SOLID WASTE BIN MONITORING SYSTEM USING NI LABVIEW

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ABSTRACT

The project is designed to monitor the level of the solid waste from time to time. If the level of the solid waste is above the threshold level, a message is sent to any public or private organization with the help of GSM model. The IR sensor is placed at the tip of the dustbin to monitor the solid waste. When the level of solid waste is above the required threshold, the GSM code is activated and the message is sent to collect the solid waste as soon as possible. We use the NI myRIO kit for providing the external connections to the IR sensor and GSM. NI labView software is used as a interface for all the hardware components. In labView software, the code of the entire project is designed. By monitoring the solid waste from time to time, it can be ensured that the solid waste is always kept in check thus ensuring a clean and safe environment. Solid waste when left to accumulate over a period of time can lead to several infectious diseases. Thus by keeping the solid waste under control, we can stay away from the various infectious diseases and enjoy a clean and safe environment.
Key words: Infrared Sensors, NI myRIO 1900, GSM module, NI LabVIEW.

I. INTRODUCTION

In our daily life, we see the pictures of garbage bins being overfull and all the garbage spills out resulting in pollution .This also increases number of diseases as large number of insects and mosquitoes breed on it.

Due to population growth, industrialization, urbanization and economic growth, a trend of significant increase in Municipal Solid Waste (MSW) generation has been recorded worldwide. MSW generation, in terms of kg/capita/day, has shown a positive correlation with economic development at world scale. Due to rapid industrial growth and migration of people from villages to cities, the urban population is increasing rapidly. Waste generation has been observed to increase annually in proportion to the rise in population and urbanization. The per capita generation of MSW has also increased tremendously with improved life style and social status of the populations in urban centers. As more land is needed for the ultimate disposal of these solid wastes, issues related to disposal have become highly challenging.

II. PROJECT DESCRIPTION

For detecting the garbage, Infrared sensor (IR sensor) is used. This is a multipurpose sensor which can be used for color detection. The sensor provides a digital as well as analog output. An on board LED is used to indicate the presence of an object. This digital output can be directly connected to an Arduino, Raspberry Pi or any other microcontroller to read the sensor output.IR sensors are highly susceptible to ambient light and the IR sensor on this sensor is suitably covered to reduce effect of ambient light on the sensor. The on board potentiometer should be used to calibrate the sensor. It can detect the level of garbage. IR sensor emits the light, which is invisible to naked eye but the electronic components can detect it. Ir sensor produces both analog and digital volatge. It consist of IR transmitter and IR receiver.It produces the output a logic "1" at the digital

output when it senses the object and a logic "0" when it doesn"t senses any object. Depending on the distance between the object and sensor, sensor produces the analog output voltage between 0 and 5V.

Figure 1: IR sensor

The output of IR sensor is acquired by The National Instruments myRIO-1900. It is an input output device which is portable and reconfigurable. The NI myRIO-1900 has a ZYNQ chip. This ZYNQ chip is a combination of processor (ARM Dual core) and FPGA (Xilinx).

The myRIO-1900 is a tool you can use to implement multiple design concepts with one reconfigurable I/O (RIO) device. Featuring I/O on both sides of the device in the form of MXP and MSP connectors, it includes 10 analog inputs, six analog outputs, 40 digital I/O lines, Wi-Fi, LEDs, a push button, an onboard accelerometer, a Xilinx FPGA, and a dual core ARM Cortex-A9 processor. USB acts as a connector between the NI myRIO-1900 and host computer. It has connectors A and B that acts as an expansion port and a connector C that act as a mini-system port, they carry the signals and these signals are distinguished by different connector names. Here the mostly used connector is mini-system port connector C. This device can even connect to the wireless network and create wireless network. It has inbuilt option to connect to Wi-Fi. This Wi-Fi-enabled version allows for fast and easy integration into remote embedded applications. You can program the myRIO-1900 with LabVIEW or C.

Figure 2: NI myRIO-1900

The myRIO can be interfaced with GSM module for wireless communication. GSM modem is a unique type of wireless modem which is used to enable communication between a microcontroller (or a microprocessor) and the GSM network. It uses a SIM card and it operates similar to mobile phone with its own specific mobile number. GSM modem mainly consists of antenna for wireless communication, SIM holder, communication port, ON or OFF switches and power supply. A GSM modem is connected to the computer via serial or USB cable. The advantage of connecting is it provides mobile network to the computer to transfer and exchange information with modems. It can be used for sending sms messages.

