BirbAI

DESIGNED BY

BIRB Co. Team

Manual Book

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FOREWORD

We express our heartfelt gratitude to the Almighty for granting us the opportunity and perseverance to complete this manual book. The journey to bring Birb AI to life has been both challenging and rewarding, fueled by the dedication and collaboration of our passionate team. This manual is the result of countless hours of research, development, and field testing aimed at creating a reliable and innovative solution for farmers.

As we strive toward a future where technology and agriculture work hand in hand, we believe Birb AI represents a significant step forward in sustainable farming. By addressing the persistent issue of bird pests, our robot is designed to empower farmers with cutting-edge technology, minimizing crop losses while ensuring environmental balance. It is our sincere hope that this manual serves as a clear and comprehensive guide for users, enabling them to maximize the benefits of Birb AI.

We would like to extend our deepest appreciation to our mentors, sponsors, and supporters who believed in our vision. Without their guidance and encouragement, this project would not have been possible. We also recognize the invaluable feedback from farmers during our testing phase, which helped refine Birb AI to better meet real-world needs.

Thank you for choosing Birb AI. Together, let us cultivate a brighter future for agriculture. If you have any questions or require further assistance, please do not hesitate to reach out.

Sincerely,
BIRB Co. Team

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TABLE OF CONTENTS

INTRODUCTION

BACKGROUND

One of the biggest challenges faced by rice farmers is pest attacks, particularly air-based pests such as birds. Wild birds often invade rice fields during the grain formation phase, causing significant damage to the harvest.

According to data from the Ministry of Agriculture of the Republic of Indonesia, losses caused by bird pest attacks reach 10-15% of total yields in several regions of Indonesia (Ministry of Agriculture, 2021). This translates to a loss of approximately 7-8 million tons of rice annually from the national harvest potential, which in 2020 was recorded at 54.65 million tons (Statistics Indonesia, 2020).

OBJECTIVES AND BENEFITS

The research aims to design and develop a prototype of an AI-based robot to detect and deter bird pests in rice fields automatically using non-lethal laser technology.

In doing so, it offers the following benefits:

- Increased rice yield by reducing crop damage.
- Improved time and labor efficiency for farmers.
- An environmentally friendly solution that does not harm the local ecosystem.
- Contribution to the achievement of Sustainable Development Goals (SDGs) 2 and 9.

ROBOT SPECIFICATIONS

PHYSICAL DIMENSIONS

- Length: 50 cm
- Width: 30 cm
- Height: 40 cm
- Weight: 5 kg

KEY COMPONENTS

- Microcontroller: Arduino Uno
- Sensors: Webcam
- Actuators: Servo Motors, Non-Lethal Laser
- Power Source: Battery (10,000 mAh)

MAIN FEATURES

- Detect birds using AI-enabled cameras.
- Deter birds with a non-lethal laser.
- Monitor and control the robot through a dedicated application.

OPERATION GUIDE

INITIAL SETUP

- Fully charge the battery.
- Inspect components such as sensors and actuators to ensure they are not damaged.
- Place the robot in a strategic location in the field.

STEPS TO OPERATE

- Turn on the robot by pressing the power button.
- Ensure the power indicator lights up.
- The robot will automatically scan the area and start operating.

SHUTTING DOWN

- Turn off the robot by pressing the power button for 3 seconds.
- Store the robot in a safe and dry location.

ROBOT MAINTENANCE

Proper maintenance is crucial to ensure Birb AI operates efficiently and has a long lifespan. Regular checks and cleaning are recommended.

ROUTINE MAINTENANCE

- Regularly clean the camera lenses and sensors to prevent dust and debris from obstructing their functionality. Use a soft cloth for cleaning.
- Check all cables and connectors to make sure they are intact and properly connected. Replace any damaged parts to avoid malfunctions.
- Ensure the battery is charged before use. Check for any signs of damage, such as swelling or leakage, and replace the battery if necessary.
- Ensure the laser module is unobstructed and clean. Check the servo motor for smooth operation.

