Repellent of the stray animals

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Abstract
The ultrasound frequencies are still receiving a lot of interest by scientists and researchers. It is used in many areas of life, especially medicine, where it was used in the diagnostic and therapeutic side. And also, it is used in the field of industry and other fields of life. The ultrasound frequencies cannot be heard by humans, but most animals hear them, especially dogs. Ultrasonic frequencies cause inconvenience in dogs. In this study, a modified device was made and used to eliminate dogs from cities and neighborhoods. The modification was of some electronic circuits in the available devices (available in the local markets) to generate ultrasound frequencies. The modified device was carried and switched off-on in multiple areas around cities and countryside and applied near groups of dogs in order to see the influence of the switch on (producing ultrasound frequencies) of the device on animals. The use of the new technique results in expel animals and dogs away from the areas of wave centers. Therefore, this technique can be used against predators such as pigs and wolves in rural areas, especially as it has spread widely at present.

1. Introduction
Humans and animals are using a specific method of hearing, after they are collected by the ear flap, the sound waves enter through the external auditory canal into the diaphragm, which transforms the sound waves into vibrations that are transmitted to the hammer and anvil and then to the stirrups. Finally to the cochlea, which leads to the vibration of the auditory and vestibular channels, thus generating a series of vibrations transmitted by the auditory nerve to the brain by means of (nerve transmissions), where it is translated there into the sounds we hear [1, 2].

Figure 1. Mounting of the ear [3].
It has been reported that the sounds can be produced by group of different frequencies. The frequencies that humans have the ability to hear are between (4 Hz-17,600 kilohertz and up to 20 kilohertz). These frequencies are called audio. Whereas, the frequencies that lies below (4 Hz) are called infrasound frequencies such as frequencies produced by landslides that precede volcanoes and earthquakes. Animals, especially dogs can distinguish infrasound frequencies by their hearing. Thus, animals sense these accidents before they happen. As for the frequencies that exceed (20 kilohertz), which are called ultrasound frequencies. The ultrasound frequencies cannot be heard by humans, but most animals hear them, especially dogs. These waves or frequencies are still receiving intense interest by scientists and researchers and it was used in many areas of life, especially medicine, where it was used in the diagnostic and therapeutic side [4]. In addition, it is used in the field of industry and other fields of life [5]. However, these waves do not differ from other sound waves that the increased frequencies in them do not mean the loudness or the decrease in the sound, but rather the roughness of the sound unit [6]. It has been observed that the ultrasonic frequencies cause inconvenience in dogs, as it was known in the past, as special whistles were used to expel dogs without the human being hearing them. Therefore, the new method can be used to expel or remove dogs and animals from residential neighborhoods because they cause environmental and health damage, not to mention accidents attacking humans. It is worth noting that the sensitivity of dogs influence or hearing comes to distinguish their ears because they move by eighteen muscles, so their movement is towards the sound, thus distinguishing its source more than other animals.

The foregoing above proves that ultrasound has effective effects that we can use in cities and alleys to expel stray dogs and other animals, especially since this method is considered an environmentally friendly method or by using new technologies that depend on the hearing mechanism of animals.

The use of pills (strychnine) or the use of cartridges are the traditional methods currently used to reduce the bad impact of stray animals on health and environment within cities. It is noticed that the traditional methods failed to expel stray dogs and other animals from cities and neighborhoods.

2. Materials and methods

Based on the dealing with the animals, the inefficiency and effectiveness of the traditional methods used to control the stray animals and dogs. A modified device was made and used to eliminate dogs from cities and neighborhoods. The modification was of some electronic circuits in the available devices (available in the local markets Figure 2) to generate ultrasound frequencies. The modified device Figure 3 was carried and switched off-on in multiple areas within cities and countryside and applied near groups of dogs in order to see the influence of the switch on (producing ultrasound frequencies) of the device on animals.

In order to obtain more useful results and a longer term, more effective electronic circuits with farther distances devices were used to fulfill the purpose using them in the following way:

Repel most of the animals, dogs, rodents, rabbit, raccoon, boar, and coyote with effective span is up to 5,000 square meters.

![Figure 2. Dog and animal repellent device ASPECTEK, Yard Sentinel Ultrasonic Animal Control.](image-url)
To prevent the entry of dogs, several devices were placed at a different distances between 100-200 meters to form an ultrasound fence around the city. In addition, more devices were distributed in expected entrance zones.

Operation methods:
1. The devices can be operated manually from a remote control device.
2. The devices turn on automatically when dark or when they sense the sound of animals.
3. The operation will be continuous in the places that require full time operation, as it depends on the battery and does not need electric power. However, devices can be powered by solar energy.

3. Results and discussion
The use of ultrasound frequencies is safe in terms of environment and health, as these frequencies have been used in the treatment of soft tissues, as well as superficial and deep wounds, by using high frequencies of (1-3 megahertz). These frequencies reduce and treat swelling, infections and pain relief in addition to speeding up wound healing [7, 8].

No morbidity was recorded using ultrasound, as the devices remained in use as one of the most important diagnostic methods without surgery or the use of radioactive materials injected into the patient [9, 10]. The wide range of these frequencies, which exceed (20 kilohertz), and the inclusion of their effect on most animals with frequencies that vary from one species to another Table 1 [1].

| Freque:  | Organisms       |
|----------|-----------------|
| 31-17,6  | Human           |
| 33,500   | the horse       |
| 35,000   | Goats           |
| 30,000-  | The lamb        |
| 45,000   | Dogs            |
| 360-42,  | Rabbits         |
| 250-45,  | Mice            |
| 2800-13, | The bat         |
| 45-64,   | The cat         |
| 45-45,   | Pig             |

This changing and different influences on animal species make the prospects open for the use of these frequencies to get rid of many unhealthy or harmful phenomena to the environment and public health [11]. One of the harmful environmental impact is the spread of livestock in roads and public places as well as the presence of animals on public roads. The latter result in accidents due to rapid
traffic. The use of the new modified device producing ultrasound frequencies results in pushing animals away from the areas of wave centers. In addition, the modification permits a longer term with farther distances influences. Therefore, the new technique can be used against predators such as pigs and wolves in rural areas, especially as it has spread widely at present.

**Recommendations**

The preparation of this research came to push towards the installation and development of a project to use this technology and to be the beginning or kernel of a major research by providing the necessary devices and equipment for its further implementation. After reading the results, this research was transferred to the city to other areas, especially the countryside or the new, remote neighborhoods, especially as they are suffering from the spread of predators such as wolves and pigs in addition to rats and rabbits. The search can be expanded to a complementary stage that includes other animals, such as cattle, in order to control them inside fields. In addition, prevent the infiltration of the animals into agricultural lands.

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