Protecting Crops From Birds, Using Sound Technology In Agriculture

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Abstract:

Food is the most important requirement for living beings. The main products of our food come directly or indirectly from agriculture. Now a day's security of agricultural field is very important. Corp damage by birds is a severe problem in most of the areas all over India. Field surveys showed that on an average 36% of the crop were damaged by wild birds. The incident of damage was very high in crop fields adjacent to forest areas; this resulted into direct conflict between people and birds

In everyday life farmers facing different kind of problems in agriculture. In olden days different kind of animals enter into crop they are damaging the fields. For reducing those kinds of problem they are used different kind of technique. Now a day birds are major problem in agriculture. Birds are falling on crop and eating it. In this research paper we are solving some problems. Every animal or group of animal is having a specific range of hearing frequencies. There irritating frequency is estimated by a specific logic. In day life birds creating irritating sounds in agriculture and out sides' fields also. At early morning and evening time bards falling on the crops and eating rice seeds, rabi crops, cons and wheat….etc. so we can create irritating sounds for birds, and then they can flay outside of the field. By using this research idea we can able to reduce mostly affected problem in agriculture. For developing this project we are using Arduino, APR900,IR, and buzzer. First step in this project we have to record some species sound in controller by using the Apr900 module.

Key word: Arduino (ATMEGA328) , APR900, IR Sensor, Buzzer.

Introduction

The range of hearing describes a range of frequencies that can be heard by humans or other animals, although it can also refer to a range of levels. The human range is usually from 20 to 20,000 Hz, although humans have significant differences, especially at high frequencies, and the gradual loss of sensitivity to higher frequencies with age is considered normal. The sensitivity also varies with frequency, as shown by contours of equal intensity. Normal screening for hearing loss usually includes an audiogram that shows the threshold levels relative to normal.

Several species of animals can hear frequencies that go beyond the limits of human hearing. For example, some dolphins and bats can hear frequencies up to 100,000 Hz. Elephants can hear sounds at 14-16 Hz, while some whales can hear infrasound sounds up to 7 Hz (in water).

Measurement

The basic measure of hearing is provided by an audiogram, a graph of the minimum sound level, distinguishable at different frequencies along the nominal auditory range of the organism.

Behavioral hearing tests or physiological tests can be used to detect auditory thresholds of humans and other animals. For people, the test includes the tones that occur at certain frequencies (tone) and intensity (volume). When an object hears a sound, it indicates it by raising a hand or pressing a button. The lowest intensity that can be heard is recorded. The test varies for children; your answer to the sound can be indicated by turning your head or using a toy. The child learns what to do by listening to the sound, such as putting the toy person in the boat. This method can be used to test animals, where food is used as a reward for the reaction to sound. Information on hearing of various mammals was obtained mainly through behavioral hearing tests.

Animal	Hearing range in Hertz
Humans	20 – 20,000
Bats	2000 – 110,000
Elephant	16 – 12,000
Fur Seal	800 – 50,000
Beluga Whale	1000 – 123,000
Sea Lion	450 – 50,000
Harp Seal	950 – 65,000
Harbor Porpoise	550 – 105,000
Killer Whale	800 – 13,500
Bottlenose Dolphin	90 – 105,000
Porpoise	75 – 150,000
Dog	67 – 45,000
Cat	45 – 64,000
Rat	200 – 76,000
Opossum	500 – 64,000
Chicken	125 – 2,000
Parakeet	200 – 8,500
Horse	55 – 33,500

Cats

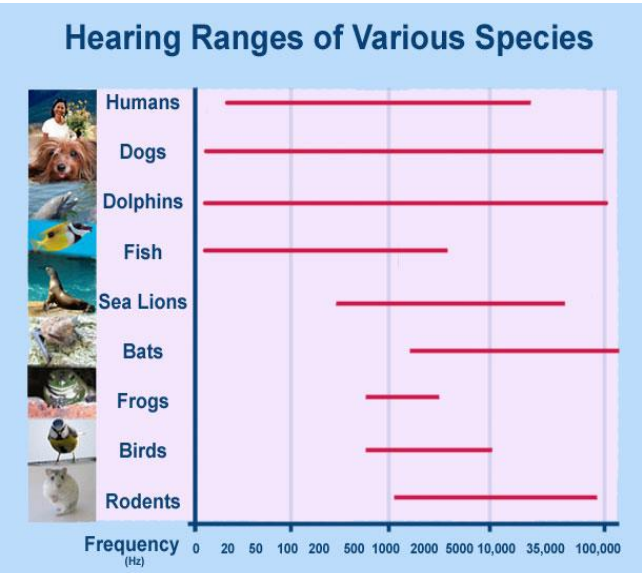
Cats have excellent hearing and can detect an extremely wide frequency range. They can hear sharper sounds than people or most dogs, detecting frequencies from 55 Hz to 79 kHz. Cats do not use this ability to hear ultrasound for communication, but it is probably important for hunting, since many rodents make ultrasonic calls. Cat's hearing is also extremely sensitive and is one of the best among all mammals, the sharpest in the range from 500 Hz to 32 kHz. This sensitivity is further enhanced by the large moving external ears of the cat (their ribs), which strengthen both sounds and help the cat perceive the direction from which noise originates

