research by Aditya and Juhana (2015) utilized MariaDB as an open-source MySQL-based database server, implementing database server clustering using Galera Cluster, which is a multi-master cluster implementation for MySQL and MariaDB, optimized through the Weighted Round Robin algorithm.

According to Dawodi et al. (2019), a very popular open-source RDBMS application is MySQL, used by hosting service providers such as Rackspace, GoDaddy, Bluehost, WHM, and others.

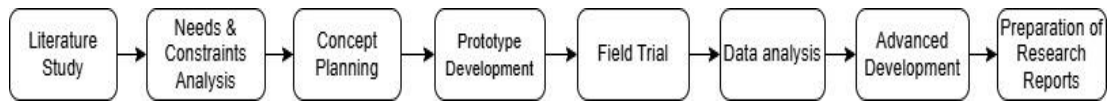
## 2. Method

Rice is a major food crop whose production is increasing from year to year. However, the level of rice productivity will decrease due to pest attacks, one of which is sparrow pests. (1) Bird pests are one of the main enemies of farmers that can reduce crop production. (2) The main animal pests that affect the growth phase of plants. (3) Because of pests, farmers feel the greatest economic losses that occur in the agricultural sector. The main animal pests that affect the growth phase of plants. (4) The main strategy in the pest control program is prevention. (5) Pest control is carried out by utilizing chemical pesticides, but because of their negative impacts on the environment and humans, chemical-free treatments have become a better choice at that time. (6) However, there is also pest control by managing ecosystems that are important for maintaining agricultural productivity. (7) Farmers even try to control pests by repelling pests in various ways, namely by chasing bird pests in the fields, using ropes and tools that make sounds like cans, using cassette reels, and even installing bebegig or people in the fields. However, these work methods are not efficient or take a long time and are difficult to apply. (8) Even monitoring the mineral content of agricultural land is still very manual. (9) So researchers want to use IoT technology to make agriculture smarter. This upheaval is changing agriculture and creating many opportunities. However, farmers face extreme concerns that cause production losses. To overcome this problem, a study proposes the implementation of an AI-enabled system that uses real-time data from IoT and advanced analytical technology to detect, prevent, and control pests. (10) Even farmers are able to monitor pest populations in rice fields by implementing integrated pest management effectively. (11) So controlling pests by utilizing IoT tools can be applied to the bird pest control system in rice plants by designing bird pest detection and control tools so that it can make it easier for farmers to control bird pests. (12) Safe and environmentally friendly pest repellent technology to develop Internet of things (IoT) tools, namely Utilizing PIR sensors or motion sensors to detect bird pests, LDR resistors detect sunlight to control agricultural land. When there is light, the lamp automatically turns off and when there is no sunlight, the lamp will automatically turn on, ESP32-CAM to monitor the rice field area and utilize solar panel or battery power as a sound signal generator that will sound disturbing the bird's hearing system so that the bird flies away and moves the DC motor which is then processed to repel bird pests automatically and the data collected from the ESP32-CAM sensor (1) will be sent to the IoT platform with the Telegram application and which is connected via an internet connection, allowing farmers to monitor and control the tool remotely via smart devices such as smartphones or computers. (13) Review Process Please submit your manuscript following the Templates and Author Guidelines, which can be downloaded and reviewed on the journal's website. Submissions should be made electronically. The initial document format must be in a one-column Word.doc format, including all images and tables.

## 3. Research Methods

This research will be conducted by following a series of careful and systematic research methods with the concept of the Internet of Things (IoT) as the core of the entire process. IoT refers to a network of physical devices connected to the internet and can communicate and interact with each other. This research stage includes several stages that will be carried out sequentially as shown in Figure 1 below. Analysis Planning Development Preparation

Development Trial Literature Study Needs and Concepts Advanced Research Prototype Field  
Data Analysis Report Constraints.



*Figure 1. Research Stages*

- Literature Study Research: Will begin with a literature study to gain a deep understanding of the latest developments in Internet of Things (IOT) technology that can be applied in agriculture, especially in the service of bird pests.
- Analysis of Needs and Constraints: Identification of the need for tools and materials that will be used in the future, constraints from the farmer's perspective will be the next step. Surveys, interviews with local farmers will be conducted to understand the problems surrounding bird pest attacks and the constraints they face in using technology.
- Concept Design: based on literature, needs analysis, the concept of a bird pest repellent tool to be designed. This includes appropriate sensors, monitoring systems, and effective repellent mechanisms. The concept will be developed, considering aspects of resource availability and ease of implementation in the field.
- Prototype Development: A prototype of the bird repellent device will be developed based on the concept that has been designed. This development involves software programming, IoT sensor integration, and hardware assembly. This prototype is tested periodically to ensure its performance is as expected.
- Field Trial: After the prototype is successful, the device will be tested directly in the farmer's rice field. This trial will provide an understanding of the effectiveness of the device in repelling bird pests, its durability against agricultural environmental conditions, and ease of use by farmers.
- Data Analysis: Data obtained from the field trial will be analyzed to evaluate the performance of the device.
- Further Development: based on the results of the analysis, the prototype will be improved and enhanced to meet the desired standards. This step can involve design changes, additional features, or feedback from farmers.
- *Preparation of Research Reports: the entire research process and its results will be compiled in the form of a research report. This report will include a detailed description of the Methodology, Findings, and Implementation of the*

