

*Presentation  
on  
“Innovative Speed Breaker Integration with IoT”*

Presented By:

*Nikhil Kushwaha  
Mohammad Kaif  
Kundan Kumar*

Guided by:

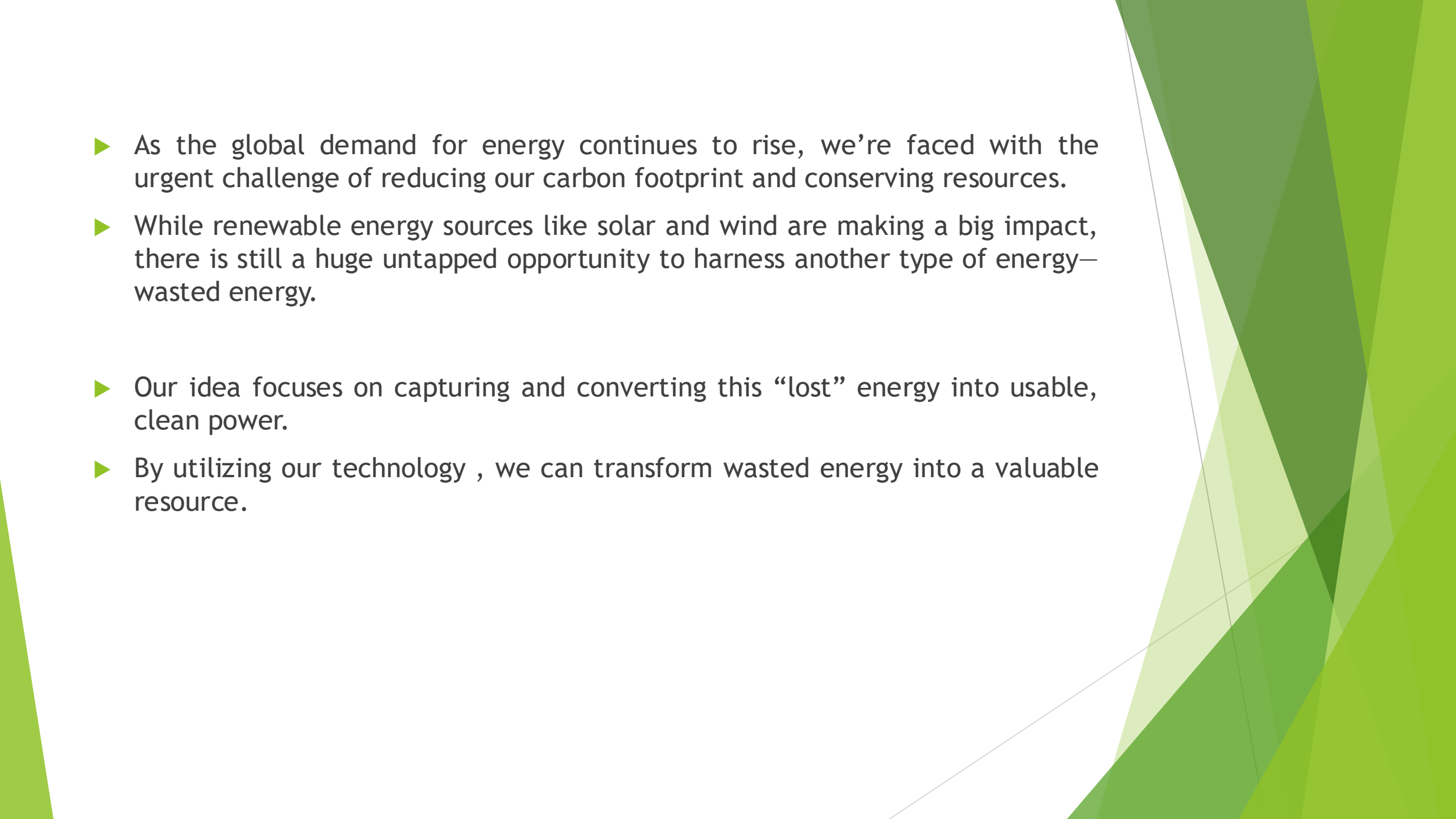
*Dr. Anurag Sharma  
HOD (CSE-DS)  
RCET Bhilai*

