

DESIGN OF MOSQUITO REPELLENT CIRCUIT

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Abstract:

Control of mosquitoes is something of utmost importance in the present day with rising number of mosquito borne illness. Specially products like mosquito repellent used to combat mosquitoes are required. This project proposal presents the design and testing of an electronic mosquito repellent. The project is aimed at developing a device that is capable of emitting ultrasonic energy, In varied frequencies. These frequencies do affect the auditory senses of pests such as mosquitoes, rodents, avian and nocturnal insects by making them uncomfortable in their abode. However, these frequencies do not affect the hearing ability of humans. The mosquito repellent circuit generates an ultrasonic sound with a high output frequency that allows spreading mosquitoes within a wider radius. The circuit is quite simple and require few external components. The oscillation frequency is given by the value of the resistors and capacitor components. The actual oscillation frequency of this electronic mosquito repellent is above 20 kHz so what is needed is a good high frequency speaker, example being a piezo speaker. The electronic mosquito repellent circuit can be supplied from a 1.5 V DC power supply.

Keywords - Electronic mosquito repellent, ultrasonic energy, resistors, capacitor, piezo speaker.

I. INTRODUCTION

Mosquito repellents like coils, mats, liquid vaporisers, creams are often used at various places. However they are prone to be fatal and can cause harm to human beings. For instance, mosquito repellent creams and oils can cause adverse effects on the skin like allergic reactions. Coils, mats can produce toxic fumes when heated and cause breathing trouble, whereas liquid vaporisers can also produce fumes when heated.

For efficient results without any side effects, the most optimum solution is building a simple electronic circuit with minimal components which can produce output so as to repel the mosquitoes. In plain words, this article is going to describe a simple mosquito repellent circuit.

Electronic insect repellent circuit is safe and an alternative method as when compared to a chemical, dangerous insect medicines. There are waves produced in this circuit which is in the form of electromagnetic waves or in the form of ultrasonic waves which will help to repel away the mosquitoes and other annoying insects. The effectiveness of this circuit is still not found, as well as only China has been successful to make a proper electronic mosquito repellent circuit. Some examples of electronic insect repellents are plug in electronic repellents, ultrasonic transmitters and the electromagnetic lamps. These electronic pest control devices are very affordable. And despite the fact that they have been around for more than two decades, they have just recently been acknowledged worldwide because of their environmentally friendly claims. Apart from this, they have also been proven to be less noticeable and cumbersome. The absence of stinking spray repellents is truly a blessing by itself.

II. MOTIVATION AND BACKGROUND

Mosquitoes are one of the main reasons that comes under the list of spreading disease among all the human beings. There are almost 4000 species of mosquitoes present among which 10% of them are very infectious and they have very high impact on humans in both direct and indirect way. Mosquito transmitted disease is major cause for all Human loss with 700 million people suffering annually. (Taubes 1997). According to recent research it is noticed that half of the world's population will be in trouble shortly if there is no action taken regarding mosquitoes. An outbreak of chikungunya had occurred in the year between 2004-2006 leaving behind many deaths occurring in the country. Almost 5.5 billion people are living in the malaria risk area around which 4.5 billion people suffer every year. The situation is one very complicated in recent years as said by research of The United States. This device has the potential to eliminate mosquitoes. This circuit or project can be helpful in domestic area by keeping the mosquitoes away using a high frequency sound produced by the circuit. For the success of this project, proper method to design and construct the circuit has been taken into consideration. Proteus 8 Professional software simulation tool is used to simulate the circuit inside a computer. After that, the circuit is connected to a breadboard to test run the project before transferring the circuit to a circuit board.

III. PROPOSED METHOD

The circuit uses 555 timer IC as a stable multivibrator which provides a pulsed output . The IC consists of 8 pins .

Pin 1 : It is connected to the ground which also serves as the negative of the battery .

Pin 2 : It is triggered at active low state ,which is connected to the 6th pin of the IC.

Pin 3 : The output is obtained in this pin .

Pin 4 : Is used for reset operation which is connected to the positive part of the battery .

Pin 5 : Carries out the control operation .It is grounded using a capacitor which is in microfarad value.

Pin 6 : Is used for the threshold operation ,it is grounded with pin 2 and is connected to pin 7 .This is being connected by using a resistor for its astable operation.

Pin 7 : Is the discharge pin that gives a release path for the capacitor.

When the circuit is complete, the 555 timer IC circuit obtains the higher value of input and then the potential difference of capacitor and triggered pin2 become nil. Here, the resistors R1 and R2 are used for the capacitor to obtain it's charge .

The change in the output is obtained when the potential difference across the capacitor is more than that of pin 6 .The capacitor discharges through the resistor R2 through the release pin7 and proceeds until the output voltage is set to the original value. Thus, the piezoelectric buzzer buzzes with the frequency of 38Khz with continuous iteration.

The resulting frequency can be varied by changing the voltage values . This frequency is allowed to reach the mosquitoes approaching and thus causes them to fly away or leave from the circuit and close by areas due to irritating sound .

