Noise Pollution Monitoring

Team Members:

1. Mohan Krishna
2. Vignesh Kumar
3. Pavan Kumar
4. Yeswanth
5. Shaik Kaif

IOT(INTERNET OF THINGS)- PHASE -3

Microphone

- The sensor most commonly used for detecting noise pollution is a *microphone*.
- Microphones convert sound waves into electrical signals, which can then be processed and analyzed to determine the noise level.
- Types 0f Microphones:
- 1. Omnidirectional microphones
- 2. Directional microphones
- 3. Array microphones
- 4.Vibration microphones

Types of Microphones

1. **Omnidirectional microphones**
2. **Directional microphones**
3. **Array microphones**
4. **Vibrational microphones**

Applications

Environmental noise monitoring:

- Sensors are used to monitor noise levels in the environment, such as in urban areas, near airports and highways, and in industrial areas.
- This data can be used to create noise maps, which can be used to identify areas where noise levels are high and to develop noise control strategies.
- Environmental noise monitoring is the long-term noise measurement to assess noise pollution in a given area with the use of noise monitoring systems.
- The objective of environmental noise monitoring is to identify sources of noise pollution and assess their impact on the surrounding community.

Industrial Noise Control

- IoT noise detection sensors can be used to monitor noise levels in factories and other industrial workplaces.
- This data can be used to identify noisy machines and processes, and to implement noise control measures, such as installing enclosures or soundproofing.
- Industrial noise control generally involves the replacement of noise-producing machinery or equipment with quieter alternatives.
- For example, the noise from an air fan may be reduced by increasing the number of blades or their pitch and decreasing the rotational speed, thus obtaining the same air flow.

