Design and Fabrication of Bird Scarer: A Review

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Abstract — Birds pose a significant threat to agricultural crops, leading to substantial economic losses for farmers worldwide. Traditional methods of bird repellence often prove inefficient and environmentally harmful. In response, this study introduces an innovative Bird Repellent Machine (BRM) designed to mitigate avian-related agricultural damage. The BRM strategically dissuading bird from the area without causing harm to them or the environment. This research explores the development and testing of the BRM, assessing its effectiveness in diverse agricultural settings. Results demonstrate a significant reduction in bird intrusion, leading to increased crop yields and reduced economic losses for farmers. Furthermore, the BRM's eco-friendly approach aligns with sustainable agricultural practices, promoting biodiversity and environmental conservation.

Keywords: Bird Repellent Machine (BRM), Sound Based Deterrence, Eco-Friendly, Agricultural Protection, Solar-Powered, Atmega8 Microcontroller, Sustainable Pest Control

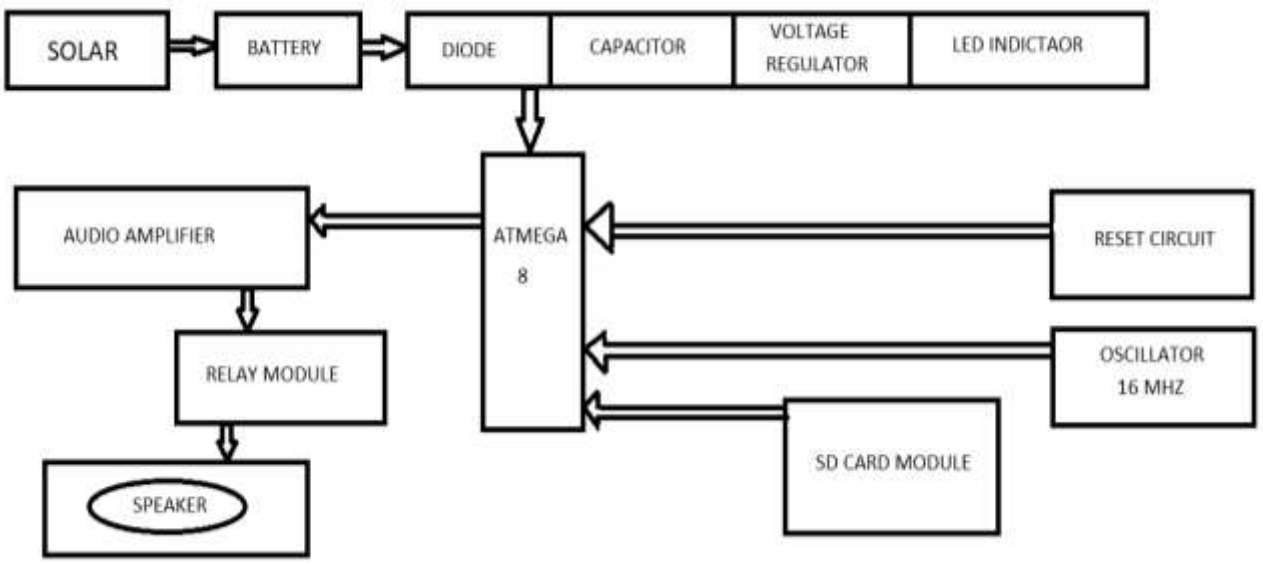
I. INTRODUCTION

Bird infestations pose significant challenges across various sectors, from agriculture and manufacturing to urban enviorments. The presence of birds not only leads to economic losses by damaging crops and property but also raises only leads to economic losses by damaging crops and property but also raises health and safety concerns due to the accumulation of droppings and the potential spread of diseases. In response to these challenges innovative technological solutions have emerged to address the need for effective bird repellent systems. This document provides a detailed analysis of the Bird Repellent Machine's architecture, components, and functionability, aiming to shed light on its effectiveness in real-world applications.

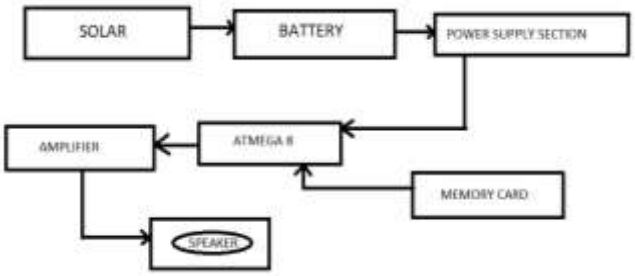
II. LITERATURE REVIEW

1) Monpara Alpesh- Effective bird control requires a combination of techniques, with visual scaring being the most successful method, acknowledging the challenge of coexistence between birds, agriculture, and nature conservation. [2022]
2) Swarankar Swanandan- He highlights the need for loud, biologically relevant, and dynamically changing signals in acoustic deterrent devices, emphasizing the importance of understanding bird hearing characteristics. . [2021]
3) Siddharth Shankar Baral- Bird repellent machines employ ultrasonic sound waves, visual cues, or motion-activated methods to deter birds without harm, offering portable and versatile solutions for various outdoor spaces. . [2020]
4) Amit Kothiya- The paper discusses the effectiveness of a bird repellent machine in deterring avian pests through innovative techniques, as outlined in its research findings and methodology. . [2019]
5) S.V. Jayshankar- Weeds, pathogens, and animal pests are among the pests that pose a threat to the productivity of crops meant for human consumption. Based on this review, current gaps are identified, and strategies for future research are proposed. . [2019]

