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IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

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Smart Waste Management System

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Abstract: Due to increasing population, modernization, people move from one place to another and way of life are expanding well. The present garbage system available in India is fully done by humans. But now in our project we have reduced the work of humans compare to the present situation. The waste which is produced across the world is innumerable if we try to reuse with the man power it may consume much time and which needs a much energy .so in order to save energy and human work we can for the technology that is available in our projects. If we concentrate power savings on the garbage issue which could save energy that may be useful for some other purposes.. Based on research of WHO 22 types of diseases can be controlled by improving solid waste management in India. Hence, people who live in India and local municipal bodies should change their casual attitude to waste management. So, waste management is a mandatory process in order to face the challenges in day to day life. The entire management includes three parts: 1) Users who generate waste,2) Waste collectors 3) stack holders. Existing waste management systems are difficult to handle and not user friendly. This project is very attractive and aids in many effective ways to make environment friendly. The waste bins are equipped with sensors and connected to cloud with push mechanism. Hence the stack holders are able to get the all data from the cloud.
Keywords- Smart: Waste Management system, Smart Bin, Garbage Monitoring System.

I.   INTRODUCTION

Waste Management is process of collection, transport, processing or disposal, managing and monitoring of waste materials. This term usually relates to materials produced by human activity, and process is generally undertaken for reduce their effect on health, the environment Waste management practices can differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Managing of wastes properly is individual responsibility. Public awareness campaigns are necessary for environment protection. So need to encourage the people to be part of this objective, protecting our environment through proper waste management. Current Product incorporates with weight sensor to find the level of the waste bin. So weight sensor is not applicable for products which are very light, very heavy and varies with size respectively. In IR sensor the weather can also interfere with reception from sunlight, rain, dust and the range of transmission is quite short compared to wired transmission then the speed at which the data is transmitted by infrared light is slower in order to avoid this problem. It also uses IR sensor to detect status of the waste bin but IR is not applicable to waste bin in darker areas [1].This process is proposed Ultrasonic sensor and GSM module. Ultrasonic sensor used to measure the object and GSM module is used to indicate the status of the dustbin but not share the location of the dustbin and GSM is need to send SMS every time. So it's very expensive [2].For some applications to permanently wire nodes, many features such as waste bin monitoring require them to be wireless to allow bin status identification. As a result, low power consumption of the node and sensors should be minimal and managed in an inventive way so as to long battery lifetime. RFID-based node provides significant power saving since transmission only takes place at specified intervals and is of minimal Power[3].So Ultrasonic sensor are used. This sensor are used for identifying the level the dustbin and also the ultrasonic sensor is fixed at the top of trash, so sensor is prevented from water like wastes then make user friendly for waste collector to get the garbage. Sensors are fixed under the lid of the waste bins for compute the distance between the lid of the can and the garbage level, Using this data the trash level capacity calculated and message from the trash can, will be sent to the servers notifying them that the trash can is full.

II.   PROPOSED MODEL

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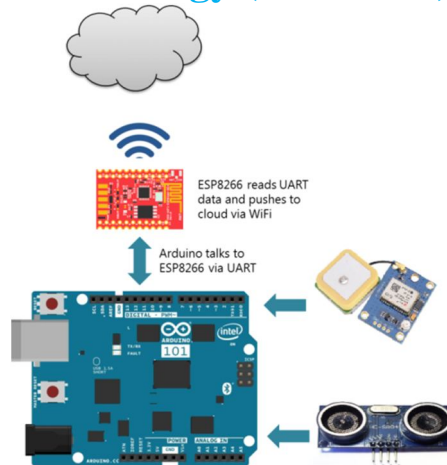

A. Ultrasonic Sensor

Ultrasonic sensor module HC - SR04 provides 3cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3cm. Using IO trigger for at least 10us high level signal. This Module sends eight 40 kHz and detect whether the pulse signal is back. If the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Electric Parameter