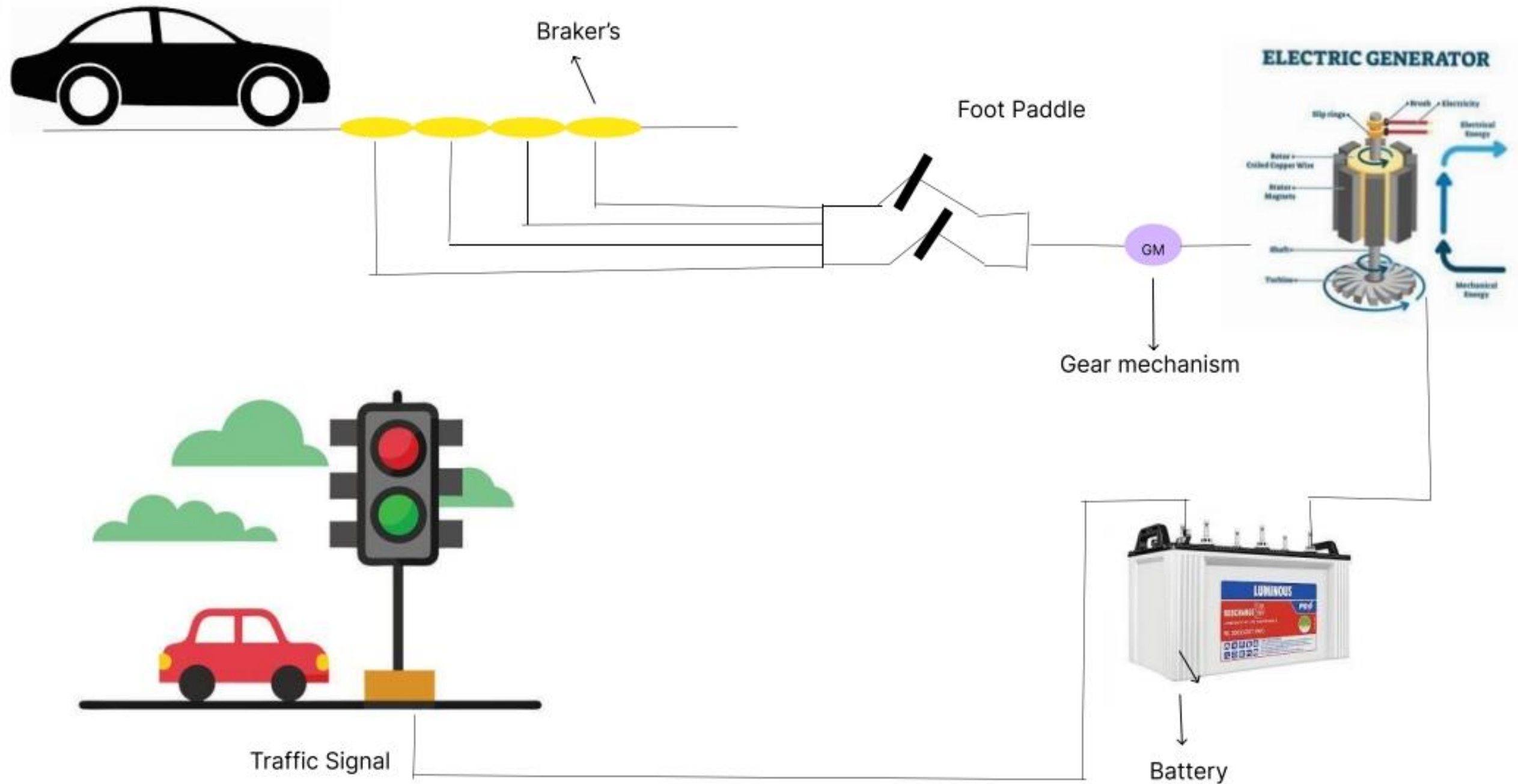
# Outline

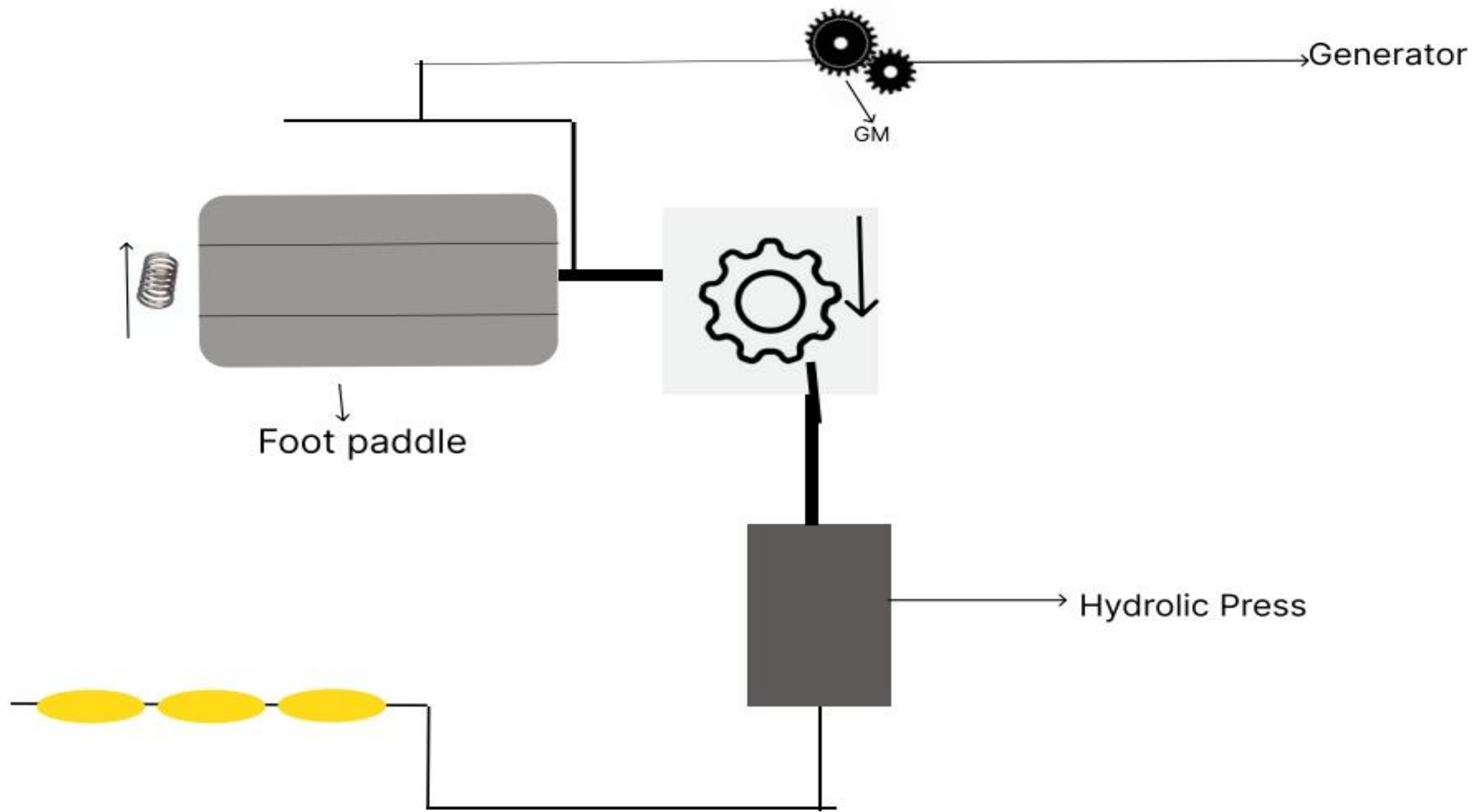
- Introduction
- Idea Visualization
- IoT Based model
- IoT Application
  1. Hardware(Connecting ESP 32)
  2. Sensor
  3. Communication Protocol
  4. Cloud Platform
  5. Monitoring
  6. Device Using
- Calculations
  1. Current Consumption of Energy
  2. Our system Requirements and Production
- Advantages
- Conclusion

# Introduction

- ▶ As the global demand for energy continues to rise, we're faced with the urgent challenge of reducing our carbon footprint and conserving resources.
- ▶ While renewable energy sources like solar and wind are making a big impact, there is still a huge untapped opportunity to harness another type of energy—wasted energy.
- ▶ Our idea focuses on capturing and converting this “lost” energy into usable, clean power.
- ▶ By utilizing our technology , we can transform wasted energy into a valuable resource.

- 
- The background of the slide features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.
- ▶ As the global demand for energy continues to rise, we're faced with the urgent challenge of reducing our carbon footprint and conserving resources.
  - ▶ While renewable energy sources like solar and wind are making a big impact, there is still a huge untapped opportunity to harness another type of energy—wasted energy.
  - ▶ Our idea focuses on capturing and converting this “lost” energy into usable, clean power.
  - ▶ By utilizing our technology , we can transform wasted energy into a valuable resource.





# IoT Based Model

- I. In our project, we developed a speed breaker that generates electricity using a compression of fluid. To monitor the electricity produced in real time, We integrated **IoT technology**.
- II. We used a ESP32 microcontroller, which connects to Wi-Fi and allows us to send data to the cloud.
- III. For measuring the electricity generated, We implemented a current sensor ACS712, which provides accurate readings of the current flowing through the generator.
- IV. This data is then transmitted to a web application where we can visualize the energy output in real time.
- V. Additionally, We utilized a dashboard tool “Microsoft Azure IoT HubReal-time” to display the data, making it easy to track performance over time.
- I. This combination of IoT devices not only enhances our project's efficiency, but also provides valuable insights into energy generation patterns.

