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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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A

Domain Specific Mini Project Synopsis

On

**“Waste Monitoring”**

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**1. Abstract**

In this project we will be using ultrasonic sensors for measuring the waste deposited in respective garbage bin, thus analysing and reporting the bin divers for collection of the waste. In this project, we are providing statistical report of garbage bins with the help of web user interface, notify the bin divers via SMS. We are also keeping a database in which we will store analysed data sensed through ultrasonic sensors installed in respective bins. Our aim is to provide optimized path for bin divers (Garbage Collectors), thus providing efficient diving time.

**2. Introduction**

Internet of Things (IoT) is a concept in which surrounding objects are connected through wired and wireless networks without user intervention. In the field of IoT, the objects communicate and exchange information to provide advanced intelligent services for users.

This project deals with the problem of Waste management, where the garbage collection system is not optimized. This project enables the organizations to meet their needs of smart garbage management system. This system allows the user to know the fill level of each garbage bin, to give an efficient and time saving route to the bin divers. Project will be build using Ultrasonic Sensors and WIFI Module – ESP8266 connecting to interface via raspberry PI breadboard. The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them, (like a tiny microphone). The speed of sound is approximately 341 meters (1100 feet) per second in air. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object. The ESP8266 WIFI Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any micro controller access to your WIFI network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your device and get about as much WIFI-ability as a WIFI Shield offers. A breadboard is a construction base for prototyping of electronics. “Breadboard” is also a synonym for “prototype”. Because the solder less breadboard does not require soldering, it is reusable. A jump wire is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them – simply “tinned”), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. This project here is a model of the large scale application which spans for areas, localities, cities, etc. We are here to display the live working of the model and give an idea about the actual implications.

**3. Problem Statement**

To design and implement system for waste monitoring to provide optimal path for bin diving.

**4. Objectives**

* To design and build a prototype of a system that could efficiently manage bin-diving.
* To provide the ideal diving schedules.
* To implement this ultrasonic sensors HC-SR04 used attached with each bin forming a layered structure.
* The sensed data is then forwarded over the cloud to the database.
* Then this data will be processed using algorithm.
* Algorithm provides optimized path for collecting waste from the bin.
* Optimal diving schedule is forwarded to respective waste management organisation and data is then displayed on web interface.

**5. Proposed System Architecture**

**6. Modules**

* **Process Data:** Data received from sensors are in form of voltages, then we convert that voltage into distance using algorithm.
* **Store Data:** Then we store that processed data into database for analysis.
* **Collection Checker:** Here we analyse the stored data and check if the waste collection is required.
* **Optimal Path Calculator:** If Collection Checker returns true then we calculate optimal path for garbage collection using algorithm.
* **Notifier:** After calculating optimal path respective bin divers are notified using SMS.
* **Web UI Updater:** In this we periodically update statistics for monitoring.

**7. Conclusion**

This Domain Specific Mini Project is developed to provide the ideal diving schedules.

**8. System Requirements:**

* **Hardware**

HC-SR04 Module

Resistors: 330Ω and 470Ω

Jumper wire

RAM : 1 GB

Processor : Pentium 4 onwards

* **Software**

Languages : Python, HTML, CSS, Javascript, Bootstrap, D3.js

Database : MySQL

Operating system : Windows

Compiler : Python Interpreter

**9. References**

**Website Links**

* <https://icpc.baylor.edu/>
* [https://stackoverflow.com/questions/16498066/finding-all-paths-between- points-on-a-square-matrix](https://stackoverflow.com/questions/16498066/finding-all-paths-between-%20points-on-a-square-matrix)
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