

Smart Dustbin- “An Intelligent Approach to Fulfill Swatchh Bharat Mission”

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Abstract:-- It becomes Essential to support clean India Movement as an Indian Citizen. This research paper gives an idea of Smart dustbin. It is an intelligent device equipped with RFID, LCD, Ultrasonic sensor, servo motor and microcontroller. It senses the person’s presence and accepts the RFID input from the user. It also displays the name of the person on serial LCD, situated at the front side of the dustbin. Once the identity of the person is detected, servo motor opens the door of the dustbin until person leaves that place. Presence of the person is detected by ultrasonic sensor. After completion of the entire process, GSM attached inside the dustbin sends the payback points to the user. User can redeem the points using android application called “DUSTBIN”. If dustbin is full of garbage then dustbin will turn on the red led attached with it and sends a message to the control room. In a nut shell this dustbin helps clean India movement.

Keywords: - Arduino UNO, Serial LCD, SIM 300, Servo Motor, SMPS, RFID

I. INTRODUCTION

Today, there are various urban areas developing all around the globe, with this development of urban areas, the population density of the area is also increasing. Thus, with the increase in population, the chances of unhygienic environment increases as there is an increase in amount of garbage and many waste products. The problem with the current society, mainly in India is that most of the people have less sense of responsibility, and many of the people in our society lay around the waste in our surroundings [6]. To overcome this kind of situations, this project is designed, which mainly aims the hygienic condition and cleanliness of any particular society [5]. People or any individual will be rewarded with the cash balance for throwing the garbage or any kind of waste in the dustbin.

The Project mainly focuses on Open source microcontroller, Wireless communication, Sensors, Motors and Drives, Serial communication, Serial Peripheral interface and many more [1]. The dustbin comprises of Arduino UNO, SIM 900 GSM modules, Ultrasonic Sensor, Serial LCD, Servo Motor, RFID and a Solar Panel [2]. Ultrasonic sensor gives digital input in form of square wave to the controller [3]. RFID uses SPI communication technology, SIM 900 GSM modules works with several serial AT commands, LCD works with serial communication and Servo motor works with Pulse width modulation waves [4].

II. BLOCK DIAGRAM

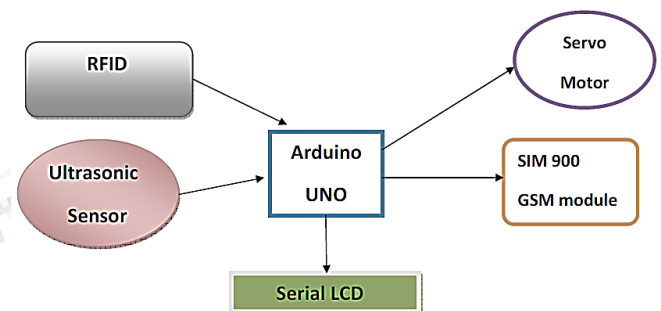


Figure 1. System Block Diagram

According to the block diagram shown in fig 1, Arduino UNO accepts signals from RFID in the form of Serial peripheral interface communication. It also accepts digital pulses from Ultrasonic sensors. Arduino prints the running process on serial LCD [7]. It also provides PWM pulses to servo motor for door opening and closing mechanism [8]. For message sending Arduino gives AT commands to the attached GSM module [9].

III. OBJECTIVES

- Interfacing RFID with Arduino UNO

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- Interfacing Serial LCD with Arduino
- Sending AT commands to GSM module
- Decision making with the use of ultrasonic sensor
- Common DC power supply designing
- Implementing SPI communication in Arduino
- Multiple Serial Port communication
- Circuit Size Reduction
- Providing PWM signals to Servo Motor

IV. METHODOLOGY

Table 1 Method used for Interfacing Various gadgets with Arduino

Sr. No.	Particulars	Method used for Interfacing
1	RFID	Serial Peripheral Interface
2	GSM SIM 900	Serial At Commands
3	Servo Motor	Pulse Width Modulation
4	Ultrasonic Sensor	Digital Trans Receiver
5	Serial LCD	Software Serial Communication

Table 1 gives the complete idea about the methodology used for interfacing various gadgets with Arduino UNO. As discussed earlier there are major five components used in this system, RFID, GSM SIM 300, Servo motor, Ultrasonic sensor and Serial LCD. It is to be noted that, there are other methods also available for the interfacing. But here most efficient and easiest methods are shown.

