Development of Short Range Monkey Repeller Device with Announcer

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Abstract— **Farmers are facing a lot of difficulties because of animals in the Indian Agricultural land, among this monkey menace makes more losses to the society. The monkey menace causes huge losses to the farmers and society. The monkeys are also becoming a threat for public health, crop and belongings. To reduce this problems the short range monkey repeller device with announcer has been developed. It can repel monkeys from causing harm and return back them to safe distance by producing ultrasonic sounds. Ultrasonic sound wave generators and timers will operate at certain programmable delay times. It will produce ultrasonic sound waves of frequency which is only sensitive to monkeys. The monkeys has a hearing range of 8 KHz to 45 KHz. When they are disturbed by this sound they will go away from the specific range of the device. The device would be charged through solar energy system.**

Keyword- solar (PV), ATmega 2560, piezoelectric buzzer

I.   INTRODUCTION

The peoples are stuck by the monkey menace in the farm areas and forest areas. We can't predict the losses causes by the monkeys. Monkeys are the closest relative to humans in the animal kingdom, they have the second largest population after humans. Hence the man and monkey conflicts are increasing day by day. Agriculture is the only way to get profit for farmers, in farm areas like banana, jackfruit, coconut, sugarcane etc. near to the forest areas are mainly affected by monkey menace, and it causes huge losses to the farmers. Farmers need to face many crises to overcome the problems caused by the monkeys.

'Monkey menace' not only cost economical losses but also danger to human health as well as to their life. The monkeys become more violent and dangerous when they hurt by the traps we have made, by this they get a tendency to attack humans and our pets. Many diseases and infections will spread due to monkey bites. In a country like India monkeys are worshipped as god so everyone discourages to harm it, but they forced to do it. This is a serious problem which should be taken in consideration.

In some cases the monkeys will die due to manmade traps like electric boundaries. They also have the right to live. So we need a repeller device which do not harm the monkeys and do not disturb other living being. The short range monkey repeller device with announcer will not cause any environmental pollution and it will not hurt the monkeys. It will produce ultrasonic sounds sensitive to monkeys and repel them from entering the farm. This device will produce an ultrasonic sound which is inaudible to human years and it will not disturb other animals.

II.   LITERATURE SURVEY

To reduce the man and animal conflicts several methods are introduced by different persons. The common aim of these methods are to reduce the problems caused by the animals to the human and keep them in a safe distance. In [1], the PIR sensor and ultrasonic sensors detect the different animals and there is a mechanism to send an alert signal to the farmers and forest department by the GSM module. This system can detect human and animals separately. In [2], V.Surendar and P.Pachiyammal have proposed a method of protecting the rooftop gardens from pests without use of any pesticides. Two mechanisms are there one for day and one for night. The ultrasonic sound generator is used to repel the pests during daytime and LED lights which attracts the insects are used during night time.

The animals can be also repelled by an idea of camera trapping, it is based on the principle of image processing and bioacoustics. This system can detect the animals differently and produce sounds of a particular frequencies which is audible only to the animal species which is detected. It is proposed in [3]. Vijayaraghavan Sundararaman, Vijayalakshmi T G and Swathi Venkatadri have done an analysis on using ultrasonic sound generator to repell dogs using solar power in [4]. It reduces the road accidents caused by the dogs and animals with same hearing range of dogs.

The mechanism to reduce power system transient faults caused by birds by avoiding the presence of birds near the transmission lines is discussed in [5]. Ultrasonic sound generators are used to repell the birds and solar power is used as the power source. In [6], the insects are driven away using the ultrasonic sounds of different frequencies. The different types of insects are repelled by two modes, one with DTMF and another with LDR.

Yahot Siahaan, Bheta Agus Wardijiono and Yulisdin Mukhlis have proposed a method to repell birds with the help of an android system in [7]. PIR sensor is used to detect the

birds and piezo ultrasonic sensor is used as repeller. An android system is connected to the Arduino Uno which shares information when birds are detected. In [8] a mechanism to repell mosquitos using ultrasonic sound waves is proposed instead of using chemicals to kill mosquitos. The piezoelectric effect is utilized to produce ultrasonic sounds.

