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Controller Based Smart Society

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Abstract: Now a days, Population is increasing rapidly which creates pressures on limited natural resources and also on the facilities provided by the Government. Population causes increase in waste. We see that the garbage bins are placed in the societies is overflowing sometimes, street lights are remaining on in day time also. This overflowing garbage bins creates unhygienic condition which leads in spreading some deadly diseases & human illness and lights in society leads wastage of energy, to avoid such a situations we are planning to design this system. Street light controller wastage of electricity over the street light is may be not a serious but concerning issue. So these lights are controlled or switched on or off as day or night comes. In buildings, it is not possible to carry the gas cylinders at higher floors so they are kept in one chamber and the supply is given to each owner in the building. In this case it is very hazardous if any gas leakage occurs. So the gas detector used in the chamber gives the pre indication of fire to aware the people in the society.
Keywords: GSM Module, IR Sensor, Buzzer, LDR, PIC Controller

I. INTRODUCTION

In the present day scenario, many times we see that the garbage bins or dust bin are placed at different places in the societies are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surroundings. This leads in spreading some deadly diseases & human illness, so these bins are to be made empty before overflowing, so such situation is avoided in the system. Numbers of dustbins are provided throughout the society, these dustbins are provided with device which helps to continuously check the fill level of smart dustbins whether the dustbin are full or not, an unique ID will be provided for every dustbin in the society so that it is easy to identify which garbage bin is full [3]. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. These details can be accessed by the concern authorities from their place with the help of GSM and an immediate action can be made to clean the dustbins.

In societies, sometimes street lights remains on in day time so it wastes the energy this energy should be saved. When the street lights are controlled as per the intensity of sun light. It gives the optimum and efficient use of energy [1]. It not only saves the energy but also reduces human efforts. In the apartmental areas where the gas cylinders of all flat holders in the society are kept in the separate chamber it may cause hazard if any gas leakage occurs. So Gas / Smoke detectors installed in that chamber will give the pre indication of the leakage.

II. SYSTEM ARCHITECTURE

The below fig.1 shows the system architecture of smart society. It contains three types of sensors and LDR. Weight sensor and IR sensors are used to detect the quantity of garbage in container. Smoke detector detects leakage of gas. When controller receives signal from smoke detector, it will turn on buzzer in case smoke/gas is detected. LDR used to detect sun intensity and according to that the street light intensity is controlled by controller.
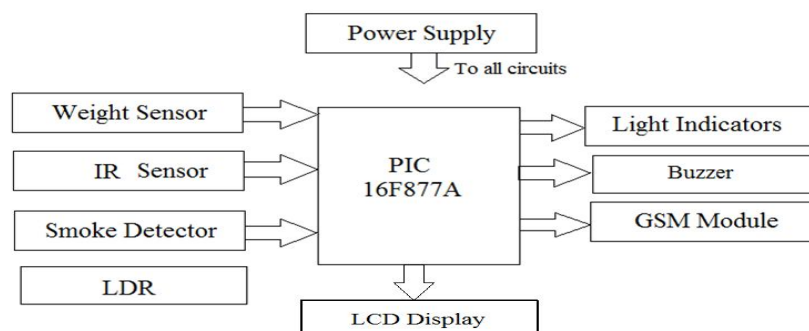

Fig.1 System architecture of Smart society

A. Weight Sensor

A load cell is a transducer that is used to convert a force into electrical signal. The most common use of this sensor is in weighing machine. Every weighing machine which shows weight has a loadcell as sensing element. This conversion is indirect and happens in two stages. Through a mechanical arrangement, the force being sensed deforms a strain gauge. The strain gauge measures the deformation (strain) as an electrical signal, because the strain changes the effective electrical resistance of the wire. A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cells of one strain gauge (quarter bridge) or two strain gauges (half bridge) are also available. The electrical signal output is typically in the order of a few millivolts and requires amplification by an instrumentation amplifier before it can be used. The output of the transducer is plugged into an algorithm to calculate the force applied to the transducer. Load cells are used in several types of measuring instruments such as weighing scales, universal testing machines.
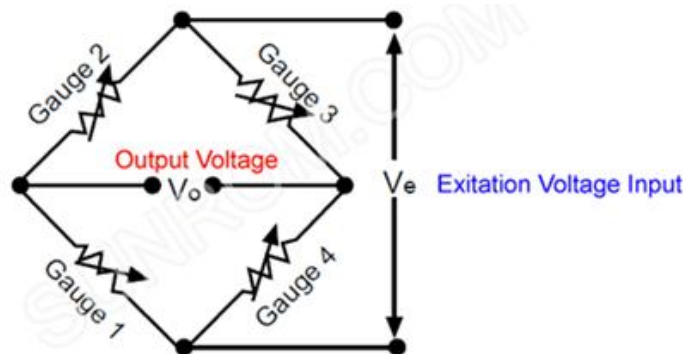

