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Smart Garbage Based On IOT Using Arduino UNO and GSM Module and IR Sensor Module

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ABSTRACT
This Project deals with the story of the smart bin which automatically senses the level of the bin. By using this smart trash bin we can experience whenever the bin is full it will advise to the respected GVMC worker.We are using a ARDINO UNO as a micro controller the job of this micro controller is process as this system can give notice to the respective GVMC location without any human intervention. What makes our labor than others innovations in the current situations there is manual checked of the bin by using this we can figure out the trouble.Basically, our project takes two levels, notifications. One is at 50% of the bin is full and another sensor for 100% completion of the bin. And a GSM module is applied for changing the message to respected actor.

Keywords:- IOT, UNO, GSM

I. INTRODUCTION

PROBLEM IDENTIFICATION

This project is more use full in monitoring bin automatically without any human interface. We call it has a smart trash bin system. We know that GVMC workers do not know when the bin is full or empty. As a consequence, on that point is a opportunity to get health damage issues. This task is an excellent result for such form of problem. this smart trash bin is convenient, particularly where there is more population and wanted to clear the bin time to time.

II. MOTIVATION OF THE PROJECT

By introduction “Swachh Bharat” Mission we are prompted to produce a clear and green city.The unclear bin will release a harmful gas. so there should be a time to time.During the period of fulling of the bin by keeping its unclean state it will damage the health.

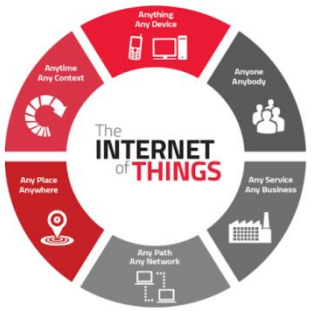
As the results whenever the bin is full there is no notification alert to the respected worker “GVMC”.Hence by looking the all the condition we made a right solution to solve it.

III. INTERNET OF THINGS

Interpret within the existing Internet infrastructure. Typically, it is required to offer advanced connectivity of devices, systems and services that goes beyond machine to machine communication and embraces a variety of protocols, knowledge bases and applications.The interconnection of these implanted devices (including smart objects) is expected to usher in automation in virtually all areas, while also enabling advanced applications like a Smart Grid, and expanding to area such as smart cities.

DEFINING IOT

The internet of things (IOT) refers to the ever-growing network of physical objects that feature an IP address for the internet connected, and the communication that takes place. Between these objects and the other internet-enabled devices and system.



If we had computer that know everything there was to know about things using the data they gathered without any assistance from us—we would be able to cut through and calculate everything.And greatly reduce waste, loss and monetary value.We would experience when things needed replacing or returning, and whether they were fresh or past their best.We require to empower computer with their own way of collecting information and then they can see her and small the world for themselves, in all its random glory.Sensor technology enables computers to observe, identify and understand the Earth without the restriction of human entered data.From a broad perspective the confluence of several technologies and securities industry trends is making it possible to interconnect more and smaller devices cheaply and well

IV. PHASE OF THE IOT LIFECYCLE

Five phases of IOT life cycle:

Firstly, create phase where devices or sensors collect data from the physical environment around them.The data from smart connected devices can be utilized to generate insights that can help business, customers and collaborators.

Secondly, communication phase where the data and results brought forth are transmitted throughout the network to the desired address.

Thirdly, aggregation phase is where the data collected is integrated by the twist itself.

Fourthly, analyze phase where upon further sophisticated analytics the aggregated data can be utilized to generate basic patterns, control and optimize operation.

In conclusion, active phase, where a desirable action is done based on the information produced.

V. CHARACTERISTICS OF IOT

The central features of the IoT are as follows

Interconnectivity: With respect to the IoT, anything can be interlinked with the global data and communication infrastructure.

Things-related services: The it is capable of providing thing-related inspection and repairs within the constraints of things, such as privacy protection and semantic consistency between physical things and their associated virtual things.In ordination to provide thing-related inspection and repairs within the constraints of things, both the technologies in the physical world and information world will shift.

Heterogeneity: The devices in the IoT are heterogeneous as based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks.

Dynamic changes: The state of devices changes dynamically, e.g., sleeping and waking up, linked and/or disconnected as well as the context of devices including location and velocity.Moreover, the number of devices can switch dynamically.

Enormous scale: The number of devices that necessitate to be done and that communicate with each other will be at least an order of magnitude larger than the devices connected to the current Internet.Even more decisive will be the management of the data generated and their interpretation for application purposes.This refers to semantics of data, as well as efficient data manipulation.

