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IOT Based Smart Garbage Monitoring System

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ABSTRACT: Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid all such situations we are going to implement a project called IoT Based Smart Garbage Monitoring System. These dustbins are interfaced with microcontroller based system having Ultra sonic sensors with wireless systems along with central system showing current status of garbage, on mobile web application with connected via Wi-Fi. Hence the status will be updated on to the application in real-time. Major part of our project depends upon the working of the Wi-Fi module; essential for its implementation. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision.

KEYWORDS: 89S52 microcontroller, Ultrasonic sensor, Wi-Fi module, B4a Software, Power supply, IOT.

I. INTRODUCTION

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown from user - user interaction to device – device interactions these days. The IoT concepts were proposed years back but still it's in the initial stage of commercial deployment. Home automation industry and transportation industries are seeing rapid growth with IoT. Yet not many articles have been published in this field of study. This paper aims in structuring a state of the art review on IoT. The technology, history and applications have been discussed briefly along with various statistics. Since most of the process is done through the internet we must have an active high speed internet connection. The technology can be simply explained as a connection between humans computers-things. All the equipment's we use in our day to day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. By this way we can monitor environment changes remotely from any part of the world via internet. These systems architecture would be based on context of operations and processes in real-time scenarios.

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II. LITERATURE SURVEY

This is not an original idea, for the implementation of smart garbage bin; the idea has existed for many years, After the IoT field finding its grip in our lives. We are using Ultrasonic sensor and Wi-Fi module for transmission of data.

[1]. A State of the Art review on Internet of Things by P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V. Parthasarathy. It gave the idea of IoT subject and addition details about IoT. The proper smart environment and various applications.

[2].Internet of Things: Challenges and state-of-threat solutions in Internet-scale Sensor Information Management and Mobile analytics by Arkady Zaslavsky, Dimitrios Georgakopoulos. This paper gave us the details about mobile analysis and sensor information management that will help in data segregation of various dustbins.

[3]Top-k Query based dynamic scheduling for IoT enabled small city waste collection by Theodoros Anagnostopoulos, Arkady Zaslavsky, Alexey Medvedev, Sergei Khoruzhnicov. It gave us the concept of dynamic scheduling required for the cleaning of dustbin and the Top-k query led us to priority based cleaning of dustbins.

[4]City Garbage collection indicator using RF(Zigbee) and GSM technology. This paper gave the details for the module required for the transmission of the data to the receiver side and also the main channel follow of the project. Initially we used GSM technology for our project, but later on decided to us Wi-Fi module for the ease of data transmission.

[5]IoT-Based Smart Garbage System for efficient food waste management by Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, Sehyun Park. This paper gave the overview working of the IoT based smart garbage bin and the food management.

III. SCOPE OF RESEARCH

Smart dustbin helps us to reduce the pollution. Many times garbage dustbin is overflow and many animals like dog or rat enters inside or near the dustbin. This creates a bad scene. Also some birds are also trying to take out garbage from dustbin. This project can avoid such situations. And the
message can be sent directly to the cleaning vehicle instead of the contractor's office. Ease of operations with accurate and real-time data will provide significant information. Futuristic trucks which can automatically collect garbage via their updated technologies will benefit from such a monitoring system.

IV. PROPOSED METHODOLOGY AND DISCUSSION

Considering the need of modern technology the smart garbage bin can be expensive, but considering the amount of dustbin needed in India, expensive garbage bin would not be a prior experiment, that is why we have decide to use sensors to reduce its cost and also make it efficient in overall applications.

Below is the block diagram for the overall operation.

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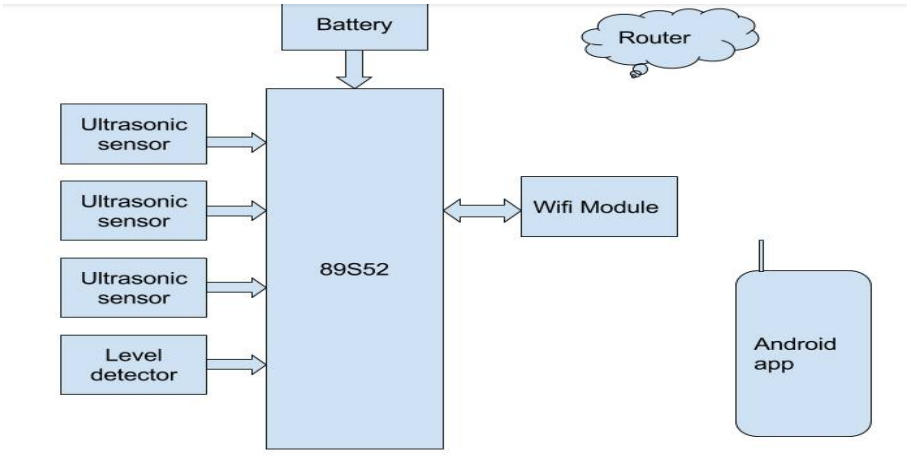

System Architecture

Microcontroller (AT89S52):
The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.
The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning.

