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DEVELOPMENT OF GSM BASED FARM SECURITY SYSTEM USING MOTION SENSORS AND IP CAMERA

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Abstract: Attack on the farms is on the increase in Nigeria which leads to conflicts between the farmers and herdsmen. Hence there is need for farm security system to check the intrusion of both animals and human being to the farms. This work is based on surveillance and motion detector with an animal ward-off system employed in farm lands in order to prevent crop destruction by wild animals. Several PIR sensors are deployed on the perimeter of the farm to detect any motion and hence serve as a virtual fence compared to the real time fence which is very much expensive. This work proposes the use of PIR sensors as virtual fence interfaced with a micro-controller and a GSM module to detect the presence of intruders and send information to owners of such farmlands mobile phone. The information to be sent will allow the owner to know precisely when and where to deploy or intensify security activities around these farmlands. A standalone IP camera is used to capture image in the farmland. When such intrusions occur and image captured, a message is automatically generated and start recording the video for some time which was stored on the Memory card. This message is sent to farm owner through the cloud. Ultra sonic and whistling sound is used as an alarm to drive the cattle away from farmland because the preliminary study of this research has shown that cattle are allergic to whistling and ultra sonic sound.

1. INTRODUCTION

An alarm system is designed to detect intrusions and other dangers on the farm and warn you accordingly. These systems are usually fitted with variety of sensors, depending on the kind of threat that you need to guard against.

Traditional alarm systems consist of a “bells and whistle” alert system; if the alarm is triggered, it sets off a loud siren to scare the intruder and alert anyone within the vicinity about the intrusion. Modern farm security systems may sometimes come with an audible siren, but coupled with a remote notification mechanism. When an alarm is triggered, the system sends an immediate notification to the farm owner who then notifies law enforcement. The notification is usually a digital signal sent over a mobile phone line.

Cattles are a special challenge for farmers in Nigeria. Animals such as monkeys, rabbits, mice, may cause serious damage to crops but cattle destroys more in Nigeria which leads to most conflicts between the herds and the famers.. Consequently this brought about loss of lives and properties. This work proposed a solution to alleviate any attack and intrusion by the herdsmen and their cattle in the farmland. This was achieved by designing a security system to check and report the activities of the herdsmen and cattle around the farmland.

However from the preliminary practical field work, it has been discovered that the cattle is allergic to ultrasonic sound, sharp whistling sound, gun-shot and lion roar. This work concentrated most on the detection and the repulsion system. The repulsion techniques that were adopted in this work were the design of ultrasonic electronic repellant and sharp siren alarm system. In this work the ultrasonic alarm is designed and constructed to emit ultrasound which is sound of frequency above 20 kHz. Above this value of frequency, sound is inaudible to the human ear, but when targeted at pests, it makes them uncomfortable within the area of coverage thereby repelling them away from the area without affecting the environment and non-target organisms including man **(**Ibrahim *et al*., 2014**)**.

The obtainable techniques proposed by some literatures are usually ineffective, for example Khare and Prashant (2015) designed an electric fencing system which is connected to the National grid to protect the farmland, and this is not only expensive but also dangerous to human and animals alike.

In this paper, PIR (Passive infrared) sensor and GSM (Global System Mobile) modem are utilized. The farmer receives SMS containing area in which the animals are observed. As the animals enter into the farmland the Sensors detect the animal and send the message to the farmers using GSM. It should be noted however that it is not all sound alarms that irritate animals.

In this work, a practical procedure to scare the animals off is presented by designing a system that detects the animal and creates the multiple sounds that irritates the animal. The system then alerts the authorized person by sending a message. The developed system has PIR sensors and IP camera that captures motion and image and send information to the farm owner at interval of time through the GSM Module.

2. MATERIALS AND METHOD

2.1 Ultrasonic transducer

The ultrasonic signal generated by oscillators and energized by the amplifier are electrical in nature. A means of converting them into ultrasonic sound (ultrasound) is required. This conversion is achieved with an ultrasonic transducer. In general, a transducer is used as a means of converting non electrical signal into electrical (or vice versa) for ease of processing. While an ultrasonic transducer is a device used to convert some type of energy into an ultrasonic vibration. The ultrasonic transducer mostly used in electronic pest control devices is the Piezoelectric transducers. These also make use of piezoelectric crystals earlier discussed, and convert the