PERIODIC CHECKS

- Battery Health: Periodically check the battery's condition and replace it if it no longer holds a sufficient charge.
- Actuator Testing: Test the servo motors and laser functionality to ensure proper movement and targeting.

TROUBLESHOOTING

Potential Problems may occur when using the Robot, Problems include but limited to

- **Problem:** Robot doesn’t turn on.

  Solution:
  - Ensure the battery is charged.
  - Check all connections and ensure the power button is pressed long enough to power the robot.

- **Problem:** Sensors not detecting birds.

  Solution:
  - Clean the camera and sensors.
  - Ensure there are no obstructions in the sensor’s field of view.

- **Problem:** Laser not functioning.

  Solution:
  - Check the laser for blockages or damage.
  - Inspect the servo motor controlling the laser.

If the issue persists, please reach out to customer support for further assistance.

BIRB AI APPLICATION

The Birb AI App is a supporting application designed to monitor and control the robot in real-time, providing farmers with the tools needed to manage bird pest control and optimize their agricultural activities. This app enables users to stay connected with the robot from anywhere, ensuring that operations run smoothly and efficiently. Through its user-friendly interface, the app offers various features that allow farmers to monitor the robot's performance, analyze data, and even customize the robot’s behavior to suit specific needs. Additionally, the app provides key insights into pest control activities and power usage, offering data-driven solutions for better decision-making.

APPLICATION INSTALLATION

Steps to Install:

- Download the application from the Google Play Store or App Store.
- Install the application as usual.
- Open the application and register an account to sync with your robot.

SYNCHRONIZING WITH THE ROBOT

- Turn on both the robot and the application.
- Connect via Wi-Fi, Bluetooth, or QR Code.
- Ensure the connection is successful before using other features.

APPLICATION FEATURES

Real-Time Monitoring

View the robot’s status and ensure it’s functioning properly. The app displays key operational details such current mode and location.

Real-Time Live Camera

Access the robot's live camera feed in real-time. This feature enables farmers to monitor the field remotely, ensuring that the robot is targeting bird pests effectively.

Customize Robot Mode

Customize the robot's behavior and modes according to the needs of the field. Theres 11 different modes user can choose.

Real-Time Location of Each Robot

Track the location of all deployed robots that connected with user in real-time on a map, ensuring that every robot is where it needs to be for optimal pest control.

Bird Detection and Power Consumption Statistics

This feature provides a comprehensive overview of both bird activity and energy usage, giving farmers valuable insights to optimize operations and resource management.

Experimental BIRB Instinct (AI for Rice Plant Health)

A cutting-edge feature that uses AI to assess the health of rice plants. This experimental mode allows the robot to capture images of plants and analyze them for signs of diseases or nutrient deficiencies, providing valuable insights to improve crop management and prevent yield loss.

CONCLUSION

Thank you for choosing BIRB AI, an innovative solution designed to help you address the challenge of bird pests in your rice fields. We hope that BIRB AI will become an essential tool in your farming operations, minimizing crop losses and improving efficiency. With its advanced technology, Birb AI offers an effective and environmentally friendly way to protect your crops without causing harm to the ecosystem.

The Birb AI robot, along with the accompanying application, provides you with the flexibility to monitor and control the robot in real time, adjust its settings, and track important data such as bird detection statistics and power consumption. This integrated system empowers you to manage pest control more effectively and optimize your farming efforts.

We are committed to continuous improvement, and your feedback is crucial in helping us enhance Birb AI for the future. We encourage you to share your experiences, suggestions, and any issues you encounter, as your input will guide us in refining the system. For any questions or technical support, please feel free to contact us using the provided details.

Thank you again for trusting Birb AI. Together, let’s work towards a more sustainable and productive agricultural future.

Sincerely,
Birb Co. Team

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CONTACT INFORMATION

For any further questions or technical support, please feel free to reach out to our team using the following contact details:

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We are here to assist you with any inquiries and ensure your BIRB AI operates smoothly.

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