V. SOFTWARE AND HARDWARE USED IN THE SYSSYEM

Table 2. Software Used in the System

Name of software	Function
Arduino IDE	The whole system is controlled using Arduino Uno Microcontroller .It is Used for programming and uploading the code the Arduino Uno board that is

	connected to the computer using a USB cable.
XCTU	It is a HyperTerminal software used to test the response coming serially from any wireless device or any microcontroller. Here is it used to check the data coming from ultrasonic Sensor and GSM module.
Proteus	It is circuit simulation software used to simulate and debug various codes and circuits without any hardware requirement.
Eagle	It is a PCB designing software used to design PCB of our project. It is used to reduce the size of circuits and mass manufacturing.

Table 3. Hardware and their Connections

Name of the Hardware	Pins of the Hardware	Arduino Pin	Nomenclature In Figure 2
RFID	MOSI	11	Not shown
	MISO	12	
	SCK	13	
	SDA	10	
	RST	9	
Serial LCD	RX	3	D
Servo Motor	PWM signal pin	4	B
Ultrasonic Sensor	ECHO pin	6	C
	TRIG pin	5	
SIM 900 GSM module	TX	0	E
	RX	1	

VI. CIRCUIT DIAGRAM OF DUSTBIN

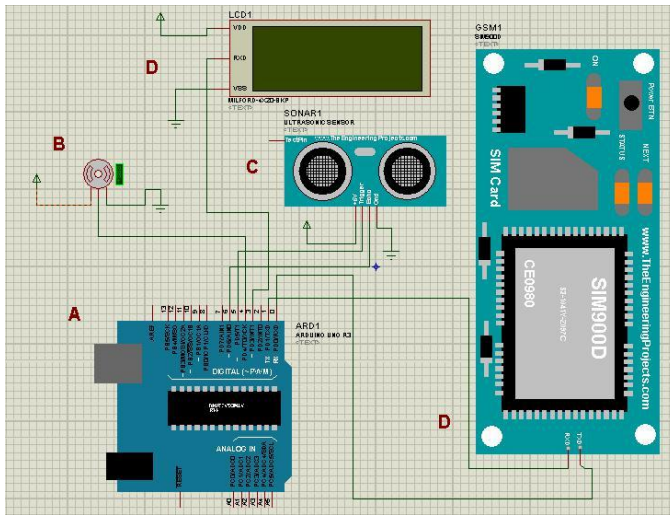


Figure 2. Circuit Diagram of Dustbin

Figure 2 shows the circuit diagram of the dustbin where A is Arduino, B is servo Moto, C is Ultrasonic Sensor, D is a Serial LCD and E is GSM SIM 900 Module. Connections and pin outs are shown in table 3.

VII. VERSION 1 AND 2 OF DUSTBIN

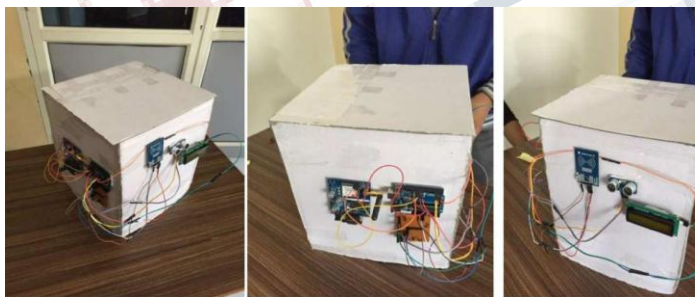


Figure 3. Version 1 of Smart Dustbin



Figure 2. Version 2 of Smart Dustbin



Figure 3 Results

Figure 1 shows the first prototype model of smart bin. Figure 2 shows the Final end product ready for the used. Figure 3 shows the results or messages received by the user. LCD also displays the name of the user.

VIII. CONCLUSION

At the end of the project, it could be concluded that the design is,

1. Cheaper
2. Components are easily available
3. Open Source technology
4. Less Power consumption
5. User Friendly
6. Battery Backup

FUTURE SCOPE

1. Solar Panel can be used
2. Virtual Server can be
3. Water Proof circuit design
4. Human Machine Interface
5. Bug Converter for Smooth power supply
6. Linking with Adhar Card

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