



Design and Fabrication of Smart Bin

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Abstract:

The idea is simple and is driven by the fact that dustbins require very frequent cleaning, which is not always possible. This leads to unhealthy environment and spread of diseases. The aim is to accommodate more and get the dustbin cleaned timely using alert services. In many places, the Municipal garbage bins are overflowing and they are not cleaned at proper time. As a result of which the consequences are severe. It includes overflow of garbage which results in land pollution, spread of diseases, also it creates unhygienic conditions for people, and ugliness to that place. The term waste management usually relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into final products, the consumption of final products, or other human activities, including municipal, agricultural, and social like health care etc. There needs to be system that gives prior information of the filling of the bin that alerts the municipality so that they can clean the bin on time and safeguard the environment. To avoid all such situations we intend to propose a solution for this problem Smart Garbage Bin, which will inform the authorized person when the garbage bin is about to fill and will send the message. Keywords: - Global System for Mobile; Microcontroller; Ultrasonic sensor; Smart Bin

I. INTRODUCTION-

As the world is in a stage of up gradation, there is one problem. We have to deal with the garbage. In our daily life, we see the pictures of overflowed garbage bins and the excess garbage spills out. This leads to a number of diseases as large number of insects and mosquitoes breed on it. A big challenge in the urban cities is solid waste management. Hence, such a system has to be build which can eradicate this problem or at least reduce it to the minimum level. Also today main issue for pollution is Garbage Overflow. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness. To avoid all such situations, we are going to implement a project called Self navigated Smart dustbin. Here we using an Ultrasonic Sensor is used for detecting whether the trash can is filled with garbage or not. Here Ultrasonic Sensor is installed at the top of Trash Can and will measure the distance of garbage from the top of Trash can and we can set a threshold value according to the size of trash can. If the distance will be less than this threshold value, means that the Trash can is full of garbage and we will print the message "Basket is Full" on the webpage and if the distance will be more than this threshold value, then we will print the message "Basket is Empty". Here we have set the Threshold value of 5cm in the Program code. After the threshold reaches the dustbin will self-navigated to the disposal point by itself and after disposal it will return back to the source point. This project will be have few update that will be unbeatable one.

II. SYSTEM DESCRIPTION

Frame

The framework of an artificial object, which supports the object in its construction and use. An example of a chassis is a vehicle frame, the underpart of a motor vehicle, on which the body is mounted the whole frame was a arc welded mild steel and power coated.

Microcontroller PIC- PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology,

derived from the PIC1650 originally developed by General Instrument Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller,[4]then it was corrected as Programmable Intelligent

Computer.^[5] The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The manufacturer supplies computer software for development known as MPLAB X, assemblers and C/C++ compilers, and programmer/debugger hardware under the MPLAB and PICK it series. Third party and some open-source tools are also available. Some parts have in-circuit programming capability; low-cost development programmers are available as well as high-production programmers. PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, Extensive collection of application notes availability of low cost or free development tools, serial programming, and re-programmable Flash-memory capability.

DC Motor_A DC motor is any motor inside a category of electrical machines whereby electricity electric power is reborn into mechanical power. Most often, this kind of motor depends

on forces that magnetic fields turn out. despite the kind, Fig 3.3 shows the double-gear DC motors, that have some quite internal mechanism, that is electronic or mechanical device. In each cases, the direction of current flow partly of the motor is modified sporadically. The speed of a DC motor is controlled employing a variable provide voltage or by dynamic the strength of the present inside its field windings. whereas smaller DC motors are ordinarily utilized in the creating of appliances, tools, toys, and automobile mechanisms, like car seats, larger DC motors are utilized in hoists, elevators, and electrical vehicles. A 12v DC motor is tiny and cheap, nevertheless powerful enough to be used for several applications. during this project we tend to used the 100rpm brushed gear motor to supply the high force that makes the conveyor to hold the specified weight.

Gas sensor

This gas sensor is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.



