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Smart dust bin – a swachh bharat initiative

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***ABSTRACT* -- Swachh Bharat Mission is a campaign in India that aims to clean up the streets, roads and infrastructure of cities, smaller towns, and rural areas. Waste management is one of the primary problem that the world faces irrespective of the case of developed or developing country. The key issue in the waste management is that the waste were thrown in public places and its not collected in garbage in proper manner . It in turn leads to various hazards such as bad odor & ugliness to that place which may be the root cause for spread of various diseases .To avoid all such hazardous scenario and maintain public cleanliness and health this work is mounted on a smart garbage system.**

Key word : waste management, plastic waste, microcontroller, relay.

I.INTRODUCTION

The NIRMAL BHARAT ABHIYAN has been restructured into the SWACHH BHARAT MISSION (GRAMIN). The mission aims to make India an open defecation free country in Five Years. It seeks to improve the levels of cleanliness in rural areas through Solid and Liquid Waste Management activities and making Gram PANCHAYAT Open Defecation Free (ODF), clean and sanitized. Technology will be used on a large scale to convert waste into wealth in rural India in the forms of bio-fertilizer and different forms of energy. More than 15,000 tons of plastic waste is generated in India everyday, of which 6,000 tons remain uncollected and littered, the government today said. As per a report of a Task Force constituted by erstwhile Planning Commission in 2014, 62 million tons of municipal solid waste is generated annually in urban areas, he said. However, as per the CPCB report in 2014-15, 51.4 million tons of solid waste is generated in the country, of which 91 per cent was collected, and 27 per cent was treated and remaining 73 per cent disposed of at dump sites."Central Pollution Control Board has estimated the generation of 15,342 tons of plastic waste in the country, out of which, 9,205 tons were reported to be recycled and leaving 6,137 tons uncollected and littered".

II. OBJECTIVES

Waste collection and disposal is a complex process that requires the use of money and elaborate management of logistics. This paper will elaborate the structural design working and overall hierarchical description of the system. In this system, without making much of the alterations to the traditional garbage vehicle the proposed system could be used to collect the garbage using garbage collector machine and according to garbage the money will be credited to the user.The design is based on deep simulation with image processing and trialing at day to day basis. The core of the proposed design lie depth estimation through a 3D model construction of captured image in using open source system. A tabulation of simulation data with field test experiments verify that design system works energy efficiently and in an orderly manner.

III. BLOCK DIAGRAM

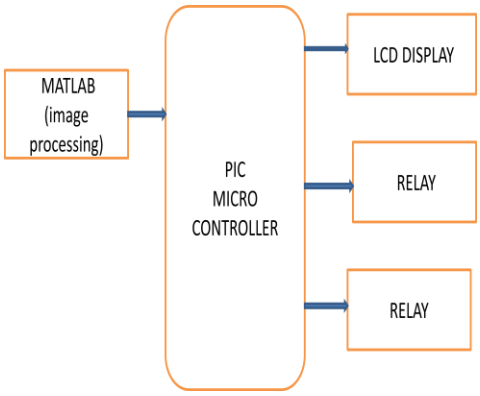

Figure 1.ATM-dustbin Block diagram

IV.CIRCUIT DIAGRAM

In this project, embedded based garbage collector machine with image processing is proposed.Based on the garbage collect, amount will be dispatched to the users. For example Rs. 3 and Rs.1 will dispatched to users for water bottles and plastic covers respectively. In this progress of work completion at the stage receiving the coin for the particular plastic material.

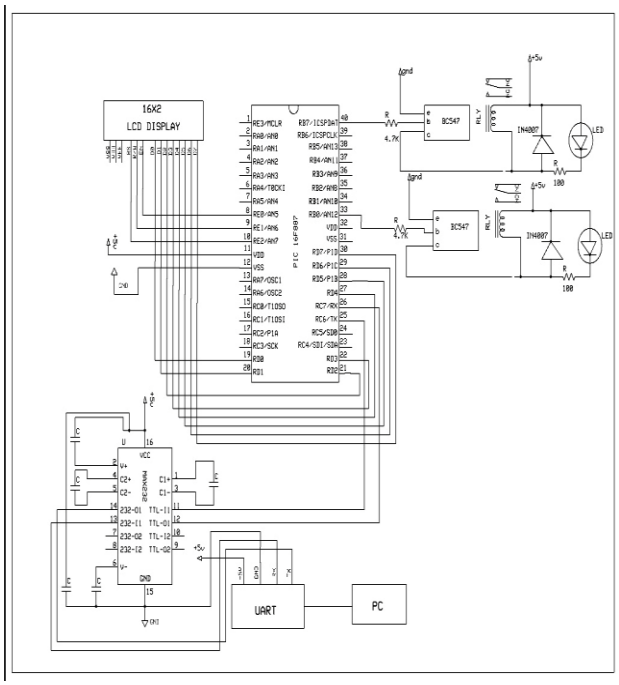

Figure 2.Circuit diagram

In this circuit the PIC 16F887 were connected with UART, BC547 and relay .The UART is connected between the pc and the PIC microcontroller which transfer the bits one by one continuously in serial communication. When the motor runs , the relay is open for some particular delay given .By using MATLAB the material can be graphically identify the material and the relay which is used for different coins to collect.

