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Fabrication of Bird Repeller for Agriculture Purposes

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Abstract: ***The need for an effective bird deterrent is important in many of today's industries. In the past there have been many attempts to develop a successful system with few achieving adequate results. The aim of this project was to develop and design an autonomous system that creates minimal disturbance whilst being effective in bird deterrence. The aim of this project is to design an autonomous bird deterrent system that is effective in deterring birds from areas such as airports, crops and public buildings. To achieve this, a study will be conducted into current bird deterrent systems in order to evaluate their tracking effectiveness. Once this is finished, the most effective system will be selected from a criteria and combined with a system to create an autonomous deterrent. The system is made up of a motion detector which will detect the presence of a bird and then sound an alarm to scare away the bird. The system is powered by a small solar panel taken from a common solar garden lamp. A simple wind generator supplies backup power. The system is controlled by a PIC microcontroller. The aim is to have all the circuitry fit within the casing of the solar garden lamp.***

Keywords- Bird Repeller, Fabrication, Agriculture.

I. INTRODUCTION

Today it is common to have electronic consumer products mass produced in factories and then sold at affordable prices to the consumer. The question and task set out in this project was could an electronic product (the Bird Repellent) be built in the college using the facilities available to electronic engineering students. Using the basic tools in the laboratories and at a student's disposal, by ordering in affordable components from companies like Farnell could an accurate product be produced within an allocated time. During the planting season in October and the harvesting season in July, birds such as pigeons, sparrows, and chickens were found to be feeding on the crops on the farm, causing significant damage. This led to the farm suffering losses in crop output and a subsequent adverse impact on its revenue. Tried and tested solutions such as shooting blanks and the usage of scarecrows or laser beams were found to only provide short-term relief and had limited impact. At a time, close to 30 birds were found to be feeding off these crops, necessitating an immediate and truly effective solution. The product in question in my case was the Bird Repellent, a device that should repel Birds from an area using a loud noise. A list of potential projects and their supervisors was handed out at the start of the year. All projects were assigned to the class randomly. My project supervisor, Pat Cogan, came up with the project idea of the Bird Repellent. During the initial implementation of the system, expected and unexpected problems in the design arose that needed dealt with. The encountered problems were then listed in each of their relative sections and supplied with solutions and suggestions for a design revision. Once this system has been fully developed, it will provide a frame work for multiple types of deterrent with the possibility for use in a variety of applications.

II. LITERATURE SURVEY

S.S. Baral, R. Swarnkar, A.V. Kothiya, A.M. Monpara and S.K. Chavda [1] this paper overcomes the mechanical and chemical methods to avoid the disturbance of birds using ultrasonic waves. Making the system as a less complicated, less maintenance and ecofriendly. The disturbing range used is 28 kHz to 60 kHz. The source of energy is 12volt. There is also a pause period of 1 minute (60 seconds). Also the system is easy to install and it has a less complicated circuit systems. It also covers large area.

Samira Shams Salehi, Ali rajpour, arash rasekh, Mohammad farkhari [2] this paper deals with the pests like moths, larvae and pupae using ultrasonic waves and its effect on it. The frequency range between 43- 45 kHz. In this observation male moths are more affected by this frequency range. Different shaped pattern of frequencies are tested and the effects are observed. This helps in protecting cereal crops from pests. Heather M. Crawford, Joseph B. Fontaine, and Michael C. Calver [3] this paper deals with the ultrasonic deterrents to reduce cat nuisance. The ultrasonic deterrents offers cost effective. Various frequency level of sound cycles were tested in this experiment. Volunteers were used for surveillance. Moreover video footage was also recorded for correct observation. These things were experimented in garden sites. Bishop, McKay, Parrott, Allan, 2003 [4] to achieve the greatest effectiveness, scarecrows must appear to be life like, be highly visible and must constantly change location to extend the length of their effectiveness. In the last few years several types of moving scarecrows have come into the market.