Figure.1.Gas sensor

Gas sensor can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting. MQ-7 Semiconductor Sensor for Carbon Monoxide Profile Sensitive material of MQ-7 gas sensor is SnO₂, which with lower conductivity in clean air. It makes detection by method of cycle high and low temperature, and detect CO at low temperature (heated by 1.5V). The sensor's conductivity gets higher along with the CO gas concentration rising. At high temperature (heated by 5.0V), it cleans the other gases adsorbed at low temperature. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit.

Ultrasonic Sensor-As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Fig 3.4 shows the ultrasonic sensors to measure the distance to the target by measuring the time between the emission and reception. An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic

waves alternately. This enables miniaturization of the sensor head. Fig 3.5 shows the diagram of ultrasonic sensor.



Figure.2. Ultrasonic Sensor

Rain sensor- A rain sensor or rain switch is a switching device activated by rainfall. There are two main applications for rain sensors. The first is a water conservation device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall. The second is a device used to protect the interior of an automobile from rain and to support the automatic mode of windscreen wipers. An additional application in professional satellite communications antennas is to trigger a rain blower on the aperture of the antenna feed, to remove water droplets from the mylar cover that keeps pressurized and dry air inside the wave-guides.

DC MOTOR:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.



Figure.3. DC MOTOR:

The DC motors were the first form of motor widely used, as they could be power from existing direct-current lighting power distribution system. A DC motor's speed can be control either over a wide range, using a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight-brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

MOTOR DRIVE:

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that features high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers. It can be act as switches. The ULN2003 series input resistors selected for operation directly with 5V TTL or CMOS. These devices will handle numerous interface needs particularly those beyond the capabilities of standard logic buffers. The ULN2003 have series input resistors for operation directly from 6 V to 15 VCMOS or PMOS logic outputs. The ULN 2003 is the standard Darlington arrays. The outputs are capable of sinking 500mA and will withstand at least 50 V in the OFF state. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability.

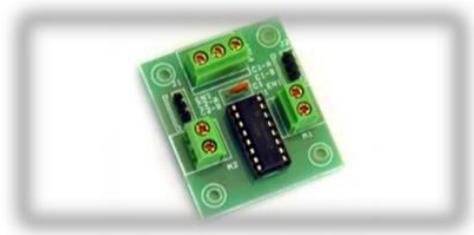


Figure.4. Motor drive:

All devices are pinned as shown in figure 4.5 with outputs opposite inputs to facilitate ease of circuit board layout. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers. It can be act as switches. The ULN2003 series input resistors selected for operation directly with 5V TTL or CMOS. These devices will handle numerous interface needs particularly those beyond the capabilities of standard logic buffers. The outputs are capable of sinking 500mA and will withstand at least 50 V in the OFF state. The collector-current rating of a single Darlington pair is 500mA.

LCD (Liquid Crystal Display):

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

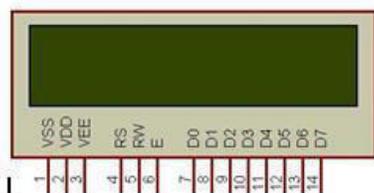


Figure.5. LCD (Liquid Crystal Display):

LCDs are used in a wide range of applications including computer monitors, Televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as DVD players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence. The LCD screen is more energy efficient and can be disposed of more safely than a CRT. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. They are common in consumer devices such as DVD players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, susceptible to image persistence.

