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AUTOMATIC WASTE MANAGEMENT SYSTEM

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Abstract— It is a design to develop an embedded solution for detecting the level of the waste bins and to dispose the waste automatically through conveyor belts which is very suitable for crowded cities. The proposed system automatically alerts a remote central station when a bin reaches a programmable filling level, thus avoiding the need to spot check if the bin is full and ensuring that the recycling spot is kept clean. We should arrange waste baskets designed specifically at road-sides in a fixed distance gap. An IR sensor pair attached in top side of each basket. The IR sensor detects the filling level of each bin. If the bin is fill, then it sends a message to the corporation office. Each bin will have separate conveyor belts and all these conveyor belts are connected to the main conveyor belt. That main conveyor belt will carry out all the waste from the filled waste bins to the corporation office automatically. The data collected by the monitoring platform is then sent to the remote central station that processes it is a design to develop an embedded solution for detecting the level of the waste bins and to dispose the waste automatically through conveyor belts which is very suitable for crowded cities. The proposed system automatically alerts a remote central station when a bin reaches a programmable filling level, thus avoiding the need to spot check if the bin is full and ensuring that the recycling spot is kept clean. We should arrange waste baskets designed specifically at road-sides in a fixed distance gap. An IR sensor pair attached in top side of each basket. The IR sensor detects the filling level of each bin. If the bin is fill, then it sends a message to the corporation office. Each bin will have separate conveyor belts and all these conveyor belts are connected to the main conveyor belt. That main conveyor belt will carry out all the waste from the filled waste bins to the corporation office automatically. The data collected by the monitoring platform is then sent to the remote central station that processes it.

Keywords— IR sensor, GSM, L293D Motor, Conveyer Belt.

I. INTRODUCTION

Nowadays, people have become more concerned about the environment and begin to increasingly separate their waste. The waste is separated at home and later deposited in outdoor recycling bins located at a recycling spot. When recycling bins are full, collecting vehicles, owned by public or private companies, continuously collect such waste thus providing a useful Service for the population and the environment. Ideally, after bins are full, the waste should be collected in a short period of time and periodically. In reality, without a monitoring system of the recycling bins filling level, the collecting authority has difficulties in optimizing routes for the collecting vehicles. Without a monitoring system, waste collection sometimes fails, resulting in collecting an empty recycling bin, one with a very-low fill level, or even one that was full a long time ago (generally meaning that the area around the bin is full of dumped waste). This leads to a waste of time and fuel, which is reflected in losses for the managing companies, since their source of revenue comes from the amount of collected waste destined for recycling.

It is an embedded platform for monitoring the filling level of recycling bins, and to dispose the waste automatically through conveyor belts. We should arrange waste baskets designed specifically at road-sides in a fixed distance gap. The filling level of each bin is detected using IR sensor. The IR sensor pair is attached to top side of each basket. When any of the waste bins is filled it send message to the corporation office which bin is filled. Each bin will have separate conveyor belts and all these conveyor belts are connected to main conveyor belt. The main conveyor belt carries out the waste from the filled waste bins to the corporation office automatically.

II. SYSTEM ANALYSIS

In several countries waste separation and recycling is a major issue. Consequently, the number of recycling spots has been steadily increasing. In order to ensure that recycle bins are properly maintained, several monitoring solutions have been proposed. These still have several limitations, such as requiring wires for power and or communications and not being able to fit in all existing types of bins. There is a growing demand for low cost, very low power and reduced size monitoring systems with wireless communications, to be used in different kinds of industrial environments.

This is a wireless embedded solution for monitoring the level of the bins located in recycling spots. The proposed system automatically alerts when a bin reaches a filling level. The developed prototype required hardware-software co-design and aimed to meet

the above mentioned requirements. The filling level readings of each bin in a recycling spot are made using an IR sensor. Then the system sends a message to the corporation office which bin is filled. Each bin will have separate conveyor belts and all these conveyor belts are connected to main conveyor belt. That main conveyor belt will carry out all the waste from the filled waste bins to the corporation office automatically.

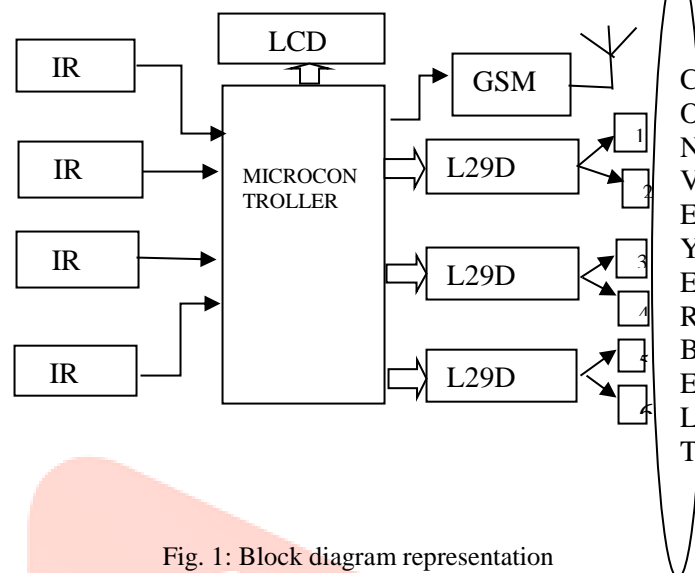


Fig. 1: Block diagram representation

It is a design to develop a system which is very suitable for crowded cities. We should arrange waste baskets designed specifically at road-sides in a fixed distance gap. The block diagram mainly consists of IR sensor, PIC16F877A microcontroller, motor driver, and conveyor belts. The IR sensor is placed on the side of the waste bin. The IR sensor detects the level of the waste bin. Here we are programming the microcontroller that it sends message to the corporation office which bin is filled. Each bin will have separate conveyor belts and all these conveyor belts are connected to main conveyor belt. The main conveyor belt carries out the waste from the filled waste bins to the corporation office automatically.