Figure 3: GSM modem

III. FLOW CHART

The flow chart gives the idea of this project. It is shown in figure 4. The flow of this project begins with the start. IR sensor is used for sensing the level of garbage, if it reaches the threshold level then, a message is sent to the respective person to clean the bin as soon as possible via GSM. If it is not filled the process repeats as shown in figure 4.
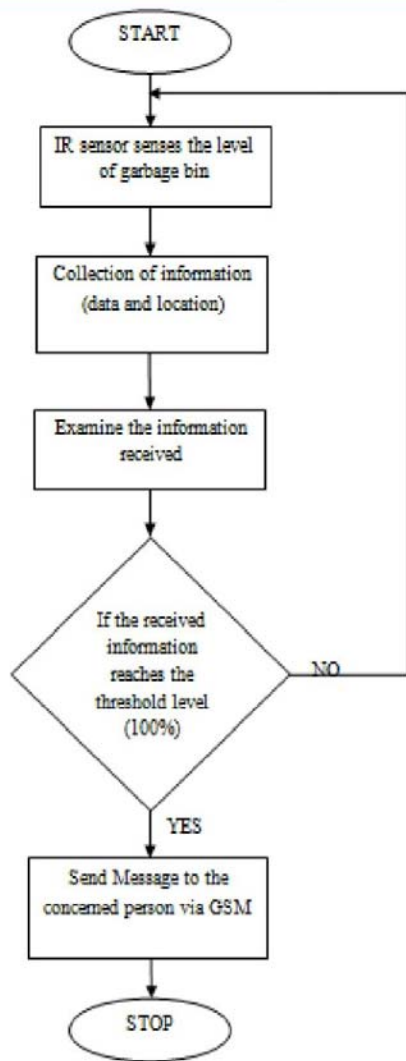

Figure 4: Flow Chart

IV. BLOCK DIAGRAM

Block diagram is shown in Figure 5. The first block in the transmitter part is the garbage bin. The IR sensor which is the level detect is used to detect and notice the level of garbage in the bin. Here to detect the different levels of wastes in the bin one to two sensors are used. The garbage level is sensed by IR sensors, the output of sensor is received by NI myRIO. When the bin gets filled, NI myRIO sends the information to the GSM modem. GUI is used to display the system status. GUI is developed using LabVIEW. GUI is displayed on the front panel of the LabVIEW. It displays the status of the garbage bin that is the level of garbage in the bin. Once the garbage bin is completely filled, the message is sent to the concerned person to clean the garbage. The message is sent with the help of GSM modem.
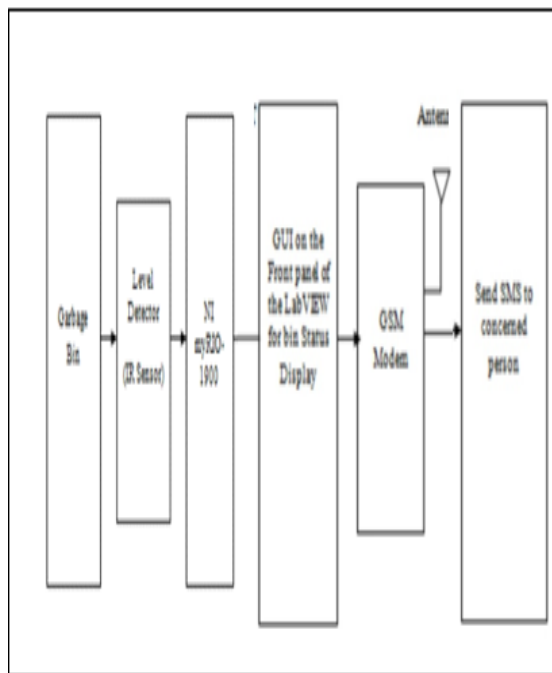