# IoT Application

Integrating IoT can enhance its efficiency and monitoring. For real-time monitoring and unit electricity production tracking, consider these IoT solutions:

## Hardware Requirements:

- ESP32 microcontroller (e.g., ESP32 DevKitC, ESP32 WROVER)
- Sensors (e.g., current sensor, voltage sensor, energy metering IC)
- Power source (e.g., USB cable, battery)
- Connecting Sensors:
  - Current Sensor (ACS758)
  - Voltage Sensor (ACS710)
  - Energy Metering IC (ADE7953)



## Communication Protocols:

1. Wi-Fi (ESP32)
2. GSM/GPRS (SIM800)
3. LoRaWAN (for long-range communication)
4. Bluetooth (for local monitoring)

## Cloud Platforms:

1. Microsoft Azure IoT HubReal-time

## Monitoring:

1. Web-based dashboards (Tableau)
2. Mobile apps (Blynk)

## Device Using:

1. SparkFun ESP32 Thing

# Calculation

## Current consumption of energy

- ▶ One incandescent traffic signal
    - ❖ in 1 hr =1.8 kwh
    - ❖ in 1 day =1.8\*24 =43.2 kwh
    - ❖ in 1 year= 1296\*12 = 15552 units
    - ❖ Cost of energy per year = RS124,416(this is for one traffic signal.
    - ❖ For 20 street lights avg per hr=0.3kwh ( 1 light)
    - ❖ avg per day=6kwh( 20 lights)
    - ❖ avg per year=26280 units
    - ❖ Cost of energy per year =RS 210,240 ( for 20 street light)
- So, Total cost for traffic signal & street light= 124416+210240  
=RS 334,656 (per year)

## Our system Requirements and Production

- ❖ one LED traffic signal
- ❖ 1hr=0.29kwh
- ❖ 1day=5.76kwh
  
- ❖ 20 street lights(LED)
- ❖ 0.1kwh in 1hr
- ❖ 24kwh in day(20 street light)
  
- ❖ Total energy consumption= $24+5.76 = 29.76$
- ❖ Approx. 30kwh daily

So, If we have 2 generators and it will operate for approximate 14-16 daily. So, we need 2kw generator rating  $2*2*14=56$ kwh daily (this is how much energy will be produced daily approx. 45kwh-60kwh)

# Advantages:-

## ➤ Enhanced Energy Efficiency:

- I. Utilizing waste energy improves the overall efficiency of existing systems.
- II. It captures energy that would otherwise be lost, converting it into useful power.
- III. This reduces the need to generate new energy, thereby minimizing resource usage.

## ➤ Cost Savings:

- I. Repurposing waste energy can lower energy costs for industries, factories, and businesses.
- II. This can result in substantial savings in utility expenses, operational costs, and long-term maintenance.
- III. Furthermore, these savings can be redirected toward other sustainability initiatives.

➤ Improved Sustainability:

- I. Integrating waste energy recovery into energy systems promotes a circular energy economy.
- II. Instead of wasting by-products, they are recycled back into the production cycle, creating a more sustainable and environmentally friendly energy ecosystem.

➤ Lower Dependence on Non-renewable Resources:

- I. Utilizing waste energy reduces the dependence on non-renewable energy sources like coal and oil.
- II. This shift supports the transition to renewable energy and encourages the development of technologies that promote green and sustainable growth.

➤ Increased Energy Security:

- I. By diversifying the sources of energy through the use of waste energy, we can enhance energy security.
- II. It provides a consistent and reliable energy source that isn't subject to market volatility or supply chain disruptions.

➤ Reduction of Heat and Pollution:

- I. Capturing waste energy not only generates additional energy but also mitigates the release of excess heat and pollutants into the atmosphere as less fossil fuel have to burnt.
- II. This contributes to a cleaner environment and reduces the urban heat island effect.

➤ Support for Innovation and Technological Development:

- I. Implementing waste energy recovery promotes research and development in cutting-edge technologies.
- II. These innovations drive technological advancements and create new market opportunities.

➤ Versatile Applications:

- I. Waste energy can be captured and utilized across a variety of sectors, including manufacturing, transportation, residential buildings, and power generation.
- II. This versatility makes it a valuable addition to diverse energy strategies.

➤ Contribution to a Circular Economy:

- I. Reusing wasted energy contributes to the circular economy model, where resources are continually repurposed rather than disposed of.
- II. This helps create a sustainable system that maximizes resource utilization and minimizes waste.

# Conclusion

- In the conclusion we would just want to say that by using our technology we could make a great impact in our society by changing the normal course of action.
- These self powered technologies can not only be applied to traffic signals but also to the areas like toll plazas, railway stations, airport, malls, and other busy areas.
- It can save a loads of energy and as we mentioned before this will help in sustainable and economic growth.
- We may face some difficulties initially during the setup but in future this will be very beneficial to us.



# Thank you !

Nikhil Kushwaha

[nikhilkushwaha6027@gmail.com](mailto:nikhilkushwaha6027@gmail.com)

+91 8085532198

Mohammad kaif

[mdkaifmaharaja@gmail.com](mailto:mdkaifmaharaja@gmail.com)

+91 7004906007

Kundan Kumar

[kundankumar85140@gmail.com](mailto:kundankumar85140@gmail.com)

+91 93045 53661