The circuit uses an IR sensor for detecting the level of the waste bin. The IR pair consists of IR transmitter and IR receiver. Here the IR transmitter is an LED and IR receiver is a photo detector. The IR sensor is placed on the side of the waste bin. Then it sends message to the corporation office that which bin is filled. Here each waste bin will have separate conveyor belts and these conveyor belts will be connected to the main conveyor belt. This main conveyor belt will carry out the waste from the filled waste bins. Here we are using two waste bins. So we need two conveyor belts and it is connected to the main conveyor belt. Each conveyor belt uses two motors and it is driven by motor drivers. Each motor driver drives two motors in either direction according to the program done in the pic microcontroller.

Servo motors re used for removing the waste from the filled waste bins. PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

III.SYSTEM DESIGN

A. Servo Motor

A servo motor is basically a DC motor (in some special cases it is AC motor) along with some other special purpose components that make a DC motor a servo. In a servo unit, you will find a small DC motor, a potentiometer, gear arrangement and an intelligent circuitry. The intelligent circuitry along with the potentiometer makes the servo to rotate according to our wishes. This is where the gear system inside a servomechanism comes into picture. The gear mechanism will take high input speed of the motor (fast) and at the output; we will get a output speed which is slower than original input speed but more practical and widely applicable. As the motor shaft progresses the potentiometer knob also rotates as it is coupled with motor shaft with help of gear arrangement.



Fig. 2: Servo Motor

As the position of the potentiometer knob changes there will be an electrical signal produced at the potentiometer port. As the angular position of the potentiometer knob progresses the output or feedback signal increases. After desired angular position of motor shaft the potentiometer knob is reaches at such position the electrical signal generated in the potentiometer becomes same as of external electrical signal given to amplifier. At this condition, there will be no output signal from the amplifier to the motor input as there is no difference between external applied signal and the signal generated at potentiometer. As the input signal to the motor is nil at that position, the motor stops rotating. This is how a simple conceptual servo motor works.

B. GSM SIM300

GSM/GPRS RS232 Modem is built with SIMCOM Make SIM900 Quad-band GSM/GPRS engine, works on frequencies 850 MHz, 900 MHz, 1800 MHz and 1900 MHz. It is very compact in size and easy

to use as plug in GSM Modem. The Modem is designed with RS232 Level converter circuitry, which allows you to directly interface PC Serial port. The baud rate can be configurable from 9600-115200 through AT command. Initially Modem is in Auto baud mode. This GSM/GPRS RS232 Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS as well as DATA transfer application in M2M interface. The modem needed only 3 wires (Tx, Rx, GND) except Power supply to interface with microcontroller/Host PC. The built in Low Dropout Linear voltage regulator allows you to connect wide range of unregulated power supply (4.2V -13V). Yes, 5 V is in between. Using this modem, you will be able to send & Read SMS, connect to internet via GPRS through simple AT commands.

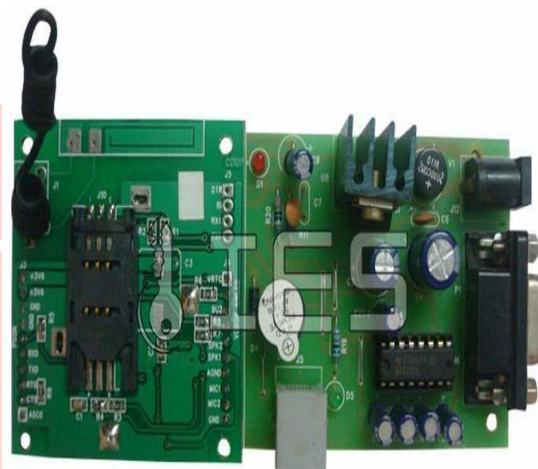


Fig. 3: GSM SIM300

C. LCD Display

Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of display of numeric and alphanumeric characters in dot matrix and segmental displays. When sufficient voltage is applied to the electrodes the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizer, which would result in activating/highlighting the desired characters. The power supply should be of +5v, with maximum allowable transients of 10mv. To achieve a better/suitable contrast for the display the voltage (VL) at pin 3 should be adjusted properly. A module should not be removed from a live circuit.

IV.CONCLUSION

In this paper, the proposed platform based on the obtained results, has behaved as expected, being a good solution for a low cost, low power and wireless monitoring system. It can be used in all the existing recycling bins in the market and it can be integrated with the existing monitoring platform. The proposed system will assure an efficient data collecting from the filling level of the recycling bins. The collected information can be used to optimize and reduce human resources, equipment used, plot optimized routes for the collecting vehicles and reduce fuel operational costs, resulting in an efficient system that can reduce costs by up to 40% and allows an investment return in just 18 months. Thus, with lower fuel consumption and lower gas emissions. The proposed system will also turn the waste collection in an environmental friendly process.

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BIOGRAPHY



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