III. CIRCUIT DIAGRAM



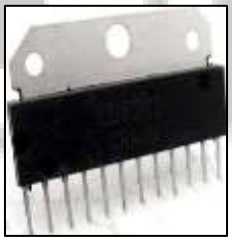
IV. SYSTEM ARCHITECTURE



V. ELEMENTS

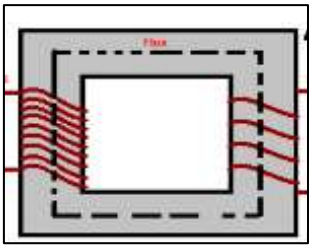
1) The ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1 MIPS per MHz, allowing the system designer to optimize power consumption ver- sus processing speed.

2) A6283 is Dual channel Stereo Audio Amplifier Built in Thermal shutdown protection. 6283 IC is best suitable for Low and medium power High quality Stereo Audio Amplifier.

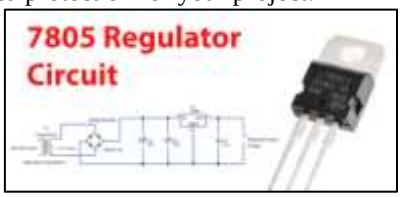


3) A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.

4) A Step-down transformer decreases the voltage incoming to the site by increasing the electrical current. It converts the high incoming voltage in the primary winding to the necessary lower voltage in the secondary windings.



5) This is the basic L7805 voltage regulator, a three-terminal positive regulator with a 5V fixed output voltage. This fixed regulator provides a local regulation, internal current limiting, thermal shut-down control, and safe area protection for your project.



6) Storage Device - To store ultrasonic sound

7) A rechargeable battery, storage battery, or secondary cell (formally a type of energy accumulator), is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use.

8) A solar panel is a device that converts sunlight into electricity by using photovoltaic cells. PV cells are made of materials that produce excited electrons when exposed to light.

9) A voltage noise suppressors for voltage regulators and for power supply.

VI. WORKING OF BIRD SCARER

This solar-powered bird repellent machine uses sunlight to charge its battery, ensuring continuous operation. It includes a 5-minute delay circuitry between activations to prevent habituation among birds. By harnessing solar energy and implementing this delay, the device maintains its effectiveness over time. This innovation creates a reliable and sustainable solution for bird deterrence.

Stored within the device's memory or removable storage medium are various bird distress calls, predator sounds, or aversive noises. Once the delay period elapses, the machine activates its sound amplification and playback system, emitting the stored sounds at a volume level sufficient to deter birds. This sudden and unexpected noise creates a hostile environment for birds, discouraging them from roosting, nesting, or feeding in the vicinity. Designed to withstand outdoor conditions, the machine may offer adjustable settings for volume levels, sound frequencies, and playback patterns.

VII. BENEFITS

1) Non-Lethal Solution
2) Environmentally Friendly
3) Versatility in Applications
4) Precision and Targeted Deterrence
5) Nighttime Deterrence
6) Low Maintenance
7) Safe for Crops
8) Coverage

VIII. LIMITATIONS

1) Limited effectiveness in heavily populated bird areas.
2) Dependency on sunlight for operation.
3) Potential habituation of birds over time.
4) Vulnerability to theft or vandalism in outdoor environments.

IX. CONCLUSION

In conclusion, our solar-powered bird repellent machine represents a significant advancement in environmentally friendly pest control. By harnessing renewable energy through solar panels, we have ensured that the device operates sustainably without relying on external power sources, thereby reducing its carbon footprint. The integration of an advanced sound system designed to emit frequencies that repel birds without causing harm has proven to be an effective solution for mitigating bird-related issues in various settings. This humane approach respects wildlife while addressing the practical needs of agricultural, residential, and commercial areas. Throughout the development and testing phases, the machine has demonstrated reliability and efficiency in diverse environmental conditions. The positive feedback from initial deployments confirms that our design meets the desired criteria of effectiveness, sustainability, and ease of use. Our bird repellent machine not only helps protect crops, buildings, and other assets from bird damage but also exemplifies how innovative engineering and environmental stewardship can work hand in hand. We are confident that this technology will contribute to more sustainable and humane pest control continue refining our design based on user feedback and advancements in solar and acoustic technologies. We also hope to explore additional applications and improvements to further enhance the versatility and efficiency of our solution.

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