Request For Grant For the Design, Production, and Deployment of an Improved Electronic Bird Repellers For Agricultural Use

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1. Executive Summary

Bird and rodent invasions remain a major cause of post-planting and pre-harvest crop losses for farmers across Nigeria. In response to this persistent agricultural challenge, The Projects Development Institute (PRODA), a research and development agency under the federal ministry of science, technology, and innovation has successfully developed and patented a locally fabricated Electronic Bird Repeller. This innovative device emits randomized, high-decibel distress and predator sounds to scare away birds and rodents from farmlands without harming them or the environment. We have applied for and secured a patent for this device. The system is inspired by traditional farm scare devices but improved through engineering principles to ensure automatic operation, durability, and consistent deterrence using electronic sounds

This proposal outlines our readiness to collaborate with your agency for funding to produce and deploy the Electronic Bird Repeller in farms to demonstrate its efficiency and robustness in curtailing animal incursion in crop farms.

2. About the Research Institute

PRODA] is a government-owned research and development Institute under the Federal Ministry of Science, Technology and Innovation. Our mandate includes technological innovations, prototyping, and capacity building in support of national development. We work closely with stakeholders across agriculture, industry, and education to develop locally relevant solutions that solve real-world problems.

3. Introduction

The productivity of Nigerian agriculture is frequently threatened by pest birds and small rodents, which destroy cereal crops, fruits, and grains. Animal intrusion in farmlands causes significant agricultural losses each year. Wild and domestic animals destroy crops by eating and trampling them, and can pose food safety risks due to the deposition of faeces on or near the crops. Birds are one of the most challenging animals to keep out of agricultural fields, especially a rice farm. Farmers in both rural and semi-urban settings face significant yield losses due to the inability to deter these intrusions effectively.

Recognizing this need, PRODA developed a cost-effective, solar-powered, and programmable Electronic Bird Repeller. The technology is field-tested and proven to reduce avian and rodent interference significantly on open farmlands.

4. Objectives

- To improve the design and manufacture up to 50 units of the Electronic Bird Repeller
- To deploy and test the devices in designated farms or cooperatives
- To offer technical support and training on the installation and use of the devices.
- To foster government-to-government collaboration in agricultural technology deployment.

5. Our Solution

The Electronic Bird Repeller

The Electronic Bird Repeller is a solar powered automated, programmable device that emits a variety of high-decibel distress and predator sounds that scare birds and other animals away from a farm.

5.1 Product Description:

This is an advanced electronic bird repellent device capable of generating highly potent audible sounds that instil fear, irritation, and disorientation in birds. These sounds are chosen to mimic natural predator calls or other distressing noises for birds. Common choices include sounds resembling hawks, falcons, or gun shots. These strategically chosen sounds are designed to evoke fear, irritation, or disorientation in the birds, motivating them to vacate the area in search of quieter, untouched spaces. To prevent the birds from growing accustomed to the noise and to maintain the system's efficacy over time, it plays the sounds cyclically. This entails intermittent playback of the various deterrent sounds, ensuring that the birds do not habituate to the audio disturbances.

It is also equipped with real time clock and an electronic circuit that ensures that the sounds start at 6am in the morning and stop at 6pm in the evening.

The system consists of solar (PV) panels, horn speakers, rechargeable battery and a Control Unit all assembled on a 9 ft high mounting structure as shown in the figures below.

Figure 1: Mounting Structure Showing Solar (PV) Panels and Speakers

Figure 2: A side view of the mounted device

5.2 Key Features

- Multi-Sound Emission: Alternating calls of birds of prey, gunshots, and alarm sounds.
- Adjustable Timer: Emits sounds intermittently at adjustable intervals to prevent animals habituating to the sounds.
- Works Only in Day Time: Automatically turns on in the morning and turns off at night
- Solar-Powered Option: Ensures operation in off-grid rural locations.
- Weatherproof Enclosure: Suitable for outdoor use.

- Optional Motion Detection: Triggers sound only when movement is detected (advanced model).
- User-Friendly Interface: Easy to install and operate by rural farmers.

5.3 Technical Specifications:

- Power Supply: 12V DC (solar + battery)
- Audio Output: 90–120 dB
- Range of Effectiveness: Up to 1 hectare
- Sound Library: Over 30 bird and rodent distressful sounds
- Weatherproof Rating: IP65

5.4 Advantages of the Electronic Bird Repeller

- Noise deterrents are generally effective, but much like visual deterrents, birds easily become habituated to them as they produce only one type of sound, decreasing their efficacy over time. Additionally, those who employ this sound deterrents may encounter complaints from neighbours about the nuisance noise.
- Non-lethal, sound-based deterrent, safe for humans and crops. Complies with environmental and wildlife protection standards.
- Powered by solar panels, the system ensures sustainable and continuous operation during day time, making it suitable for deployment in remote farming areas with limited access to electricity. The system begins by harnessing energy from sunlight using a photovoltaic (PV) panel. This solar energy is converted into electrical power and stored in a rechargeable battery, ensuring the device can function even when sunlight is not available.
- Unlike the wind operated systems that produce noise even at night, during odd hours, this electronic system only works from 6am to 6pm each day.

However, the system has the following limitations:

- Most electronic systems rely on batteries, solar panels, or direct electricity. Power failures or weak solar charge can render them inactive.
- This electronic system has high initial cost due to sensors, circuitry, and enclosures.
- It requires regular maintenance: Electronics may malfunction due to dust, moisture, insect ingress, or component degradation.
- Electronics placed in open fields can be stolen or vandalized, especially in unsecured farms.
- Exposure to rain, humidity, or extreme heat can damage internal electronics if not made rugged.

1. Budget Estimate

A detailed budget can be provided upon further discussion of quantities and optional features, but an estimated unit cost is provided below for planning purposes for the two types of bird repeller developed by the institute:

1.1 Budget for the Solar Powered electronic bird Repeller

Item	Quantity	Unit Cost (₦)	Total Cost (₦)
Improved Electronic Bird Repeller Unit design and development	50	307,000	15,350,000
Transportation & Logistics	--	--	300,000
Installation & Testing	--	--	250,000
Total Estimated Cost			**15,900,000**

7. Sustainability and Impact

The deployment of these devices will:

- Reduce crop losses by up to 70% in affected farms
- Improve food security and farmer productivity
- Support local content and indigenous technology adoption
- Create new opportunities for public-private partnership in rural innovation

8. Our Team and Capacity

PRODA is equipped with a multi-disciplinary team of highly skilled Researchers, Engineers, Technologists, and Technicians with expertise in electronics/electrical, mechanical and agricultural engineering. We apply cutting edge skills in embedded systems design, wireless sensor networks and Internet of Things.

9. Conclusion

We are confident that this collaboration will offer a cost-effective and impactful solution to one of the critical challenges in Nigerian agriculture. Our institute is fully prepared to begin production immediately upon receipt of approval and procurement agreement.

We thank you for considering this proposal and are available for a detailed briefing at your earliest convenience.