

# A SMART TRASH BIN WITH SHORTEST PATH FINDER USING IoT AND ROUTE OPTIMIZATION

## Project description

Monitoring garbage bin levels using IoT-based ultrasonic sensors and ESP8266 microcontroller

Sending real-time bin status and location data to the cloud

Optimizing garbage collection routes using Python based shortest path algorithms (like Dijkstra's or A\*)

## Results

- Efficient bin monitoring and timely collection based on real-time data
- Optimized collection routes significantly reduce travel distance
- Visual data monitoring through Blynk app enhances system accessibility

## Challenges

- Ensuring consistent internet connectivity for real-time data transmission
- Integrating accurate GPS data with route optimization algorithms
- Managing power efficiency and durability in outdoor bin environments

## Objective

Improve urban waste collection efficiency using sensor data smart algorithms

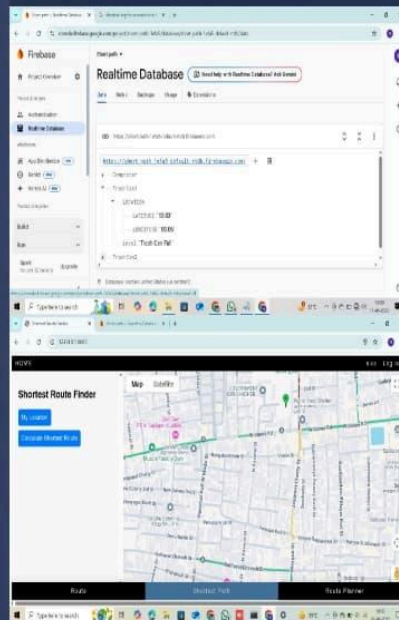
Minimize fuel consumption and human effort by optimizing routes

## Methodology

The process involves two key phases:

**Hardware Integration**  
Using ESP8266 with ultrasonic sensors to detect bin fill levels. A module used to indicate bin type with GPS module using GPS module

**Route Optimization & Visualization**  
A Python script on Blynk app.



## Conclusion

This smart waste management solution integrates IoT and algorithmic intelligence to transform how urban waste collection. By providing real-time bin status updates and completing the most efficient collection route, it enhances operational efficiency and supports sustainable urban living.

## References

- User Project Documentation, 1023
- Arduino & ESP8266 Documentation
- Dijkstra's Algorithm, for Route Optimization. Usengizans