*design of the IoT based bird repellent device. In every stage of IoT solution development, the role and concept of IoT is very important as this system enables the connection and communication between physical devices and centralized systems. This allows to gain valuable insights from the data collected by IoT devices and take necessary actions based on that information.*

#### 4. Flow Diagram

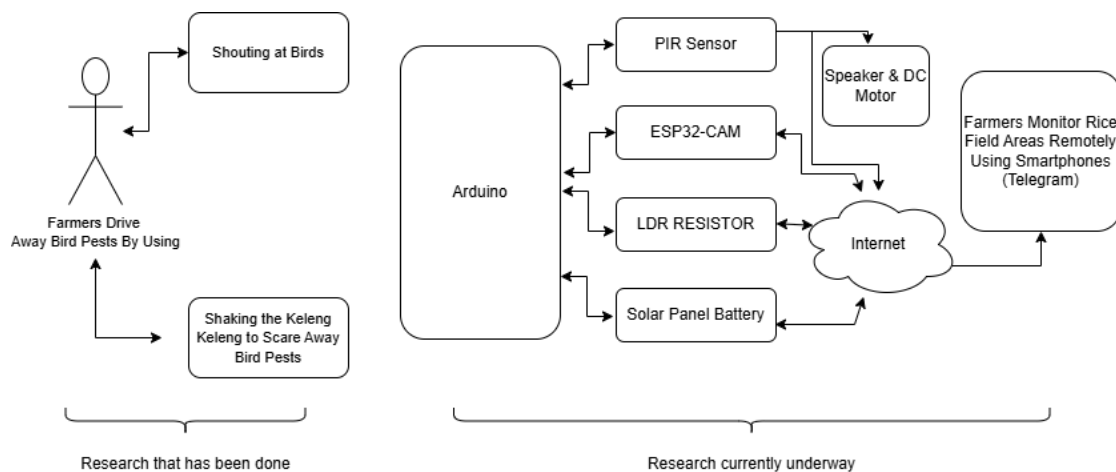


Figure. 2 Flowchart

Description:

- Ardiono: media used to provide information to Arduino so that it can provide output according to what is desired. Arduino software is in the form of processing software used to write programs into Arduino Uno, a combination of C++ and Java languages. Arduino software can be installed on various operating systems such as Linux, Mac OS, Windows. Arduino Uno will process data from the sensor and will produce output in the form of siren sounds and Electromagnetic Waves
- PIR Sensor: to detect movement using infrared light. This sensor can recognize humans and animals because they emit certain infrared waves that can be detected by the sensor.
- ESP32-CAM: to record the movement in the form of images. Images captured by this camera will be automatically sent to the Telegram messaging application via the Telegram bot
- Spiker & DC Motor: The spiker makes a sound to scare birds and the DC motor is a component used to drive the sparrow repellent mechanism.

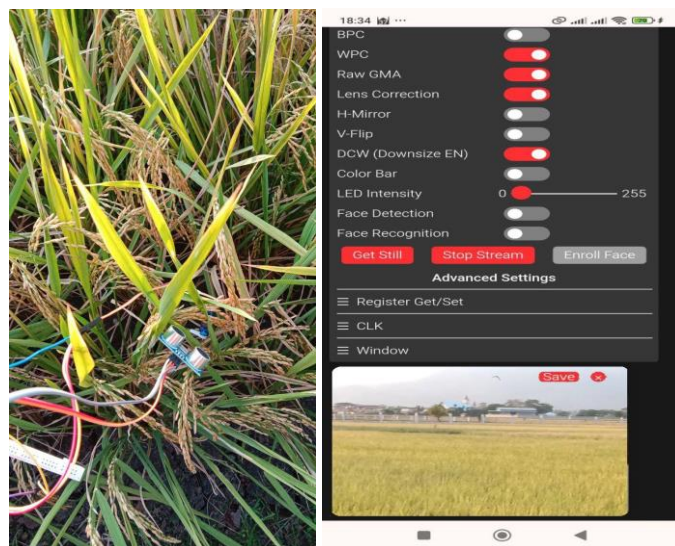
- Resistor (LDR): to create an automatic switch using a relay that gets a command when the LDR is exposed to light, so the street lights will turn off automatically when exposed to light, so you can save electricity usage if you forget to turn it off.

**5. Results And Discussion**



*Figure 3. Telegram Information*

The image above shows that when the motion sensor detects movement in the rice fields, the system will automatically send a message to Telegram to provide information that there is something in the fields, please check the camera.



*Figure 4. Agricultural Land Monitoring*

The picture above shows that when there are bird pests, the speaker and DC motor will scare the birds and the DC motor is a component used to drive the sparrow

pest repellent mechanism. And farmers can monitor their agricultural land remotely just by checking their cellphones or laptops.

## 6. Conclusions

Bird Pest Repellent System on agricultural land automatically by utilizing motion sensors to detect the presence of birds on agricultural land then Spiker and DC motors that make sounds to scare birds in rice fields so that birds fly away and the system sends signals or information to Telegram to notify farmers that there is something in the field please check the camera. Then by utilizing ESP32-CAM farmers can easily or can monitor the condition of their rice fields remotely without having to go to the rice fields to see the condition of their rice fields directly.

## 7. Acknowledgements

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