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion

B. Wi-Fi Module
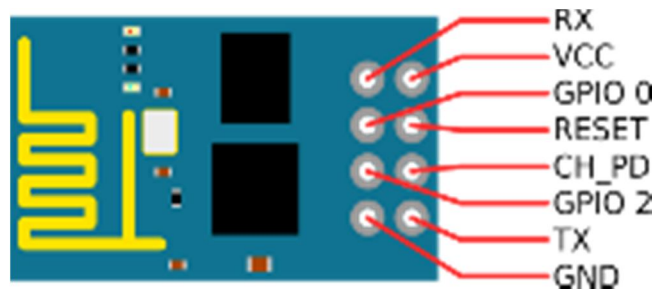
Normally in ESP series there are 12 type of modules are available, the ESP8266-01 is a chip with which manufacturers are making wirelessly networkable micro-controller modules. More specifically, ESP8266 were a system-on-a-chip (SoC) with capabilities for 2.4 GHz frequency range and it has 8 pins, 4 in the each row of 2. The first pin on the top right is Vcc. The lower left pin is GND andGPIO0 and GPIO2 determine what mode the module starts up in and the TX/RX pins are used to program the module and for Serial I/O. This small module allows the microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections. Wi-Fi module comes with pre-programmed firmware with support of AT commands, you can simply hook this up to your Arduino device.

Note: The ESP8266 Module is capable of 3-3.6V. Please do not power it directly from your 5V development board.

C. GPS

The NEO-6m series is a family of u-blox 6 positioning stand-alone GPS receivers featuring the high performance. The antenna is attached to the PCB with a little snap on coax connector. It can be carefully lifted off to disconnect. There are 4 connections, Tx,Rx,Vcc and Gnd.

The SPI interface allows for the connection of external devices with a serial interface, e.g. serial flash to save configuration and Assist Now Offline A-GPS data or to interface to a host CPU. The maximum bandwidth is 100kbit/s.

GPS receiver monitors the satellites accessing and solves equations to determine the position of the receiver and its deviation from true time. GPS receivers need at least four satellites must be view of the receiver for identifying four coordinates.

III.   WORKING PRINCIPLE

Fig.1 shows the block diagram of Smart Waste Management System. In our system, whole circuit is placed at top of the dustbin. In general, Ultrasonic sensors transmit head sent the trigger pulses continuously to the dustbin and echo pulse reflects back to ultrasonic sensor whenever there is object in front of the sensor. So, Ultrasonic sensor continuously checks the garbage level in dustbin. If the trash is not exceeding the limit as maximum, then cyclically checks the distance. Once the level of trash reaches particular threshold values, now the ultrasonic sensor gives indication to Arduino Uno and GPS searches the location where the dustbin is available, give the Latitudinal & Longitudinal details to the controller, then controller process these obtained data and send the intimation signal to the server through Wi-Fi along with the location details to waste collector. Trash level is measured by connecting access points to mobile or laptop's by open the browser and enter corresponding IP address of Wi-Fi module. This server page is loaded with HTML language for viewing the sensor data remotely.

IV.   FLOW CHART
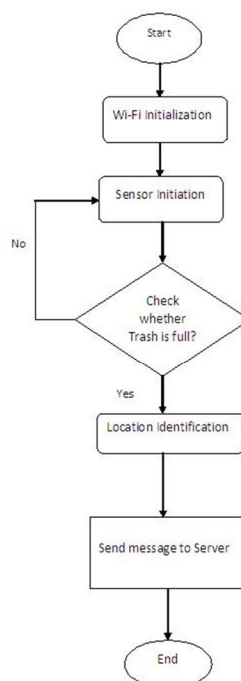
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V. CONCLUSION

Advancements in latest technology in different sector of life and with the increasing population and changes in the lifestyle, waste management is another sector need to be maintained properly. So monitoring of the Trash bins with the use of sensors, it's a possible way to monitor and clean the dustbin and more efficient system than the current existing. Ourideaof "Embedded based Smart waste management system "mainly focuses on monitoring the waste management, providing a smart technology for waste management system, by this reducing human time and effort, cost and which results in healthy environment.

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