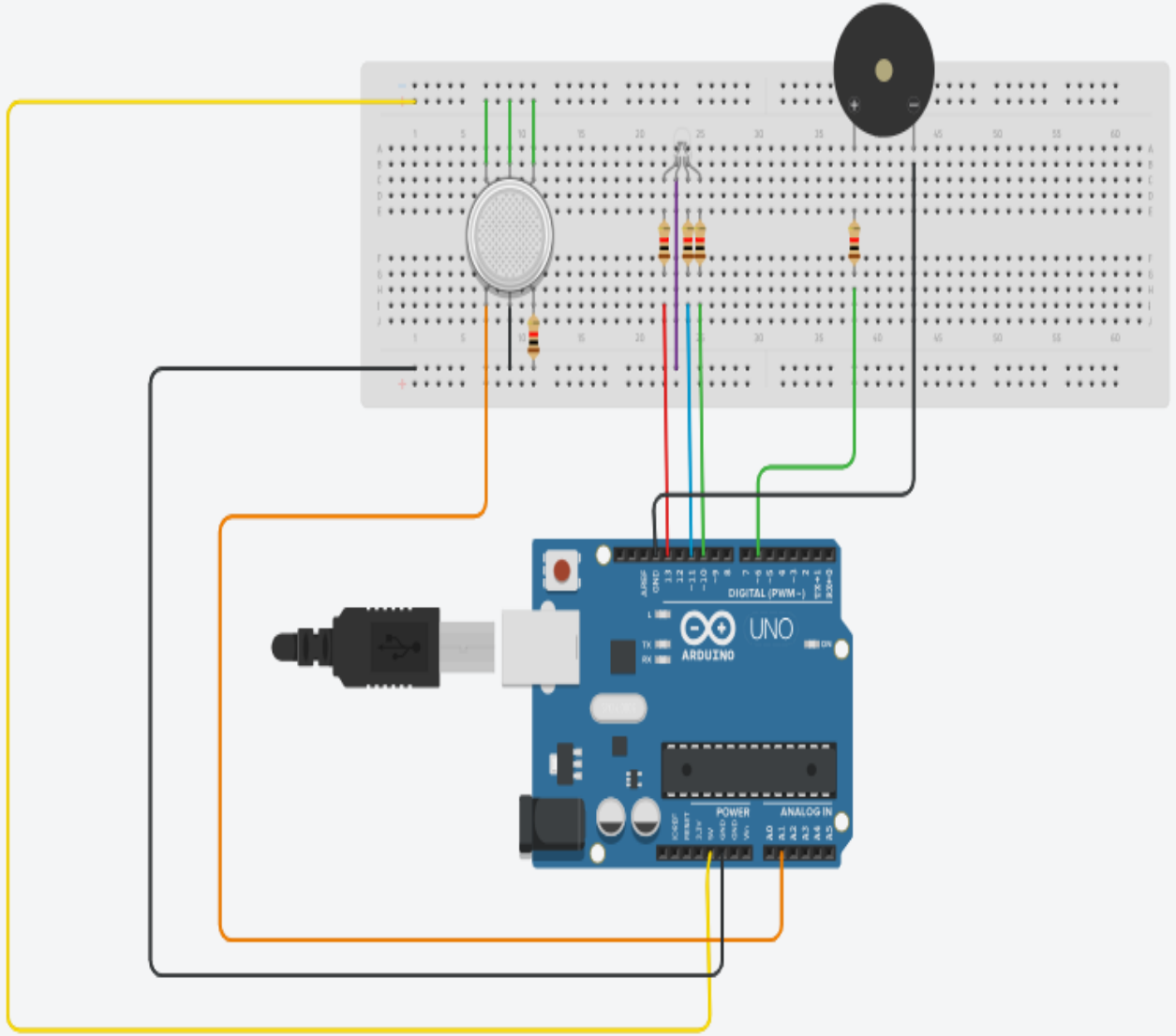
Occupational Safety and Health

- IoT noise detection sensors can be used to monitor noise levels in workplaces where employees are exposed to high levels of noise.
- This data can be used to ensure that employees are wearing adequate hearing protection and to identify areas where noise levels need to be reduced.

Smart homes and businesses

- IoT noise detection sensors can be used in smart homes and businesses to detect and monitor noise levels.
- This data can be used to trigger alerts, such as when noise levels exceed a certain threshold, or to automate tasks, such as adjusting the volume of a speaker.
- A smart home refers to a convenient home setup where appliances and devices can be automatically controlled remotely from anywhere with an internet connection using a mobile or other networked device.

MODEL



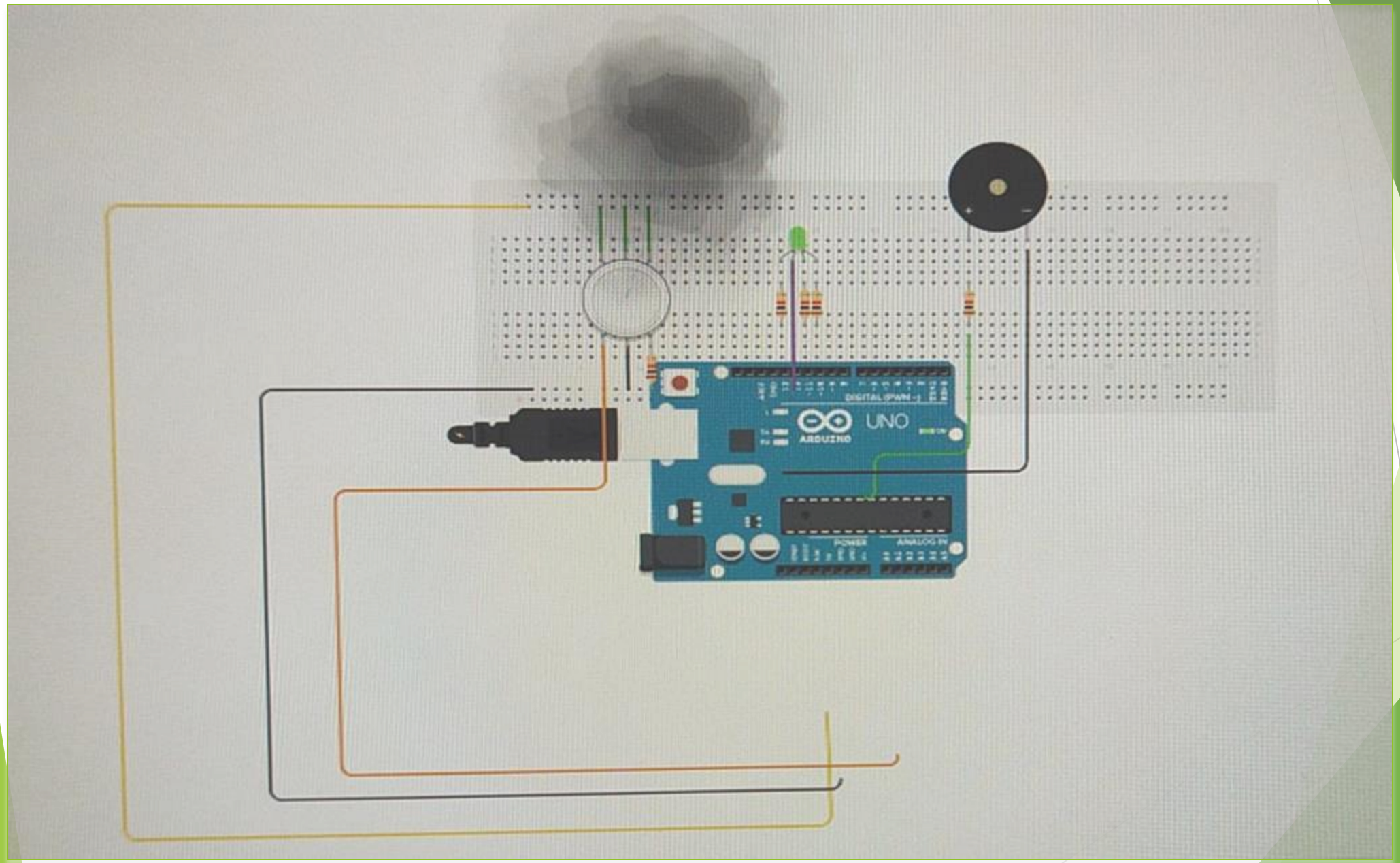
Code

```
import random

class Stantia:
    def __init__(self, name, hp, atk, def):
        self.name = name
        self.hp = hp
        self.atk = atk
        self.def = def

    def attack(self, other):
        damage = self.atk - other.def
            if damage < 0:
                damage = 0
        other.hp -= damage
     def is_dead(self):
        return self.hp <= 0

class Kup:
     def __init__(self, name, hp, atk, def):
         self.name = name
         self.hp = hp
         self.atk = atk
         self.def = def
```

```
    def attack(self, other):
        damage = self.atk - other.def
        if damage < 0:
            damage = 0
        other.hp -= damage

    def is_dead(self):
        return self.hp <= 0

def fight(stantia, kup):
    turn = 0
    while not stantia.is_dead() and not kup.is_dead():
        if turn % 2 == 0:
            stantia.attack(kup)
        else:
            kup.attack(stantia)
        turn += 1

    if stantia.is_dead():
        print(f"{kup.name} wins!")
    else:
        print(f"{stantia.name} wins!")
```