Safety: As we gain benefits from the IoT, we must not forget about safety. As both the creators and receivers of the IoT, we must plan for safety.This includes the safety of our personal information and the safety of our physical well-being.Battening down the endpoints, the nets, and the data moving across all of it means creating a security paradigm that will scale.

Connectivity: Connectivity enables network accessibility and compatibility. Accessibility is getting along a network while compatibility provides the usual power to ingest and create information.

VI. SCOPE OF IOT

Internet of things can connect devices embedded in various systems of the Internet. When devices/objects can represent themselves digitally, they can be controlled from anywhere. The connectivity, then helps us capture more information from more places, ensuring more ways of increasing efficiency and improving safety and IOT security. IOT is transformational force that can assist companies better performance through IOT analytics and IOT security to render better outcomes.A concern in the utilities, oil and gas, insurance, manufacturing,

transportation, infrastructure and retail sectors can reap the benefits of IOT by making more informed decisions, aided by the torrent of instructional and transaction information at their disposition.It is expected that IOT products with interoperable capability will dominate the marketplace.Awareness of IOT products is too vital for market penetration along with protection features.

Many scopes will be created for technology companies to release offerings as per the behavior of consumers. It may then fall out that Netflix can know when a person is sad and alone by monitoring the smart watch, smart thermostats and in-home camera.

VII. SRS (SOFTWARE REQUIREMENT SPECIFICATION)

A software requirements specification (SRS) is a description of the software to be evolved.It lays out functional and non-functional requirements, and may include a set of usage cases that describe user interactions that the software must provide.The software requirements specification document enlists enough and necessary prerequisites that are needed for the project development.To deduce the requirements we demand to receive clean and thorough understanding of the products to be developed or being acquired.

VIII. FUNCTIONAL REQUIREMENTS

Functional requirement defines a function of a system or its part.A mapping is identified as a set of inputs, the behavior and yields.Functional requirements may be calculations, technical details, data manipulation and processing and other specific functionality that specifies what a system is supposed to carry out.

Operational requirements for present project:

1. Input: Arduino
2. Output: Garbage level
3. Process:

- Connect the adaptor to the Arduino .
- Pre-requirements: solder the jock to the circuit. Connect relay to the Arduino among jumper wires.
- An IR sensor will be placed on the interior side of the bin. As the trash increases, the distance between the IR sensor and the trash decreases. This live data will be sent to our micro-controller.
- Our micro-controller then processes the data and through the help of GSM sends notification to the respected municipality worker(GVMC).

IX. NON-FUNCTIONAL REQUIREMENTS

Nonfunctional requirement is a requirement that defines standards that can be employed to judge the performance of a system, rather than specific behaviors.This should be contrasted with functional requirements that specify specific behavior or functions in general;

Functional requirements specify what a system is supposed to do, whereas non-functional requirements determine how a system is said to be.Nonfunctional requirements are often called qualities of a system. Other conditions for non-functional are “constraints”, ”character attributes”, “quality goals” and “quality of service requirements” and “non-requirements”.Nonfunctional requirements, can be split into two primary classes:

1. Execution qualities, such as protection and usability, which are observable at run time.

2. Evolution qualities, such as testability, maintainability, extensibility and scalability, which are personified in the static structure of the software organization.

X. SYSTEM REQUIREMENTS

System requirements refer to the hardware and software components of a computer system that are required to install and use software efficiently.The software manufacturer will list the system requirements on the software bundle.If your computer system does not match the system requirements, then the software may not function correctly after installation.Scheme requirements for operating systems will be hardware components, while other application software will list both hardware and operating system essentials. System requirements are most commonly seen listed as minimum and recommended requirements.The minimum system requirements need to be taken on for the software to work at all on your system, and the recommended system requirements, if satisfied, will offer better software usability.Both hardware and software tools have been employed in this task.

XI. SOFTWARE REQUIREMENTS

Software requirements deal with defining software resource requirements and requirements that need to be set up on a computer to provide optimal functionality of an application. These requirements or prerequisites are generally not included in the software installation package and need to be installed separately before the software is installed.

Arduino IDE:

The Arduino Software (IDE) allows you to write programs and upload them to your dining table. On the Arduino Software page you will find two options

If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor).It will allow you to bring through your sketches in the swarm, having them available from any device and backed up.You will always possess the most up-to-date version of the IDE without the need to install updates or community generated libraries.

If you would rather work offline, you should use the latest version of the desktop IDE.

