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# Smart Garbage System

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***Abstract*: In this fast and restless world the waste production is more and it increases, now the waste management is a big challenge as the population is increasing day by day. This paper aims at developing the smart garbage system using IoT. Technology with an objective of disposing the filled garbage cans in a proper and hygienic way. we propose a smart dustbin that consists of a level sensing ultrasonic sensor that constantly measures the level of garbage in the bin, when the bin is full it will send the signal. When a signal is received a team will be sent to collect the waste with GPS location in the Google map. We use IoTgecko to develop the online web part for the IoT system.**

***Keywords*: Internet of Things(IOT), GPS, Sensor, IoTgecko, Arduino UNO.**

## 1. Introduction

Agriculture is the back bone of all developed countries. 85% of fresh water resources is used worldwide and this percentage continues to be dominant in water consumption due to population growth and increase in food demand. Due to this, efficient water management is the major concern in many cropping systems in arid and semi-arid areas. The Smart Irrigation System is used to overcome over irrigation and under irrigation. In future agriculture fields, data collected from sensors would become the fertilizer to grow crops. Wireless Sensor Network temperature, humidity, pH, soil moisture, etc., can be used in Wireless Sensor Networks to calculate data from different sensors. The wireless system improves crop productivity and convenience. WSNs collect information from different sensors in large and small area so end user can get and process the data. In our proposed system, we collect different data through sensor notes. In addition, it contains current information such as weather condition because analyzes of the system that takes external factor into its own is more reliable. This neutralizes the need for costly and ungainly wiring between nodes, instead relying on the flexibility of mesh networking algorithms to make simple. A sensor is a device that detects and response to some of the inputs detected from the field. The input is generally a signal and that is converted to output in the form of human readable display at the sensor location or further processing.

## 2. Related Work

In [1] got to learn and know in detail about Internet of things, how they can be useful in the future.

In [2] official website to know about ARM7 LPC2148 is a 16/32 bit ARM7TDMI-S Core Microcontroller from Philips (NXP). LPC2148 includes built in peripherals such as USB, ADC, DAC, Timer/Counter, PWM, Capture, RTC, I2C, SPI, UART etc.

In [3] The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

In [4] ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

In [5] Thing Speak™ is an IoT analytics platform service from Math Works®, the makers of MATLAB® and Simulink®. Thing Speak allows you to aggregate, visualize, and analyze live data streams in the cloud. Thing Speak provides instant visualizations of data posted by your devices or equipment.

## 3. Proposed System

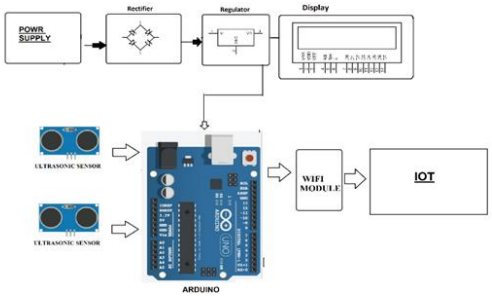

Fig. 1. Block diagram

The ultrasonic sensor monitors the garbage being filled in garbage bin. The LCD monitor displays the graphical view of the garbage level in the garbage bin by website developed using IOT. The wifi module is used to transmit the signals from the garbage bin to the user who is monitoring the smart garbage bins. Arduino microcontroller brings all components into a single device which is powered by 12v transformer.

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## 4. Hardware Design

### A. Arduino UNO

Fig. 2. Arduino UNO

The Microcontroller used here is an Arduino UNO. The UNO is a Microcontroller board based on ATMEGA 328P. The ATMEGA 328P has 32kB of flash memory for storing code. The board has 14 digital input and output pins, 6 analog inputs, 16 MHz quartz crystal, USB, an ICSP circuit and a reset button. The UNO can be programmed with the Arduino software.

### B. Ultrasonic Sensor

Fig. 3. Ultrasonic sensor

Ultrasonic distance sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each module includes an ultrasonic transmitter, a receiver and a control circuit.

### C. ESP8266 WIFI

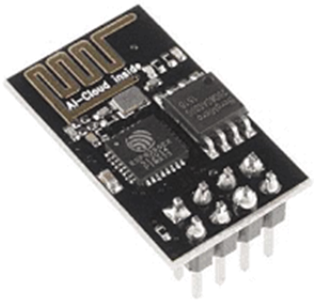

Fig. 4. ESP8266 Wi-Fi

The ESP8266 Arduino compatible module is a low-cost Wi-Fi chip with full TCP/IP capability, and the amazing thing is that this little board has a MCU (Micro Controller Unit) integrated which gives the possibility to control I/O digital pins via simple and almost pseudo-code like programming language. This device is produced by Shanghai-based Chinese manufacturer, Express if Systems.

### D. Software

#### 1) Arduino Compiler

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

#### 2) MC Programming Language C

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software. Embedded C programming plays a key role in performing specific function by the processor.

#### 3) IOT Gecko

IOT Gecko is a free IOT systems development platform for students, researchers and developers. Build an own system to handle/monitor the IOT system on the web. Process the sensor obtained values and display online.

## 5. Implementation and Working

Working and Implementation of this smart garbage system is quite simple. It is not completely an automated system and there require man power only for emptying the garbage bin and disposing the collected garbage waste. Arduino is used for controlling the whole process, ultrasonic sensors are used to detect the level of garbage filled in the bin and Wi-Fi modem is used for sending data. Whereas a web page is built to show the status to the user monitoring it. The web page gives a graphical view of the garbage bins and highlights the garbage collected in color in order to show the level of garbage collected. The LCD screen is used to display the status of the level of garbage collected in the bins. The LCD screen shows the status of the garbage level. Once the garbage bin reaches the level, The system puts on the buzzer when the level of garbage collected crosses the set limit and a team will be sent to the location using GPS to empty the garbage bin and dispose the garbage waste. The system is powered by a 12V transformer. Thus, this system helps to keep the city clean by informing about the garbage levels of the bins by providing graphical image of the bins via a web page.

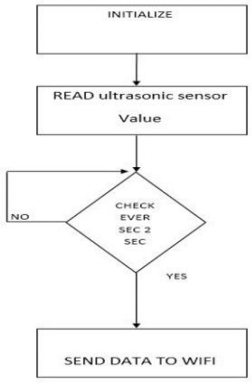


Fig. 5. Transmitter side

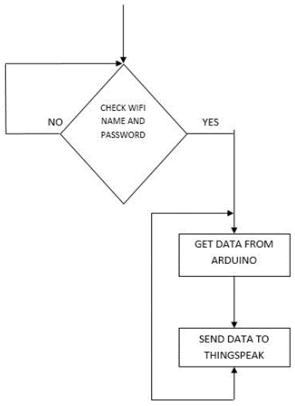


Fig. 6. Receiver side

## 6. Result

The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system. One of the main concerns with our environment has been solid waste management which in addition to disturbing the balance of the environment also has adverse effects on the health of the society. The detection, monitoring and management of wastes is one of the primary problems of the present era. The traditional way of manually monitoring the wastes in waste bins is a complex, cumbersome process and utilizes more human effort, time and cost which is not compatible with the present-day technologies in any way. This an advanced method in which waste management is automated. This project IoT Garbage Monitoring system is a very innovative systemwhich will help to keep the cities clean. This systemmonitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. This web page also sends all information to garbage collection vehicles.


Fig. 7. Output

## 7. Conclusion and Future Work

In proposed model we connected single dustbin to cloud to get the data further we will connect the entire dustbin together. Data of dustbin can be checked in cloud database further we will design a web portal to connect the entire dustbin together.

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