V. PIC16F887BASICFEATURES

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

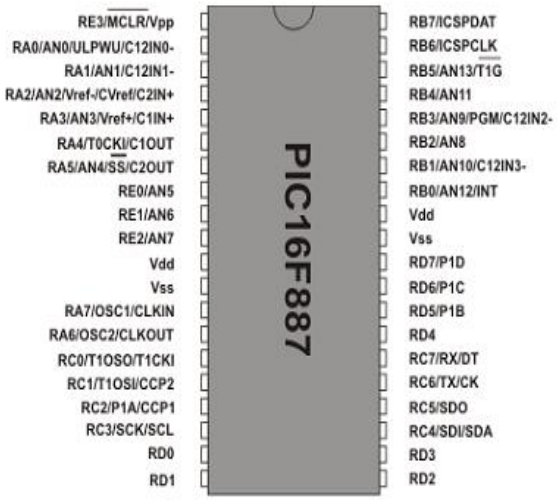

Figure 3.PIC Microcontroller.

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.

This powerful yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into 40- or 44-pin package. The PIC16F887 features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 14 channels of 10-bit Analog-to-Digital (A/D)

converter, 1 capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and an Enhanced Universal Asynchronous Receiver Transmitter (EUSART).

All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances or consumer applications. PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller. The first parts of the family were available in 1976; by 2013 the company has shipped more than twelve billion individual parts, used in a wide variety of embedded systems.

It has only 35 instructions to learn. It has Operating frequency 0-20 MHz .It Precision internal oscillator. The Software selectable frequency range of 8MHz to 31KHz.It Power supply voltage 2.0-5.5V.The Consumption: 220uA (2.0V, 4MHz), 11uA (2.0 V, 32 KHz) 50nA (stand-by mode).It 35 input/output pins. High current source /sink for direct LED drive. The 8K ROM memory in FLASH technology.256 bytes EEPROM memory, 14-channels.The fixed voltage reference (0.6V).

VI . LIQUID CRYSTAL DISPLAY

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, 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. LCDs are used in a wide range of applicati*ons* including *LCD* televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens1 are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smart phones.

LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television sets. Since LCD screens do not use phosphors, they do not suffer image burn-in when a static image is displayed on a screen for a long time (e.g., the table frame for an aircraft schedule on an indoor sign). LCDs are, however, susceptible to image persistence. The LCD screen is more energy-efficient and can be disposed of more safely

than a CRT can. Its low electrical power consumption enables it to be used in battery-powered electronic equipment more efficiently than CRTs can be. By 2008, annual sales of televisions with LCD screens exceeded sales of CRT units worldwide, and the CRT became obsolete for most purposes.

A.RESOLUTION:

The resolution of an LCD is expressed by the number of columns and rows of pixels (e.g., 1024×768). Each pixel is usually composed 3 sub-pixels, a red, a green, and a blue one. This had been one of the few features of LCD performance that remained uniform among different designs. However, there are newer designs that share sub-pixels among pixels which attempt to efficiently increase the perceived resolution of a display without increasing the actual resolution, to mixed results.

B. COLOUR PERFORMANCE:

There are multiple terms to describe different aspects of color performance of a display. Color gamut is the range of colors that can be displayed, and color depth, which is the fineness with which the color range is divided. Color gamut is a relatively straight forward feature, but it is rarely discussed in marketing materials except at the professional level. Having a color range that exceeds the content being shown on the screen has no benefits, so displays are only made to perform within or below the range of a certain specification. There are additional aspects to LCD color and color management, such as white point and gamma correction, which describe what color white is and how the other colors are displayed relative to white.

C. BRIGHTNESS AND CONTRAST RATIO:

Contrast ratio is the ratio of the brightness of a full-on pixel to a full-off pixel. The LCD itself is only a light valve and does not generate light; the light comes from a backlight that is either fluorescent or a set of LEDs. Brightness is usually stated as the maximum light output of the LCD, which can vary greatly based on the transparency of the LCD and the brightness of the backlight. In general, brighter is better, but there is always a trade-off between brightness and power consumption.

VII. BC547 TRANSISTOR:

BC547 is a NPN transistor hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. BC547 has a gain value of 110 to 800 this value determines the amplification capacity of the transistor.

The maximum amount of current that could flow through the Collector pin is 100mA, hence we cannot connect loads that consume more than 100mA using this transistor. To bias a transistor we have to supply current to base pin, this current (I_B) should be limited to 5mA.It is a Bi-Polar NPN Transistor. It has DC Current Gain (H_{FE}) is 800 maximum. It has Continuous Collector current (I_C) is 100mA.Emitter Base Voltage (V_{BE}) is 6V and Base Current (I_B) is 5mA maximum.When this transistor is fully biased then it can allow a maximum of 100mA to flow across the collector and emitter. This stage is called **Saturation Region** and the typical voltage allowed across the Collector-Emitter (V_{CE}) or Base-Emitter (V_{BE}) could be 200 and 900 mV respectively. When base current is removed the transistor becomes fully off, this stage is called as the **Cut-off Region** and the Base Emitter voltage could be around 660 mV.