The method to prevent the monkeys from agricultural fields using ultrasonic sounds with application of flooding algorithm is discussed in [9]. The ultrasonic sensor is used to detect and repell the monkeys, ultrasonic sound with a particular frequency with is only audible to monkey is generated when monkeys are detected. In [10],the birds are driven away from the agricultural fields by producing scatter sounds. Solar power is the power source and different scatter sounds are produced for different species of birds.
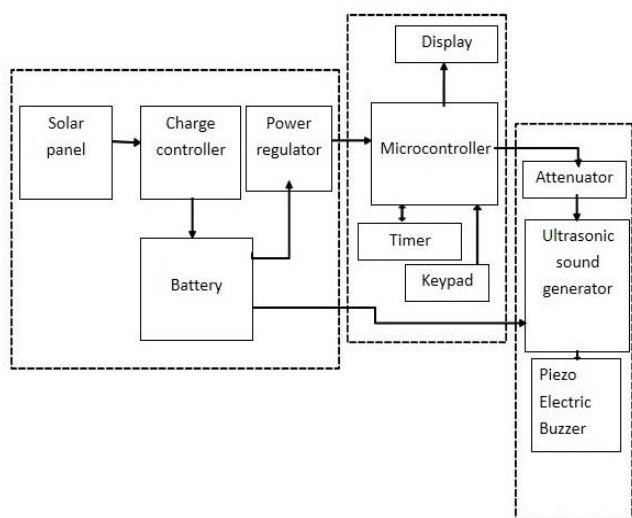
III.   METHODOLOGY

Fig 3.1 Block Diagram of proposed work

The short range monkey repeller device works with the solar power as input and the system generate an ultrasonic sound of frequency 43 KHz which is not audible to the humans and only audible to the monkeys. The ultrasonic sound is produced in a certain time interval which effectively drive away the monkeys to a safe limit.

A 75W solar panel is used in the input side it produce power from the sunlight and stores in the battery. The solar panel is connected to the battery through a charge controller. The charge controller is used to control or limit the charge from the solar panel to store in the battery. Since a 12V 4A lead acid battery is used so a 12V 4A charge controller is selected for the controlling operation. The battery gives input to the microcontroller and the ultrasonic sound generator. A power regulator is connected between the battery and the

microcontroller, the power regulator has similar operation to the charge controller. A 7812 regulator is used for the current limit operation.

The power regulator gives an input to the microcontroller which is sufficient for the operation. The microcontroller used is Atmega 2560 which operates in certain programmable delay with the help of timer. The microcontroller has input and output devices, the keypad act as the input device and the LCD display act as the output device.

The ultrasonic sound generator takes power from the battery and it is also energised by the signals from the microcontroller. The microcontroller sends signals to the ultrasonic sound generator depending upon the timer through an attenuator there the signal is filtered and the amplitude of the signal is adjusted. When the signal reaches the ultrasonic sound generator it generates sound signals and is given to the piezoelectric buzzer where sounds at a particular frequencies are eliminated to the atmosphere. It is the output part of the system.
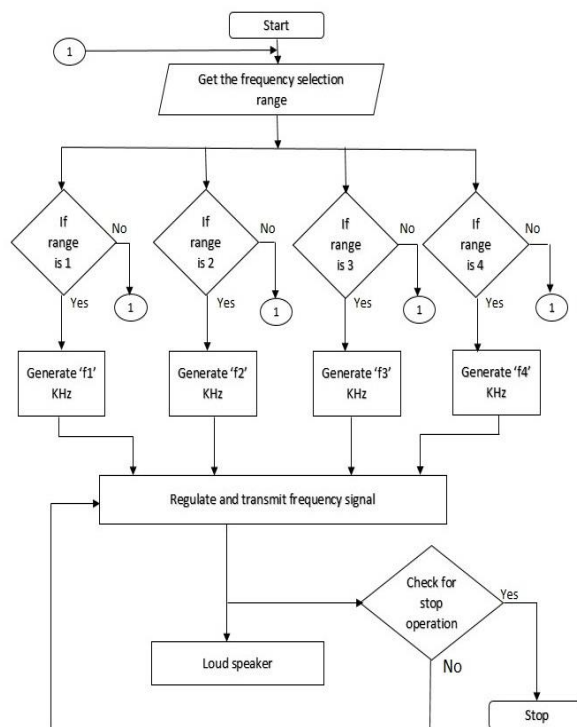

Fig 3.2 Flow chart of Methodology

IV.   IMPLEMENTATION

A. ATMEGA2560

The ATmega2560 is a low power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. The Mega 2560 board is compatible with most

shields designed for the Uno and the former boards Duemilanove or Diecimila.