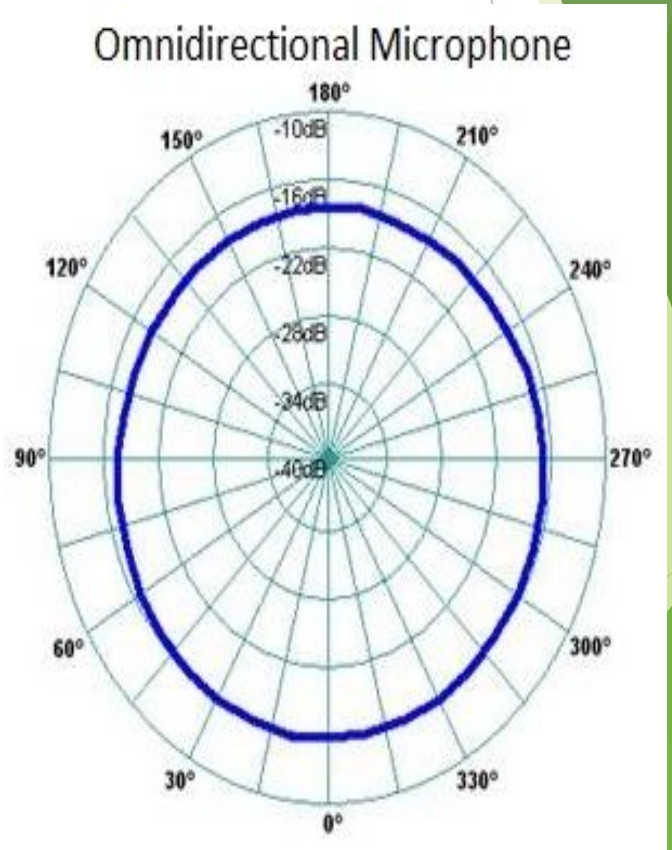
```
if __name__ == "__main__":
    stantia = Stantia("Stantia", 100, 10, 5)
    kup = Kup("Kup", 100, 10, 5)

    fight(stantia, kup)
```

OUTPUT



Omnidirectional Microphones

- Omnidirectional microphones are microphones that are sensitive to sound from all directions.
- They are often used in recording situations where it is important to capture the sound of the entire environment, such as in live music recording or when recording a group of people talking.
- Omnidirectional microphones can also be used in applications where it is important to detect sound from all directions, such as in security systems or in home automation systems.



Advantages

- They capture a natural and realistic soundstage.
- They are less sensitive to the proximity effect, which is the tendency of microphones to boost low frequencies when the sound source is close.
- They can be used to record sound from all directions, which can be useful in a variety of situations.
- It can handle the vibration noise consists of low frequencies.
- The lack of proximity effect with an omni equates to less of this type of noise.
- As an omnidirectional microphone hears equally well in all directions, it works whether it is right side up or upside down.