Birds

The second hearing is the most important of the birds and their ears are to focus the sound. The ears are located almost behind and under the eyes, and are covered with soft feathers - the air antennas - for protection. The shape of a bird can also affect listening, such as leaps, which their facial disks help with a direct sound towards the ears.

The bird listening range is more sensitive than 1 kHz and 4 kHz, but its total range is similar to human hearing, with higher or lower limitations depending on bird species. Birds are particularly sensitive to changes in tone, tone and rhythm and these variations can be used to identify other individual birds, even in a terrible discharge. Birds use different sounds, songs and different calls in different situations, and recognize they find that the various things are essential to determine if a warning is called by a predator, advertising on territorial demand or offering food.

Some birds, especially oil birds, also use echolocation, as bats: these birds live in cushions and use their uses and quick uses to guide the dark places when vision could not sensitive even to be quite useful.



Literature Survey:

Between 1974 and 1991, the amount of damage caused by sparrows in Japan showed a sharp drop. Since the main crop eaten by sparrows is rice, this probably reflects the decline in the area of paddy fields over that period. Damage by other birds increased, however, especially by the brown-eared bulbul. On the whole, crop damage by birds in Japan is tending to increase.

What are the reasons for this? First of all, the number of birds is increasing. Many farmers are using combines to harvest rice and wheat. Quite a large number of grains reaped in this way are left behind in the field. This gives birds an abundant and high-quality food supply that contributes to the increase in numbers, and keeps it stable.

Furthermore, many farmers are beginning to plant rice by direct seeding rather than by transplanting. The sown seed is a food resource for ducks if the paddy fields are flooded and for sparrows and pigeons if the fields are drained.

In some cases, damage has occurred to new crops. One example is the brown-eared bulbul, which began to eat the leaves of various kinds of leaf vegetables. Bulbuls were formerly migratory birds, which overwintered in the southern part of Japan and bred in the mountainous and northern regions of Japan. In the 1970s, they became year-long residents and began to cause severe damage to winter cabbage and other leaf vegetables. In the case of Japanese pear, bird damage became much worse after the introduction of new varieties such as Kosui, which have higher sugar content than traditional varieties.

Sometimes a new pest bird species appears. An example is the Chinese bulbul (Pycnonotus saneness) which appeared in Okinawa for the first time in 1976 and began eating the leaves and fruit of vegetables.

How to Scare Birds Away

Japanese farmers use many methods to protect their crops from birds. The most effective way of doing this is to cover the field with netting. However, nets are costly and cannot be used in large fields. Another method is to reduce the bird population. However, all wild birds are protected in Japan, and cannot be hunted without special permission from the government.