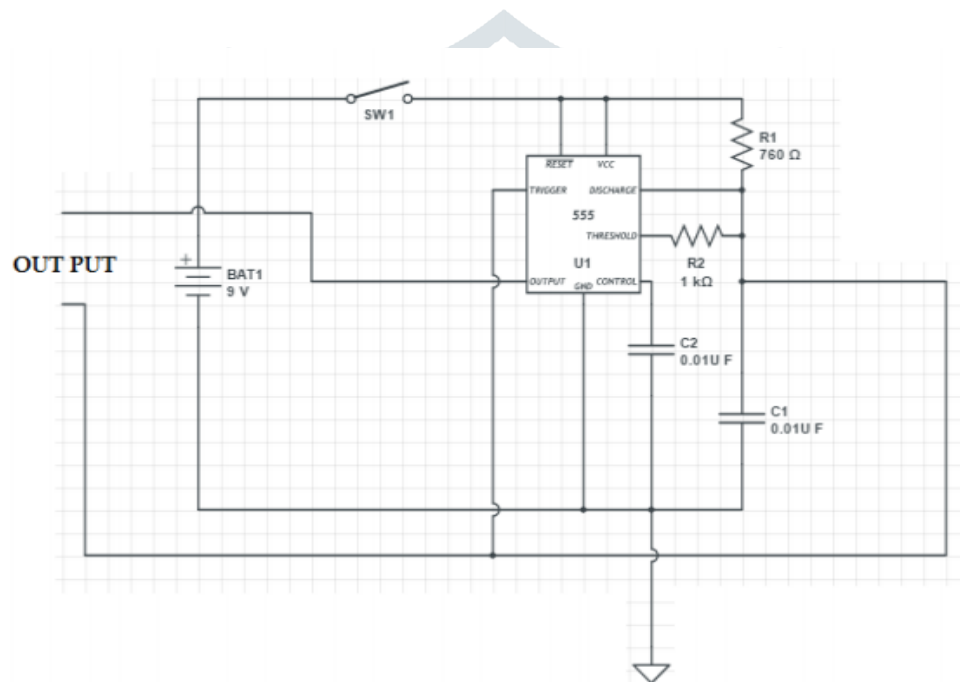


Figure 1 Mosquito repellent circuit diagram

Once the switch is closed, the 555 timer gets the power supply. As per the inner circuit, initially the capacitor voltage will be zero and hence voltage at threshold and trigger pin will be zero. As the capacitor charges through resistors R1 and R2, at a certain point voltage at threshold pin is less than the capacitor voltage. This causes a change in timer output. The capacitor now starts discharging through resistor R2, i.e. the discharge pin and continues so until the output voltage is back to the original. Thus, the output signal is an oscillating signal with frequency 38 KHz. The output from this astable multivibrator circuit drives a 38 KHz piezo buzzer, producing ultrasound at regular repetitions. On varying the value of potentiometer, the output frequency can also be varied.

IV CONCLUSION

We know that mosquitoes are found through out our globe. There are 2000+or more varieties of mosquitoes identified throughout our globe. But there are quite less of them which pass on the infections. The main necessity for them to mate is water. Therefore it is getting very hard to maintain the breeding of mosquitoes. Even if halt of maintaining takes place it has minute result on them.

V. RESULT

As described, this circuit can be used as a mosquito repellent. By certain modifications and changes in the value of resistors and capacitor, the circuit can also be used as other insect repellent. Further, it can also be used as a simple buzzer alarm circuit. This circuit can further be used to modified so as to bring it into action for other insects by varying the voltage which subsequently changes the frequency of the circuit. The circuit can be maintained under lower cost and reduces the probability of mosquito infections if implemented on a large scale .It requires a lot of frequency setting. Ultrasound signals travel at an angle of 45 degrees from the source. In case of any obstacles in the path, the signals get reflected or diverted. It shows effect for lesser mosquito population.

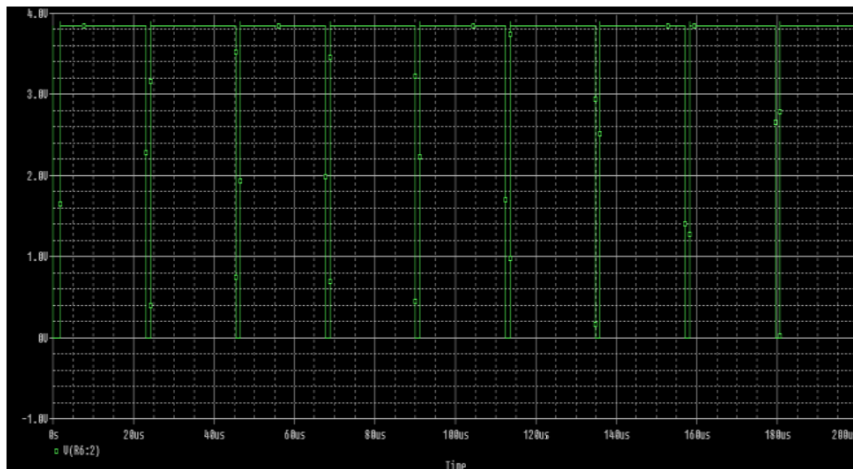


Figure 2 Screenshot of the output

V. FUTURE SCOPE

However, the circuit can be further improved. There are many ways to improve the circuit of which includes: To put sensor and led lights in the circuit to detect mosquitoes so that we will be able to know when there are mosquitoes all around us. It is also able to prove that this circuit works well because if the led light does not work that means the area is safe from the mosquitoes .In addition, we can use direct current and the battery charger circuit. Thus, this circuit can operate during blacks out because usually mosquitoes are attracted to dark places. Next, we can improve by enlarging the field to repel mosquitoes so we can use a circuit covering a large area. In addition, this circuit could apply to another system and it is not limited to mosquitoes only if the frequency is modified. Modifying the frequency will produce a sound that can easier detect any other animal not only mosquitoes such as produce the siren or yapdog sound. Using microcontrollers and ultrasonic sensors to transmit the sound in a special band of frequency

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