Disadvantages

- They are more susceptible to picking up background noise.
- They may not be as directional as other types of microphones, such as cardioid microphones.
- The only real negative side effect of using an omni microphone is its potential to pick up unwanted sounds.

• Complexity: ODM systems are typically more complex and expensive than traditional microscopes. This is because they require multiple cameras and lenses to be synchronized and calibrated.

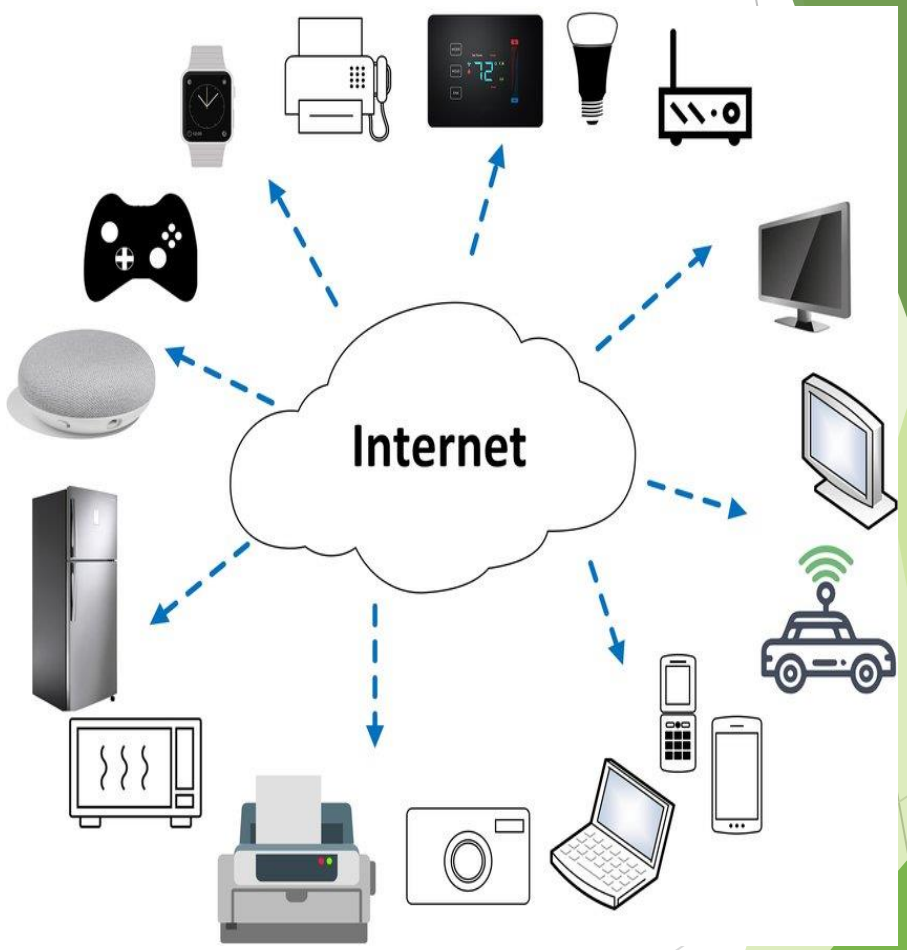
•Data processing: ODM systems generate a large amount of data, which can be challenging to process and analyze.

•Resolution: The resolution of ODM images is typically lower than that of traditional microscopes. This is because the multiple cameras and lenses in an ODM system can introduce aberrations.

•Depth of field: ODM images typically have a shallower depth of field than traditional microscope images. This means that only a small portion of the object will be in focus at any given time.

Examples

- Ambient Microphones.
- USB Microphones.
- Smart speakers and voice assistants.
- Security systems
- Environmental monitoring.
- Industrial automation



Code For Omnidirectional microphone

```
import sounddevice as sd

def audio_callback(indata, frames, time, status):
  if status:
  print(status, flush=True)
    print(indata, flush=True)

microphone_device_id = 1

sample_rate = 44100

duration = 10

with
sd.InputStream(device=microphone_device_id,
channels=1, callback=audio_callback,
samplerate=sample_rate):
    print("Recording from omnidirectional
microphone...")
    sd.sleep(duration * 1000)
 print("Recording finished.")
```

Conclusion

- IoT is very suitable to be implemented in monitoring the noise level in some areas to deal with the problem.
- The demands of modern society lead to the creation of noise sources such as industrial sources, transport vehicles, defence equipment and construction.
- The most significant example is inside UTM(Universal Transverse Mercator).

THANK YOU