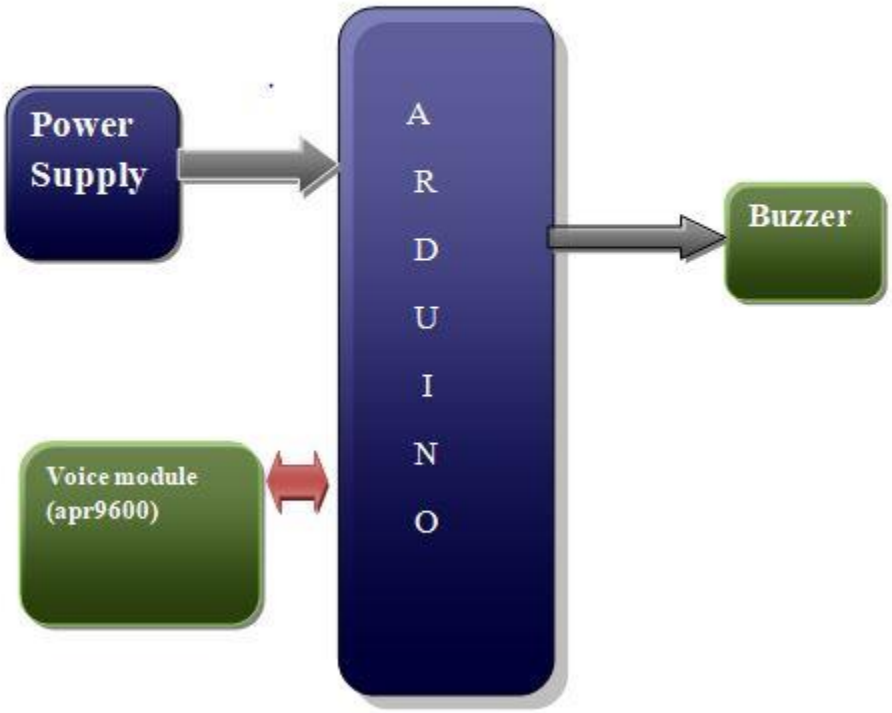
For these reasons, the most common method of protecting crops is to scare birds away. Stimuli which rouse aversion in the birds are used to drive them away from fields. These stimuli can be classified into two main groups, visual and acoustic.

Figure 1 Balloons with Eyes Protect Rice Field

Figure 2 Traditional Scarecrow

Figure 3 Old Shop Mannequin Used As Scarecrow

BLOCK DIAGRAM



Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

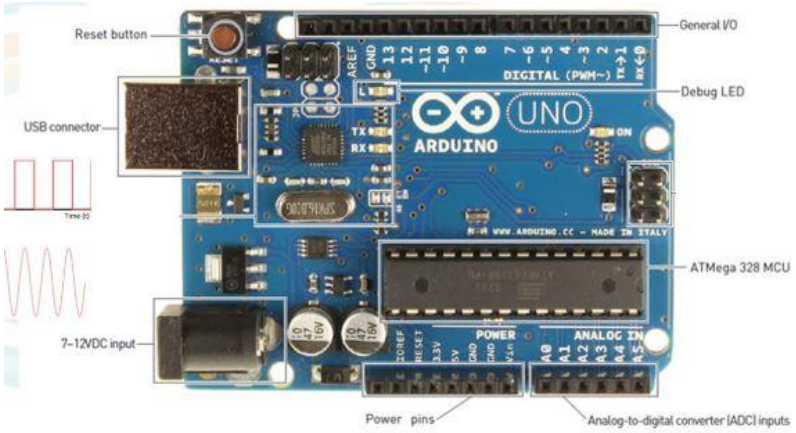
Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Features of the Arduino UNO:

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader

- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz



APR9600

The APR9600 device offers true single-chip voice recording, on-volatile storage, and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs. Integrated output amplifier, microphone amplifier, and AGC circuits greatly simplify system design. the device is ideal for use in portable voice recorders, toys, and many other consumer and industrial applications.

IR

Infrared Obstacle Sensor Module has builtin IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.

Specifications

- Operating Voltage: **3.0V – 5.0V**
- Detection range: **2cm – 30cm (Adjustable using potentiometer)**
- Current Consumption: **at 3.3V : ~23 mA**, **at 5.0V: ~43 mA**
- Active output level: **Outputs Low logic level when obstacle is detected**
- On board Obstacle Detection LED indicator

Advantages:

- Reduce human work
- More efficient
- Less cost
- Smart work

Applications:

- Fields
- Rail way stations
- Road crossing
- Industrial areas
- Lift
- Parking

Future Scope

This is a basic design we are designing and it will modified by using the advanced technology like GSM (SIM-900) module by adding this feature we can operate the system by using our mobile in any ware in the world .

And the anther thing that will make a most useful and more accurate thing that instead of using we can replace the buzzer with a IF frequency generator to produce a high frequency signals to avoid the animals/birds from the fields.

Conclusion

The experimental results are obtained for particular animals like Dog, Cow and Cats. It was successfully tested. It is a new approach in social aspects for wild animal death avoidance and accidents prevention. Animal specific frequency spectrum signals are generated. The specific animals are alerted with these signals of danger and successfully ran away. System can be added on vehicles or trains instead of mounting poles on road side.