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input and output pins among these 15 can be used as PWM outputs, 16 analog inputs, 4 UARTs, a USB connection, a 16 MHz crystal oscillator, an ICSP header, a power jack and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.
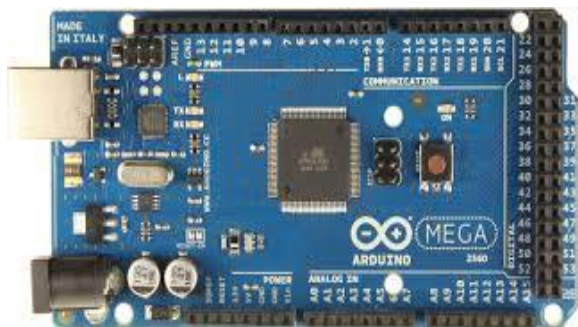

Fig 4.1 ATmega 2560

The ATmega2560 AVR is supported with a full suite of program and system development tools including C compilers, program debugger/simulators, macro assemblers, in-circuit emulators and evaluation kits.

Fig 4.2 ATmega 2560

B. SOLAR PANEL

Photovoltaic solar panels uses sunlight as a source of energy to generate electricity. A photovoltaic (PV) module isa packaged connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. There are a few commercially available solar modules that exceed efficiency of 24%.

Fig 4.3 Solar panel

A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wiring and a optionally solar tracking mechanism.The most common application of solar energy collection outside agriculture is solar water heating systems.

C. BATTERY

The battery used is a 12V 4A lead acid battery. The battery which uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power, such type of battery is called a lead acid battery. The lead acid battery is most commonly used in the power stations and substations because it has higher cell voltage and lower cost.

Constant current and constant voltage charging is possible.Constant voltage charging is the most common method of charging the lead acid battery. It reduces the charging time and increases the capacity up to 20%. But this method reduces the efficiency by approximately 10%. In this method, the charging voltage is kept constant throughout the charging process. The charging current is high in the beginning when the battery is in the discharge condition. The current is gradually dropping off as the battery picks up charge resulting in increase back emf. The advantages of charging at constant voltage are that it allows cells with different capacities and at the different degree of discharge to be charges. The large charging current at the beginning of the charge is of relatively short duration and will not harm the cell. At the end of the charge, the charging current drops to almost

zero because the voltage of the battery becomes nearly equal to the voltage of the supply circuit.

In constant current charging the batteries are connected in series so as to form groups and each group charges from the DC supply mains through loading rheostats. The number of charging in each group depends on the charging circuit voltage which should not be less than the 2.7 V per cell. The charging current is kept constant throughout the charging period by reducing the resistance in the circuit as the battery voltage goes up. In order of avoiding excessive gassing or overheating, the charging may be carried out in two steps. An initial charging of approximately higher current and a finishing rate of low current.

D. ULTRASONIC SOUND SENSOR

Ultrasonic transducers or ultrasonic sensors are a type of acoustic sensor divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

Fig 4.5 ultrasonic sound sensor

In a similar way to radar and sonar, ultrasonic transducers are used in systems which evaluate targets by interpreting the reflected signals. For example, by measuring the time between sending a signal and receiving an echo the distance of an object can be calculated. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions.Ultrasonic probes and ultrasonic baths apply ultrasonic energy to agitate particles in a wide range of materials.

E. PIEZOELECTRIC SPEAKER

The piezoelectric speaker produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle.

Fig 4.6 Piezo speaker

These speaker can be used alert a user of an event corresponding to a switching action, counter signal or sensor input. They are also used in alarm circuits.

The speaker produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz.
The Red lead is connected to the Input and the Black lead is connected to Ground.
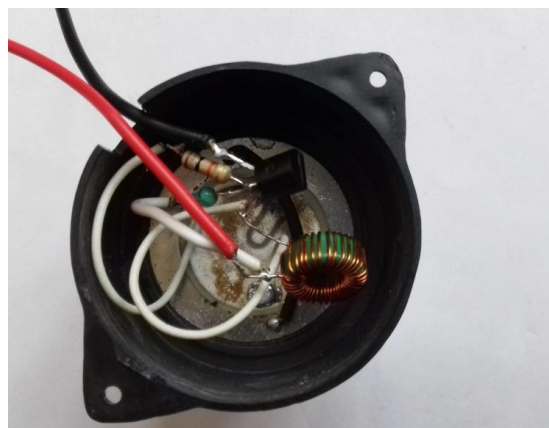

Fig 4.7 Piezo speaker circuit

V. CONCLUSION

Now a days the monkey menace is increasing and people are using various methods to avoid them, which will also cause harm to them. The ways followed by the people to avoid them are by making electric boundaries, hunting them down, making big noises which cause noise pollution, by making traps etc. These are not the suitable ways to avoid them.

By using the proposed device we can minimize the damage caused due to monkey menace, as well as, repel the monkeys without casing any harm to it. This is the effective method to drive away monkeys to a safe distance.

Now the device is only to repell monkeys. If we are making an option to select various frequency of ultrasonic sounds we can also repell other animals according to the needs.

VI.   REFERENCES

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