2D Design

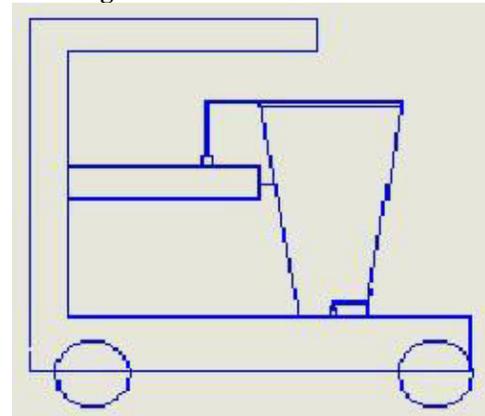


Figure.6. Front view

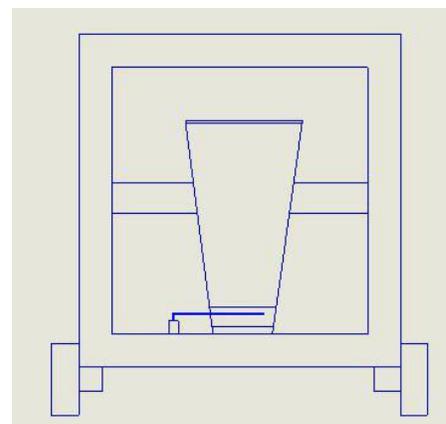
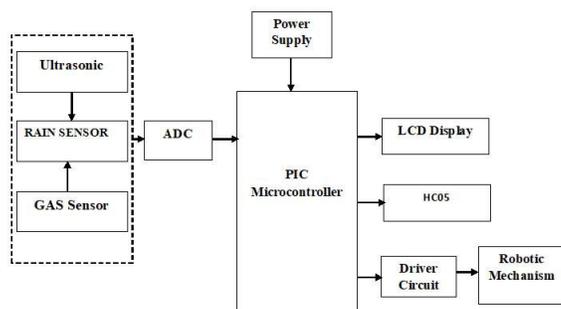


Figure.7. Side view

WORKING: This is project is to keep city clean and automatically indicate the dust pin is full a message is send to the authorized person. Ultrasonic sensor get detect the trash in the

dust pin. Once the dust pin is get filled automatically the door will closed. Automatically the trash will get unloaded in the midden. Then comes to the original position To achieve this process we have designed a project that block diagram is shown in figure below,



how the devices used in this project and also the way of communication between themselves. In this diagram we can see that PIC controller is used to control the all devices. In this project we used ultrasonic sensor, Rain sensor and gas sensor to automate the bin to make sure keep city clean. When the trash gets fill ultrasonic sensor get sense and send the command to the controller. Controller activate the motor allow the bin moves to the destination for unloading. When the bin moves to the destination the motor get open the door, and get unloading the bin. After unloading the motor get activated and goes to the original place. Rain sensor indicate the rain to the controller and get the bin to close. The gas sensor will indicate the gas, send the signal to the controller, and indicate to the person by application as smart bin. This the Bluetooth device connected to the mobile application and inform all the details to the authorized person. LCD display, display the condition results.

III. RESULT

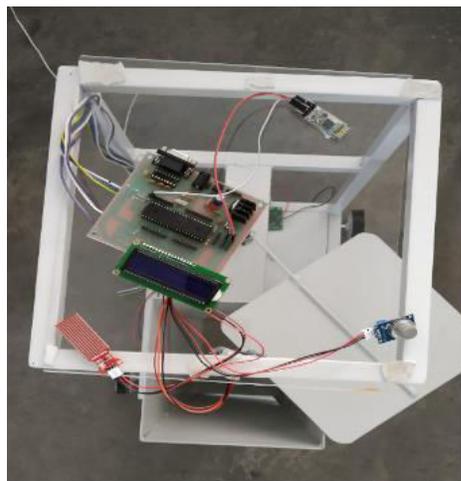
In this design, we used sensors to control the distance and direction of user movement and location. Ultrasonic sensor used to detect the waste. The rain sensor used to sense the rain. Gas sensor used to detect the gas inside the bin. Bluetooth module is used to connect with the application and send the message to the concern person.

IV. CONCLUSION

This project work is the implementation of smart garbage management system using sensors, Microcontroller and BLUETOOTH module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. And also if any gas were detected it will indicates alert to the authorized person

V. FUTURE WORK

The ongoing and future work is concentrated on improvement sensors, which are used to improve the sensitivity and transmitting speed. IOT module should be developed with android app efficiently, which contains the sensor values in it. IOT is emerging market field in the future. Additional features such as filtering the harmful air inside the industrial environment and leaving it to the outer environment. These data should be uploaded on the internet.



VI. REFERENCES

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