VIII. IN4007 DIODE:

A diode is a device which allows current flow through only one direction. That is the current should always flow from the Anode to cathode. For **1N4007 Diode**, the maximum current carrying capacity is 1A it withstand peaks up to 30A. Hence we can use this in circuits that are designed for less than 1A. The reverse current is 5uA which is negligible. The power dissipation of this diode is 3W.The features are Average forward current is 1A.The Non-repetitive Peak Current is 30A.The Reverse current is 5uA.The Peak repetitive Reverse voltage is 1000V.The Power dissipation 3W

IX. UART ASYNCHRONOUS RECEVIER TRANSMITTER:

In UART communication, two UARTs communicate directly with each other. The transmitting UART converts parallel data from a controlling device like a CPU into serial form, transmits it in serial to the receiving UART, which then converts the serial data back into parallel data for the receiving device. Only two wires are needed to transmit data between two UARTs. Data flows from the Transmitter pin of the transmitting UART to the Rx pin of the receiving UART.UARTs transmit data *asynchronously*, which means there is no clock signal to synchronize the output of bits from the transmitting UART to the sampling of bits by the receiving UART. Instead of a clock signal, the transmitting UART adds start and stop bits to the data packet being transferred. These bits define the beginning and end of the data packet so the receiving UART knows when to start reading the bits.

When the receiving UART detects a start bit, it starts to read the incoming bits at a specific frequency known as the *baud rate*. Baud rate is a measure of the speed of data transfer, expressed in bits per second (bps). Both UARTs must operate at about the same baud rate. The baud rate between the transmitting and receiving UARTs can only differ by about 10% before the timing of bits gets too far off.

The UART that is going to transmit data receives the data from a data bus. The data bus is used to send data to the UART by another device like a CPU, memory, or microcontroller. Data is transferred from the data bus to the transmitting UART in parallel form. After the transmitting UART gets the parallel data from the data bus, it adds a start bit, a parity bit, and a stop bit, creating the data packet. Next, the data packet is output serially, bit by bit at the Transmitter pin. The receiving UART reads the data packet bit by bit at its Rx pin. The receiving UART then converts the data back into parallel form and removes the start bit, parity bit, and stop bits. Finally, the receiving UART transfers the data packet in parallel to the data bus on the receiving end.

UART transmitted data is organized into *packets*. Each packet contains 1 start bit, 5 to 9 data bits (depending on the UART), an optional *parity* bit, and 1 or 2 stop bits:

A. START BIT:

The UART data transmission line is normally held at a high voltage level when it's not transmitting data. To start the transfer of data, the transmitting

UART pulls the transmission line from high to low for one clock cycle. When the receiving UART detects the high to low voltage transition, it begins reading the bits in the data frame at the frequency of the baud rate.

B. DATA FRAME:

The data frame contains the actual data being transferred. It can be 5 bits up to 8 bits long if a parity bit is used. If no parity bit is used, the data frame can be 9 bits long. In most cases, the data is sent with the least significant bit first.

C. PARITY:

Parity describes the evenness or oddness of a number. The parity bit is a way for the receiving UART to tell if any data has changed during transmission. Bits can be changed by electromagnetic radiation, mismatched baud rates, or long distance data transfers.

After the receiving UART reads the data frame, it counts the number of bits with a value of 1 and checks if the total is an even or odd number. If the parity bit is a 0 (even parity), the 1 bits in the data frame should total to an even number. If the parity bit is a 1 (odd parity), the 1 bits in the data frame should total to an odd number.

When the parity bit matches the data, the UART knows that the transmission was free of errors. But if the parity bit is a 0, and the total is odd; or the parity bit is a 1, and the total is even, the UART knows that bits in the data frame have changed.

D. STOP BITS:

To signal the end of the data packet, the sending UART drives the data transmission line from a low voltage to a high voltage for at least two bit duration.

X. IC MAX232

IC MAX232 is used for TTL/CMOS to RS232 conversion. Meaning most of our Microcontrollers (PIC/ARM/Atmel) operates on TTL/CMOS logic that is it communicates through either 0V or +5V, but our computers work with the help of RS232 which operates at logic level -24V or +24V. So, if we have to interface these microcontrollers with Computer we need to convert the TTL/CMOS logic to RS232 logic. Hence if you are looking for an IC to perform this conversion and interface a Microcontroller with your computer then MAX232 IC is the right one .

XI. RESULT AND DISCUSSIION

This method is used to making an awareness about the usage of plastic material .This can be create a India from an pollution, free from polluted land and from hazardous diseases. This method is mainly applied in SWACHH BARATH mission which makes India clean. And it can also updates in various process for future development. The waste is collected from various location and recycle them for making an plastic roads .

XII .CONCLUSION

The waste collecting using SMART Dustbin is achieved by implementing various features and classifying the smart collection of waste in the reference database.The project is build with the method of avoiding usage of plastic material and the collected waste is recycle them for making an plastic roads.The main objective of this project is to clean the city easily by paying amount for the garbage collection and it should be more encouraging process.

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