Figure 5: Block Diagram

V. RESULT

The output of IR sensor is a digital output which is generally either "1" or "0". This output is given to the case structure. The case structure has two cases, a true case and a false case. The IR sensor is placed at the tip of the dust bin. When the IR sensor senses the garbage level it gives logic "1" then it goes to true case and the SMS will be sent to the concerned authorities. If the IR sensor does not senses the garbage level, it produces a logic "0" so that it goes into the false case. In this case, no SMS will be sent and the process repeats until the level of garbage is detected by the IR sensor.
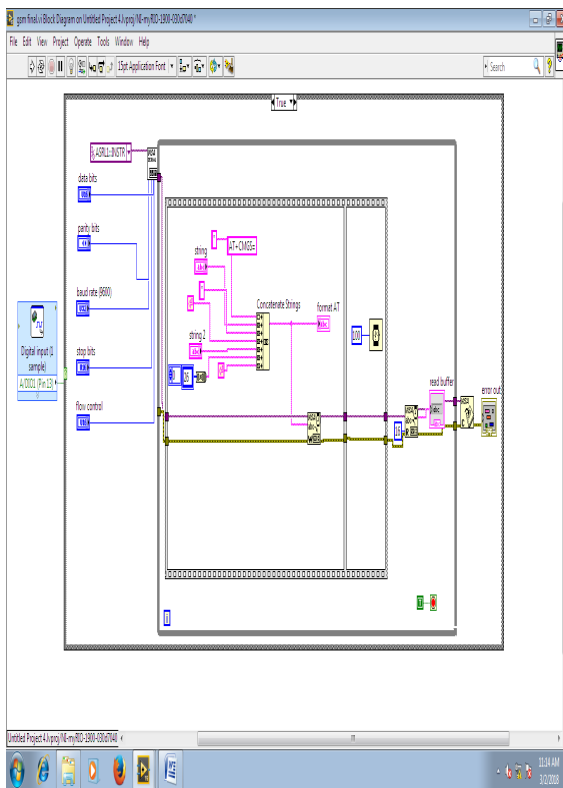
Figure 7:Block Diagram code

The SMS consists of AT command, number and the message. Here the display of AT command and the number are not required, but the message is essential.
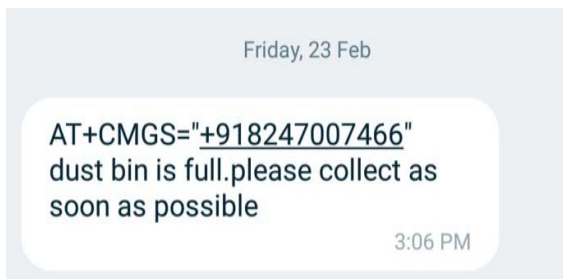

Figure 8: Message which is sent to the concerned person

Front Panel of labVIEW shows the serial communication standards such as baud rate, data bits, parity bits, stop bits, status of code and two strings. Here string1 is used for entering the mobile number and string2 is used for entering the message.
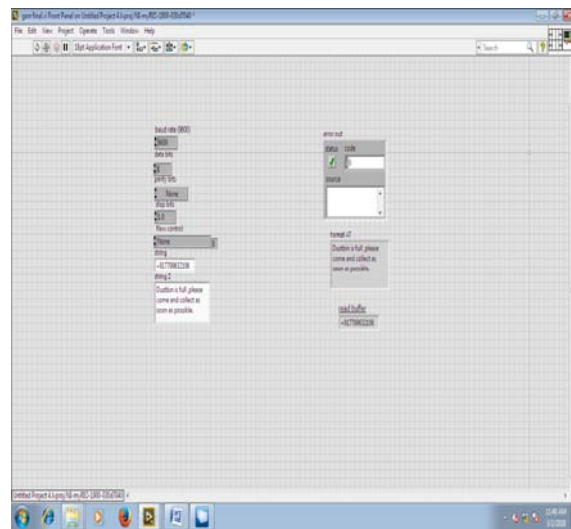

Figure 9: Front Panel view

VI. CONCLUSION

Solid waste management is very critical for a healthy and hygienic environment. By proper solid waste management, we can ensure a clean environment devoid of any harmful and infectious diseases. When the amount of solid waste generated is not monitored, it becomes difficult for proper solid waste removal. By monitoring the solid waste from time to time in different areas, we can come up with a good solution for efficient solid waste management.

VII. REFERENCES

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