XII. HARDWARE REQUIREMENTS

ARDUINO UNO R3:

The Arduino UNO is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button.It contains everything needed to keep up the microcontroller; simply connect it to a data processor with a USB cable or power it with an AC-to-DC adapter or battery to get moved.

The UNO differs from all preceding boards in that it does not use the FTDI USB-to- serial driver chip. Instead, it features an ATmega16U2 programmed as a USB-to- serial converter. This auxiliary microcontroller has its own USB bootloader, which allows advanced users to reprogram it.

The Arduino has a large support community and an encompassing circle of funding libraries and hardware add-on “shields” (e.g.You can easily get your Arduino wireless with our Wixel shield), naming it a great introductory program for embedded electronics.Note that we as well offer a SparkFun Inventor’s Kit, which includes an Arduino Union, along with an assortment of ingredients (e.g.Breadboard, sensors, jumper wires, and LEDs) that make it possible to make a routine of fun introductory projects.

Figure 1: Arduino UNO

GSM MODULE:

This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in an SMT module which can be embedded in the client applications, permitting you to benefit from small dimensions and cost- efficient solutions.Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power utilization.With a tiny configuration of 24mm x 24mm x 3 mm, SIM900A can fit almost all the space requirements in your applications, especially for slim and compact demand of design.

Figure 2:GSM SIM900A

SIM900A GENERAL SPECIFICATION:

- Dual-Band 900/ 1800 MHz
- GPRS multi-slot class 10/8
- GPRS mobile station class B

- Compliant to GSM phase 2/2+
- Class 4 (2 W @ 900 MHz)
- Class 1 (1 W @ 1800MHz)
- Dimensions: 24x24x3mm
- Weight: 3.4g
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- SIM application toolkit
- Fax: Group 3, Class 1
- Data
- GPRS class 10: max. 85.6 kbps (downlink)
- PBCCH support
- Coding schemes CS 1, 2, 3, 4
- Compatibility: AT cellular command interface

IR SENSORS:

IR detectors are little microchips with a magic eye that are tuned to listen to infrared illumination.They are nearly constantly utilized for remote control detection - every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR illumination is not visible to the human eye, which means it requires a little more work to test a setup.

FEATURES:

- Input Power: 3.3V or 5VDC.
- 3 pin interface which are OUT, GND and VCC:
  - OUT is digital output pin from sensor module, please connect to any digital input on your microcontroller. Will output logic LOW when object is detection.
  - GND is where you connect to your controller ground, or 0V.
  - VCC is the +ve supply, connect to either +3.3V or +5V.
- Two LED indicators, one (Red) as power indicator, another(green) as object detection indicator.
- Obstacle detection range: 2cm to 10cm
- Adjustable sensitivity with on board potentiometer, this translate to adjustable detection range.
- Detection angle: 35 degree
- Small size makes it easy to assembly.
- Single bit output.
- Compatible with all types of microcontrollers.
- Dimension: 3.1cm x 1.5cm

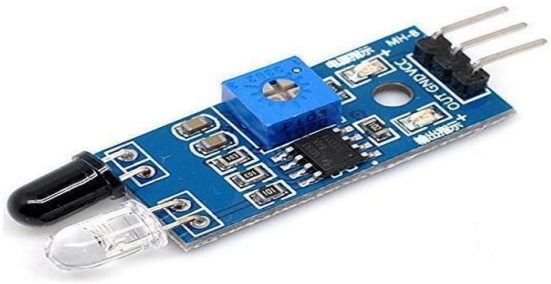


Figure 3:IR SENSOR

XIII. RESULTS AND DISCUSSION

The results of the system is as shown below

Hardware Part

Figure 4:The model for proposed system

Procedure:

Step-1: Get an arduino uno board and USB cable

Step-2:Download the arduino Software environment

The open-source *Arduino Software* (*IDE*) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source *software*. This *software* can be used with any *Arduino* board.

Step-3:Connect the board

Arduino uno board automatically draw powerFrom either the USB connection to the computer or external powe supply.
You'll need to make sure that the board is configured to draw power from the USBconnection.

Step-4 Verify &Upload the code

First when we write the we have verify the code and check wheather he code having any error are not.if the code is correct then you need to upload the code.

Step-5 Output

Click on the monitor button to see the output on the monitor.It will check continuously .

XIV. CONCLUSION

The sensing elements are successfully interfaced with Arduino UNO and wireless communication is accomplished.
All observations and experiment tests prove that this project is a complete answer to the field activities bin problems. Implementation of such a scheme in the field can definitely serve to improve the monitoring of the bin level.

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