These “Whirly Ozidge” scarecrows are constructed of a reinforced PVC skin which is stretched over the aluminium frame and rotate in the wind around their central axis. Bishop, McKay, Parrott, Allan, 2003 [5] another type of moving scarecrow is the Scarey Man made by Clarratts. The Scary Man” is a 165 cm plastic scarecrow that runs off a 12 volt car battery. The scarecrow rapidly inflates about every 18 minutes and lasts for 25 seconds. During its inflation period the Scarey Manemits a high pitched wail, and if at night illuminates. Ultimately, however lifelike scarecrows are, they do not pose a significant enough threat to scare birds. Therefore to improve the threat that scarecrows create it is recommended that these devices are combined with actual human activity or audio deterrents. Kenneth. I Morris [6] this paper comprises of ultrasonic wave generating device for the purpose repelling of animals. The frequency is an ecofriendly to animals. It do not harm animals. Battery powered for working of systems. It comprises of infrared detector to detect presence of animals and ultrasonic emitter to repel animals. Neither the intensity nor frequency of ultrasonic wave is emitted. Arun pandiyan, Murugan, Udaya kumar, Vinith kumar [7] the approach taken by the paper is to reduce the disturbance of birds in cropping fields. The thread posed by birds to economic crops in farms require effective bird deterrent in such locations. The disturbing ultrasonic range to be 15-25 kHz. Here piezo speakers are used for emitting the ultrasonic waves for repelling birds. Herbert Montgomery White [8] in this paper the sonic sound is used for bird repellency. Here the electronic sound generator generates wide range of frequency. The sound is generated by means of unijunction saw tooth oscillator and a ceramic transducer. Frequency between 10 kHz to 150 kHz which is only harmful to birds. So this device is of ecofriendly. Martin L. lenhardt ,Hayes, Alfred L,Ochs ,Richmond, both of VA [9]An external stimuli is provided that alerts animals to danger and repels the animals from certain areas. Pulsing microwaves, vibrate or supersonic sound waves. In order to alert birds or other animals of danger. These same birds or animals from specific areas. Sensation is virtually harmless to the birds and other animals. Bishop, McKay, Parrott, Allan, 2003 [10] as the demand for non-lethal, environmentally safe methods of bird scaring has increased, interest has grown in the use of lasers, particularly low-power lasers that work under low light conditions. The low power levels, distance, accuracy and silence makes lasers an attractive choice when choosing a method of bird control. Leopatra Pike1, Buddhamas Pralle Kriengwatana [11] Humans perceive speech as relatively stable despite acoustic variation caused by vocal tract (VT) differences between speakers. Humans use perceptual ‘vocal tract normalization’ (VTN) and other processes to achieve this stability. Similarity in vocal apparatus/acoustics between birds and humans means that birds might also experience VT variation. This has the potential to impede bird communication. Jairo Cervantes, Fred Choobineh [12] we propose a stochastic mixed integer optimization model to optimally size a solar power system and its battery storage for residential and nonresidential customers of electric power. The objective function of the model is to minimize the total cost associated with solar power system investments and the grid provided electric power over a planning horizon. We consider the uncertainty associated with solar radiation, load, and electricity price in the form of probabilistic scenarios. Conover, 1983 [13] Hawk kites are mobile devices that act as a predators to create a threat to birds in the surrounding area. Most kites bear the image of a soaring eagle outline and are tied to the ground. Studies have shown that hawk kites are ineffective in deterring birds from crops but however, are effective when flown beneath helium balloons to create a sufficient threatening movement. Bird BGone Website [14] in this paper Other such bird deterrents such as ultrasonic systems which emit frequencies 21-26kHz in order to deter birds from areas such as warehouses, manufacturing plants, arenas, and loading docks. One of the current systems on the market is the Bird Chase Ultrasonic from Bird-B-Gone.

Chigbogu Godwin Ozoegwu [15] Solar is the mother renewable energy (RE) resource with relative superiority over the other RE resources. The superiority is hinged on its universal availability (and fairly uniform endowment to all human-in- habited regions), it’s almost-zero environmental impact on utilization and its risk-free supply facilities (that is, free from natural disasters, human vandalism and local/international politics). For this reason, solar energy is normally accorded higher penetration levels than the other resources in the long-term retargets of countries. Harris and Davis, 1998 [16] this system comes with 5 different program modes of ramp, blast, steady, sweep and random to discourage birds from the surrounding area. It also has 6 separate speakers and a claimed range of 500 square meters. Despite the superior features of this system the is no evidence that ultrasonic devices deter birds, with studies showing that most species of birds do not hear frequencies above 20kHz (Harris and Davis, 1998) giving no biological reason to use ultrasonic. Therefore ultrasonic systems are ineffective in deterring birds and use should be avoided. Blackwell; Bernhardt; Dolbeer, 2002 [17] Flashing, rotating, strobe and searchlights are novel stimulus to birds, which encourage an avoidance. Although stationary lights are known to attract birds at night, bright, flashing, revolving lights because a blinding effect which causes confusion. Light systems are designed for deterring birds from roosting and feeding in specific areas and are most effective between dusk and dawn. HuiWanga, [18] as a promising application of solar energy, parabolic trough concentrating solar power with indirect thermal energy storage has been widely used in concentrating solar power plants constructed in China. The dynamic modeling and behavior of the power plants were important for achieving fast start-up and shut down and to overcome weather disturbances.

