



Design and Development of Intelligent System for Waste Collection and Handling I-SWaCH

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ABSTRACT

Around the globe, more and more litter is being thrown away carelessly or dumped illegally in streets, in public spaces or in nature. Littering and the wrong waste disposal respectively affect adversely the public order, lead to higher costs for the cleaning teams and to a diminished quality of life for society. This project has been conceptualized to tackle situation against littering and the incorrect waste disposal. This innovative idea allows city authorities to tackle the problem more efficiently by the use of technology.

I. INTRODUCTION

An intelligent garbage collector and management system. Few sensors make the bin Interactive, Attractive, Intelligent and Efficient. Infrared sensor is used to detect a human presence in surrounding and to activate the garbage bin by flip open its flap for a small duration of time. A pressing mechanism ensures optimum usage of the garbage bin. Every time the bin detects new garbage put into it, it activates the pressing mechanism. Two electronic switches are employed for start and stop operation of pressing mechanism. The time period of the mechanism is calculated from start to stop every time it is activated which gives indication of the amount of garbage in the bin. It also has a GSM Modem installed in the waste containers that then send data to the concerning Authority. The Authorities can then calculate optimized collection schedules and routes based on the data sent by the GSM module in each container. Essentially, you always empty the waste containers exactly when needed, never wasting

money on nearly empty containers. This is a small step toward Swach Bharat and Smart city Initiatives.

II. PART DESCRIPTION

IR SENSOR : An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received. In this project two IR sensors are used one for detecting human presence and another for detecting

garbage being dumped into the bin and activating pressing mechanism.

GARBAGE BIN: In this project an closed bin is designed to provide hygienic surrounding environment. A small opening with flap is provided to put garbage inside the bin. A IR sensor is built and placed around the opening to detect garbage being dumped in the bin and activate the inbuilt pressing mechanism. The design of pressing mechanism consist of a rigid wooden board with gears and DC motor for its up and down movement and electronic switch placed at the bottom of it. The IR sensor at the opening of the bin provides necessary trigger signal to the microcontroller which starts the downward motion of pressing mechanism until all the garbage is compressed to the maximum. At this point the electronic switch beneath the pressing mechanism is on and triggers upward motion of the pressing mechanism up to the start point.

EMBEDDED SYSTEM : An Embedded System is a combination of piece of microcontroller based hardware and typical software to undertake specific task. Embedded systems uses microcontroller to perform its own task. Embedded system prefers microcontroller as it contains RAM, EPROM, OSCILATORS, TIMERS, COUNTERS are in built in microcontroller chip. So microcontroller reduces cost of product and space that gives more advantage in Embedded World..One of the most critical needs of an embedded system is to decrease the power consumption and space. This can be achieved by integrating more functions into the CPU chip. In this project an 8 bit Atmega microcontroller is used, which is triggered by the IR sensor. The microcontroller in trun activates the DC motor to start the downward motion of the pressing mechanism while the electronic switch beneath the pressing mechansim is used to trigger microcontroller and therefore the DC motor for upward movement of the mechanism. The microcotroller is programmed to

monitor the time elapsed from start to stop of the mechanism movement every time it is initiated and compares with a predefined value which indicated that the bin is full. At this point the microcontroller closes the flap at the opening of the bin temporarily untill the bin is cleared , displays message on the LCD display that the bin is full and initiate communication with concerning authority through GSM module.

GSM MODULE : A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

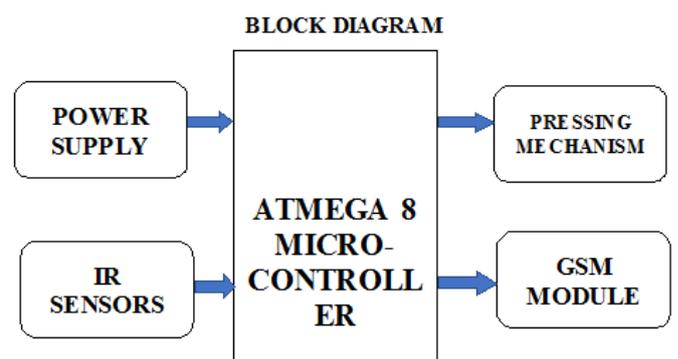


Figure 1

WORKING: The circuit consist of an individual with two infrared detector. One of this sensor senses human presence nearby and open up the flap of the garbage bin making it interactive with the user , the

other sensor is used to detect weather the waste has been delivered, after a time delay of 5 second the flap gets closed . the microcontroller Atmega 8 is programmed to start the Pressing mechanism for optimum use of dust bin space .Two switches at both ends of the pressing mechanism is employed to detect time dealy between start and stop of pressing mechanism, an counter counts the elapsed time and compare with the predefined value to check whether the dust bin is full and then in that case triggers the GSM module which in turn sends message containing dust bin ID and Address to the concerning authority indicating that it is full.

ADVANTAGES :

- User friendly interactive Garbage bin
- Complete utilization of space inside the dustbin by using pressing mechanism
- Closed bin with automated opening and closing mechanism
- Smart communication system between I-SWaCH and concerning authority.

III. CONCLUSION

This small idea ensures that there is proper cleanliness, no overflowing garbage, no foul smell ,optimum usage of the bin and very good management with the concerning authority.

IV. REFERENCES

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