

Summary of Indonesian Paper

Reference no. 2 from our report , Indonesian paper 3 from mam's given links

They want to build **An Automatic Farmer Pest Repellent with Arduino ATmega2560 Based On Sound Displacement Technique.**

Their goal is to repel **bird** and **mouse** pests automatically on the **rice** plants.

Instruments they used to build this prototype:

- i) Arduino ATmega 2560
- ii) Sensors (Ultrasonic and PIR)
- iii) Servo Motors connected with Bells
- iv) Buzzer
- v) Power source voltage of 12 volts

Operation:

Ultrasonic and PIR both Sensors are giving a signal to drive the servo motor. So that, the pest repellent bells sound. And then turn on the buzzer to repel the pests. Width and length of 40 cm and 50 cm respectively with a scale of 1:100. That means the prototype created can reach an area of 4m*5m for the actual area.

Ultrasonic sensor has a max range of 4m and an effective angle of 15 degree. The width of the sensor range is 1.04m. Whereas PIR max range is 7m. Angle <110 degree. If the desired range is 4m the width of the sensor is 11.4m.

Ultra sensor range, $\tan\theta = y/x$, $x = 0.52m$

PIR sensor range, $\tan\theta = y/x$, $x = 11.4m$

They used 10 ultrasonic sensors→10 HC SR04, 3 PIR sensors--> 3 HC SR501.

Each servo motor has been connected with a bell. When an Ultrasonic reads the existence of a pest, it will move the servo motor that is connected to the sensor and the bell will produce a sound that can repel the bird pest. The system will continue to loop. When there is a PIR sensor that reads the presence of pests, the system will turn on the buzzer to repel the rat pests. And the servo motor will move and move the bellows thread to avoid the rat pests, so as not to go further into the area. The system will continue as a loop until the pest is removed.

Drawbacks that I found:

- i) They do only for rat and bird pests but as we know there are more kinds of pests that affect besides rice plants, wheat plants, sugarcane plants, vegetables plants etc. etc.
- ii) They use PIR sensors to repel rat pests and Ultrasonic sensors to repel bird pests respectively. They use two sensors separately to repel bird & rat pests.

Summary of Sri Lankan Paper Reference no. 7 from our report

They want to build **An Intelligent Pest Repellent System for Srilankan Farming Industry.**

Their goal is to focus on an effective, user friendly, human energy efficient and cost efficient pest repellent system that can be used by farmers **only** focused on repelling **wild boars** and **sparrows** from the **paddy fields**.

Device Construction:

- i) Sink Node
- ii) Sensor Node

Operation or working way:

Emitting ultrasonic sound waves and also high intensity flashlights are used here as the repellent systems.

Wireless sensor network (WSN) used to detect pests in the fields.

As they only work for **Wild Boars** and **Sparrows**, so at first need to know about them. Wild boars attack at night in paddy fields and the traditional method to repel wild boars is waving a flashlight or torch towards them. But they go away from the field just for sometimes and they change their attacking time. On the other hand, Sparrows damage paddy during the day. Repel them using a whistle. Which emits a sound wave higher than 20,000hz. That is environment friendly but requires a higher amount of time. In this work a real time clock is attached to the sink node. As day time birds attack and night time wild boar attack. So the speaker unit & light unit combined together. Light unit switched off during the day time to save energy. The solar panel was used to power up the sink node. Throughout the night time a 12v battery was used to provide energy. Sensor nodes are the simplified versions of the sink node. The nodes remain active all the time. Are vigilant about the movements in the surroundings. Each node consists of 3 PIR sensors covering a whole range 360 degrees. Each sensor node is given an individual address and ID.

Once create a stimulus by sensor node then it indicate the presence of pests, sent a data packet to sink node, when get 1 packet sink node be active according to the flash light or speaker system. High frequency speaker system shooting to fend off any creature in the way above 20 khz to any range. To Chase away wild boar flashlight units lights up at night. If the sink node gets a signal from a static goal then it sends the user information that an unknown pest is there. They categorize two nodes, real mode & demo node. Real node for real time deployment and demo node for testing purpose. They use pattern recognition here. The sink node calculates a pattern of

the arrival of pests with the direction and time. The lighting system is activated according to the pattern and the sound system is activated for the 40s.

Use interface & SMS alerts:

- i) interacts with the sink node---> input the phone no. & sms alert
- ii) interacts with all nodes----> GUI (Graphical user interface) ----> Collect data from the node.

3 different alerts: i) Battery failure , ii) Malfunctions to sink nodes. iii) Uncontrollable animal behavior.

Results: Real mode---> 0600 to 1800 hours

Demo mode---> 1800 hours 0600 hours.

Drawbacks that I found:

- i) Their tools are not tested in real paddy fields for a longer period of time.
- ii) They Used single hop WSN. So, coverage area by the sensor nodes is power compared to actual paddy fields. They improve this problem by using a multihop network.

Summary of Indian Paper paper no.7 from mam's given links

This paper presents that —> SMART ULTRASONIC INSECTS & PETS REPELLER FOR FARMS & INVENTORIES PURPOSE

They used the design of an Automated Ultrasonic-insects and animal repeller. This paper provides a survey of the technologies, protocols & architecture for an urban & rural IOT & AI. This work both supports the farmers and provides benefits in productivity.

Their goal is to repel insects and animals from plants & fields. (not specific rice fields)

Device Construction:

- Ultrasonic wave repeller,
- A motion-sensor,
- A GSM module and
- Arduino Uno board.

Operation or working way:

This repeller system detects the sound of vermin (পোকা) by noticing ultrasonic signals. That propagated by provisioning vermin in crops. Then the presence of vermin proved by the **motion sensor**. Once presence of vermin confirmed by both the sensors Arduino Uno board start ultrasonic repeller by which the animal or insect goes away from that area and a memorandum will be sent by using **GSM** module and then farmer get ready for protecting it and they can use pesticides or insecticides according to their crops.

Ultrasonic frequency range is more than 20kHz and humans are not capable of hearing this audio. Because their eardrum will not vibrate rapidly.

Cockroach, spiders etc have a unique ear to identify ultrasonic audio. For getting the desired output , testing will be done by system within 20 minutes.

Development & Design:

A. Charging Unit : i) Used a 20W solar panel to generate voltage for the function of charging.
ii) Used LM7805 to provide 2A current. Managed 5 volt supply. Also provide thermal protection. LM is able to provide voltage which is helpful for the components specification.
iii) R1 and R2 two resistance , 220 and 350 ohm respectively. And R3 resistance for maintain variable voltage.

B. Ultrasonic Frequency Module : When the motion is detected by a motion sensor the repeller emits ultrasonic waves. Emitted waves get emulated by pest & traveling time stored by the arduino.

C. Controlling Arduino Unit: Motion sensor is connected to arduino by vcc of motion sensor to 5 volts. Then connect the ground to the motion sensor to the ground of the microcontroller. Put digital pin 3 of arduino and the wave pin 11 ground to arduino ground.

Drawbacks that I found:

- i) They could not say specifically which fields can be used properly.
- ii) Not confirmed that their prototype works at all successfully?
- iii) No pictures , no view of the prototype we can not see in this paper!