Pilo, 1988 [19] Studies conducted on light systems have shown that high intensity strobe lights caused birds to take evasive action and move away from some airfields. In the same study it was found that a randomized selection of two strobe frequencies increased the effectiveness over a range of species and that the strobes stopped all bird habitation.

Johan mansson, [20] in this paper lethal scaring is used as to disturb goose. Lethal scaring substantially decrease graylag geese numbers in damage prone fields. Geese did not change alertness to approaching persons after lethal scaring. Matthew Ainsley, Nicolas kosoy, [21] in this paper the tragedy of birds scaring is researched. Here they highlighted the role of birds scaring by farmers of millet as a barrier to greater adoption of drought resilient, high traditional crops. Farmers scare away pests to mitigate negative loss associated with crop raid. Kailong Liua, Xiaosong Hub, Zhile Yangc, Yi Xieb, Shengzhong Fengc [22] Technical challenges facing the development of battery economic charging for energy management arise from various contradictory objectives, immeasurable internal states, and hard constraints. Available solutions often resort to optimizing economic charging from the perspective of power grid, while few focus on the benefits of electric vehicle (EV) owners. Carla Menale a, Francesco D'Annibale a, Barbara Mazzarotta b, Roberto Bubbico [23] This paper describes a set of experimental tests carried out to better understand the thermal behavior of Lithium-ion batteries under load and the capability of various cooling fluids in maintaining the working conditions within a safe range for the cells. Despite several theoretical models are available in the literature, very few experimental data are reported. Mayanglambam Manolata Devi, Ankush, Sujit Kumar Guchhait, Sunaina, Suresh babu G. N., M. Sreekanth, N. Kalaiselvi, Ashok Kumar Ganguli, Menaka Jha [24] in this paper Zn, Mn and C sources have been extracted from spent primary batteries. Extracted materials have been used as anode in rechargeable lithium ion batteries. C-ZnMn2O4 shows high capacity of 600 mAhg-1 at a current density of 50 mAg -1. Jing Wang, Zhenjun Wang,Carolina L.Z. Vieira, Jack M. Wolfson, Guiyou Pingtian, Shaodan Huang [25] The application of ultrasonic technology in the treatment of organic pollutants in water has attracted more and more attention in recent years. Compared with conventional treatment, ultrasonic treatment is more efficient and time saving. Ultrasonic technology is effective for the degradation of many refractory organic pollutants.

III.COMPONENTS AND WORKING

A. Liquid Crystal Display

A liquid crystal display (LCD) is a flat panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.

Fig .1: LCD display

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B. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees of kelvin) gives off infrared radiation. There are two types of infrared sensors: active and passive.

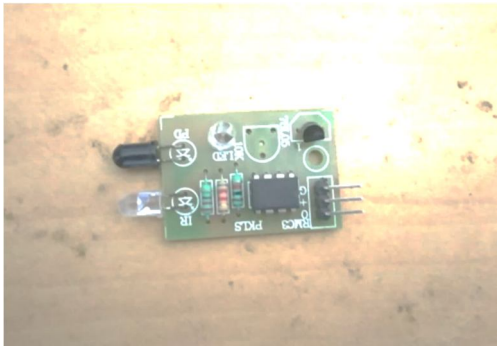

Fig .2: IR sensor

C. Passive Infrared Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. The term passive in this instance refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work entirely by detecting the energy given off by other objects. It is important to note that PIR sensors don't detect or measure "heat" per se; instead they detect the Infrared radiation emitted from an object which is different from but often associated/correlated with the object's temperature (e.g., a detector of X-rays or gamma rays would not be considered a heat detector, though high temperatures may cause the emission of X or gamma radiation).

D. Micro Controller

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip. A microcontroller is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit chip. In modern terminology, it is similar to, but less sophisticated than, a system on a chip (SoC); a SoC may include a microcontroller as one of its components. A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. Program memory in the form of ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computer or other general purpose applications consisting of various discrete chips.

Fig. 3: Micro controller

E. Relay

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

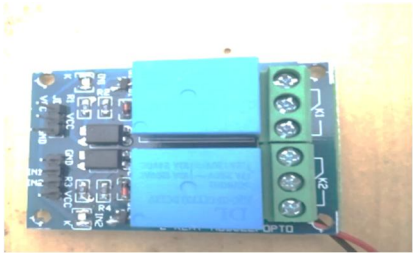

Fig .4: Relay

F. Ultrasound Generator

The device that provides the electrical energy to power the ultrasonic transducers is known as the ultrasonic generator. Basically, the ultrasonic generator converts electrical energy received from the power line into electrical energy with the proper frequency, voltage and amperage. Ultrasound generator with sound transducer for generating a continuous ultrasound signal. The sound wave generated in liquids can be used for investigation of sound propagation and when a standing wave is set up, it is possible to demonstrate both light scattering and diffraction of coherent light rays at density transitions in the acoustic wave. This enables highly accurate determination of the speed of sound in the liquid. And it is known as the ultrasonic sound generator.