WIFI Module:
Espressif Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.
ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications.

Ultrasonic sensors :
(also known as transceivers when they both send and receive, but more generally called transducers) work on a principle similar to radar or sonar, which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Active ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions.

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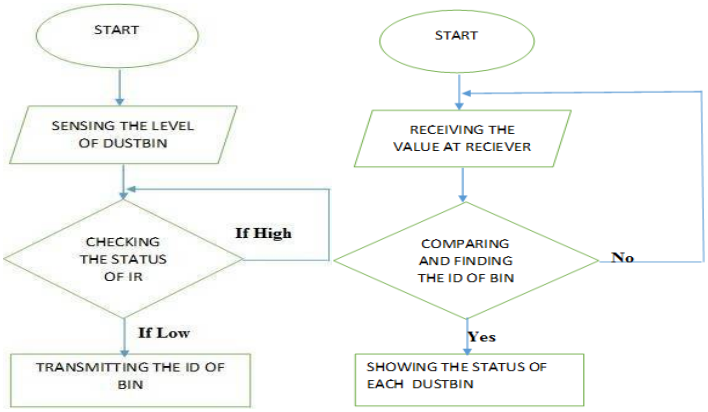
Software requirements:

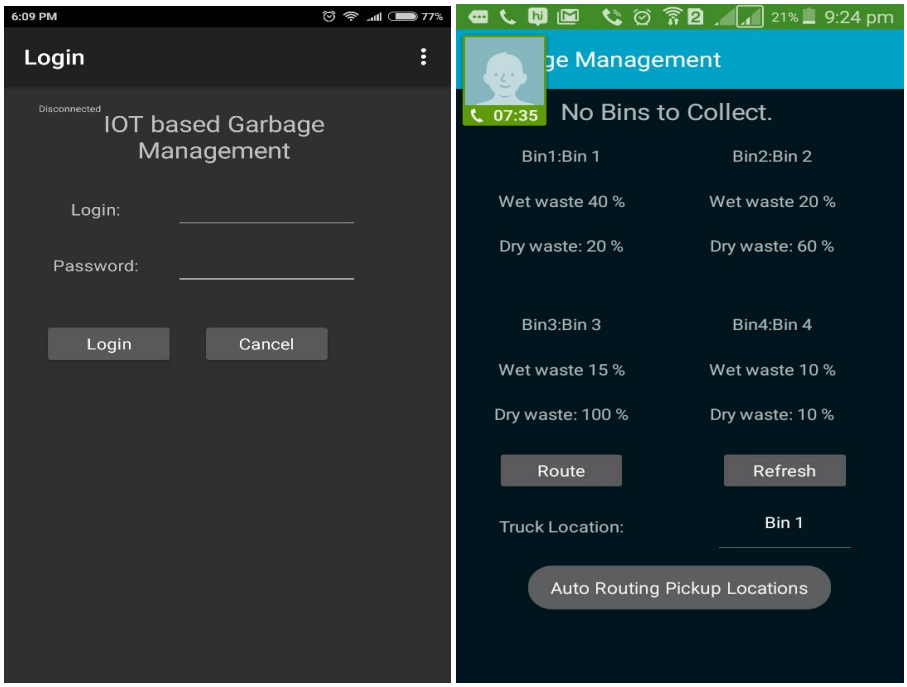
-keil software -for 89s52 controller.
-uc flash.
-Diptrace software.
-basic for android.

V. EXPERIMENTAL RESULTS WITH TABLES & GRAPHS

The flow chart on which the overall working will be based, is as below



Our development software's login page is as below.



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VI. CONCLUSIONS

- This project work is the implementation of smart garbage management system using ultrasonic sensor, microcontroller and Wi-Fi module.
- This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is Wi-Fi Router Mobile Garbage bin Level Detector Weight Sensor Microcontroller WIFI Module Antenna sent to the higher authority who can take appropriate action against the concerned contractor.
- This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection.
- It ultimately helps to keep cleanliness in the society.
- Therefore, the smart garbage management system makes the garbage collection more efficient.
- Such systems are vulnerable to plundering of components in the system in different ways which needs to be worked on.

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