

Development and preliminary testing of an electronic pest repeller with automatic frequency variation

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ABSTRACT: *This study presents the development and preliminary performance evaluation of an improved electronic pest repeller with automatic frequency variation. The study is aimed at developing a device that is capable of emitting ultrasonic energy of varied frequencies. These frequencies do affect the auditory senses of pests such as rodents, avian and nocturnal insects by making them uncomfortable in their abode. However these frequencies do not affect the hearing ability of man. An Astable Multi-vibrator (AMV), timer NE555 was used to generate the required ultrasonic frequency and automatically varied in five steps by a pulse generating IC (CA3130) and a counter (CD4017). A D-type flip-flop IC (CD4013) was used to obtain a symmetrical output signal which was amplified in push-pull mode by 2-NPN Transistors (BD-139) and 2-PNP transistors (BD140). Five variable resistors (each 100KΩ) were used to control the different frequencies selection. Two transducers (tweeters) were employed to produce an efficient sound generated. The unit was tested with three groups of white foot mice (*Peromyscus leucopus*) and a female house mouse *Mus musculus* which all responded positively from a distance of up to fifteen (15) meters from the source. The average designed efficiency was found to be 86.5%. The device can be utilized by both small and large scale farmers for the purpose of repelling pests. The performance of the device could be greatly improved with little modifications, for instance, using microcontrollers and ultrasonic sensors to transmit the ultrasonic sound in a special band of frequency.*

Keywords—*Development, electronic, pest, frequency, repeller, sound*

I. INTRODUCTION

Electronic pest control is the name given to the use of any of the several types of electrically powered devices designed to repel or eliminate pests, usually rodents or insects.

Numerous electronic pest control devices are readily available throughout the world. Hardware stores and garden centers usually stock some sort of electronic device advertised to repel a variety of pests and one can also find them on the internet. Although these devices have been around for at least 20 years, they have only recently become popular and widely advertised, probably due to their environmentally friendly claims. There is a wide range of opinion about these devices. Some people claim that they work for them, while others claim they are not effective at all [1]. Several methods have been used and are still being used for the control of pest; many of them have been proved ineffective in one way or the other.

The commonest method of pest control is the use of pesticides (chemicals). Pesticides are substances or a mixture of substances used for destroying, preventing, repelling or mitigating pests. Pesticides are commonly used in and around homes because they are easy to apply, fast-acting, and effective against a wide variety of pests. There are instances where the use of pesticides in rodents control may be effective, but there is no registration which specifically refers to the use of pesticide against pests control which does not constitute a potential hazard to man and his environment. Chemical method of pest control has been found to be very effective but quite expensive to maintain. Also, these chemicals are highly poisonous and harsh both to humans and pests alike as a result of their ability to pollute the air. Air pollution is thought to be one of the most important risk factors for respiratory diseases, particularly for bronchial asthma and chronic obstructive pulmonary disease (COPD). However, a direct causal relationship is not easy to prove because air pollutants do not occur as individual entities but in combination. In addition, the concentration and duration of exposure to air pollutants required for inducing an adverse pulmonary effect have not yet been determined [2]. Moreover, it adversely affects the environment that it brings about the genetic mutation of the internal make up of these pests that they produce offspring that are immune to these chemicals that were used on their predecessor. [3]. This, coupled with society's growing concern about environmental risks, makes alternative methods of pest control increasingly attractive.