Fig .5: Ultrasound generator

G. Solar Panel

Solar cells are used to make solar modules which are used to capture energy from sunlight. Because of earth rotation certain suitable tilting mechanism is to be adapted in congenial to the earth rotation to fall sun rays continuously on photovoltaic cell throughout the day. A dc motor has been used to tilt the solar panel.

Fig. 6: Solar panel

IV. CONCLUSION

This project sets a foundation that could be easily taken up as a future project. It covers the problems and make recommendations for future improvements. A future project topic could be to conduct a design analysis of the system and to fully construct and test the redesign system. Design process of the deterrent system and describes the problems encountered during implementation.

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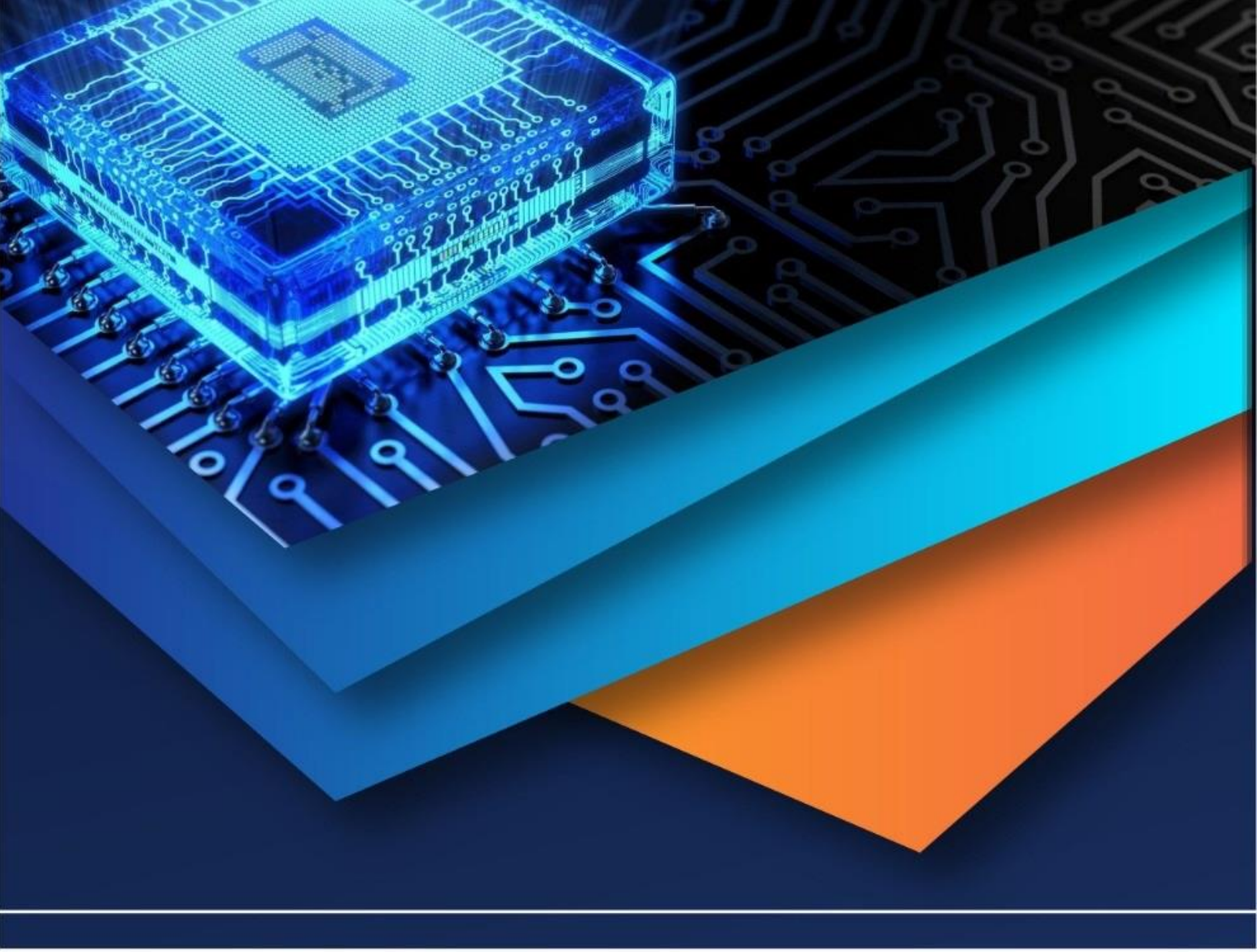

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