Fig. 2 Weight Sensor

B. IR Sensor

The IR sensor used for human detection. IR sensor transmit infrared signal, this infrared signal struck on the surface of an object which comes in front of it & reflects back which is received at the infrared receiver. Infrared sensor consists of infrared source and infrared detector. Infrared source is generally an IR LED or LASER diode. Infrared detector includes photodiodes or phototransistors. The energy emitted by the IR LED is reflects back from an object and falls on the IR detector. When object is detected by IR sensor it produces LOW output, and in absence of object IR sensors output is HIGH. This output can be directly connected to Arduino controller. Below figure shows the working principle of IR sensor.
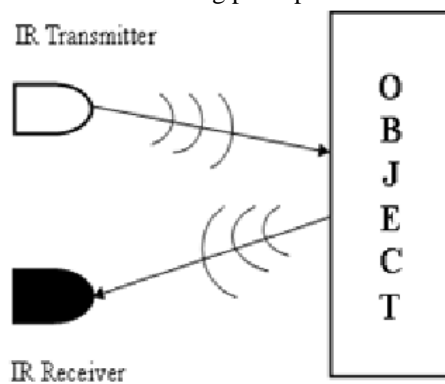

Fig.3 Working of IR Sensor.

C. PIC Controller

PIC is a Peripheral Interface Microcontroller which was developed in the year 1993 by the General Instruments Microcontrollers. It is controlled by software and programmed in such a way that it performs different tasks and controls a generation line. PIC microcontrollers are used in different new applications such as smart phones, audio accessories and advanced medical devices. There are many PICs available in the market ranging from PIC16F84 to PIC16C84. These types of PICs are affordable flash PICs. Microchip has recently introduced flash chips with different types, such as 16F628, 16F877 and 18F452. The 16F877 costs twice the price of the old 16F84, but it is eight times more than the code size, with more RAM and much more I/O pins, a UART, A/D converter and a lot more features

D. GSM Modem

The long form of GSM is Global System for Mobile communication. Most GSM uses frequency band of 900 MHz or 1800 MHz . This GSM modem acts just like a mobile phone. The modem uses RS232 standard for communication. The modem can be connected to serial port of PC or to any controller. GSM modem is used to send and receive SMS or to make/receive voice calls. It can also be used as GPRS modem to use internet service. When Arduino receives signal from sensors it send AT commands to GSM modem to make a call to a predefined number stored in program.
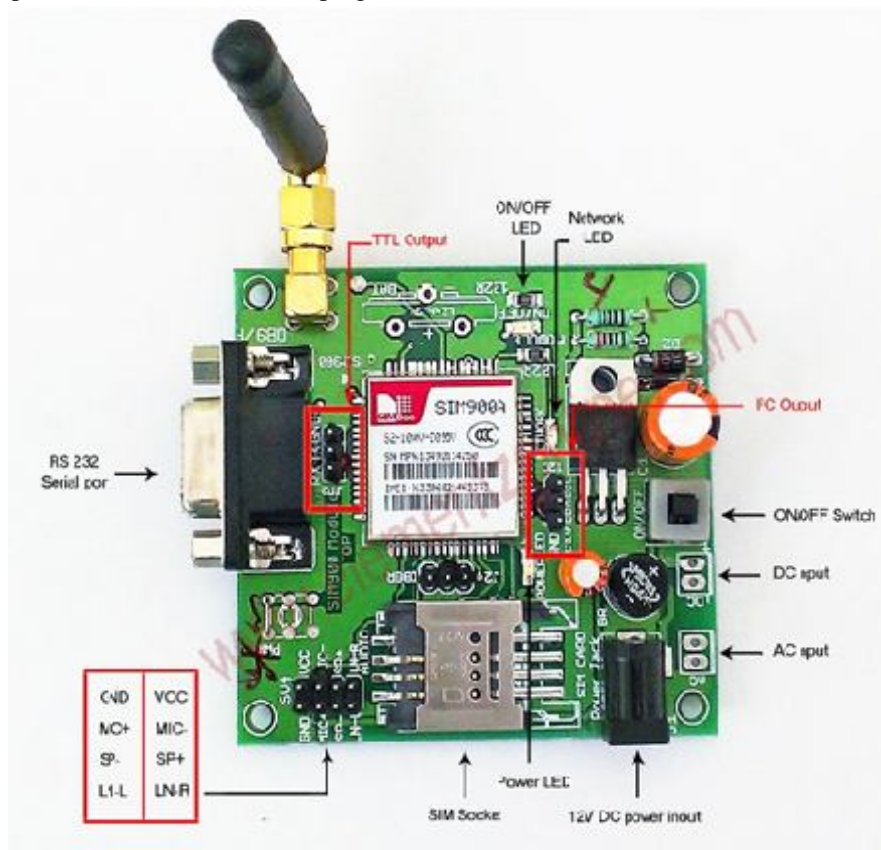
Fig. GSM Module

E. 16*2 LCD Display

Alphanumeric LCD display module means it can display alphabets and numbers. LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. Operating Voltage is 4.7V to 5.3V. The current consumption is 1mA without backlight. Display consists of two rows and each row can print 16 characters, Where each character is built by a 5×8 pixel box. It can work on both 8-bit and 4-bit mode. It is available in Green and Blue Backlights.

F. Gas Sensor MQ3 - Alcohol, Ethanol, Smoke Sensor

Sensitive material of MQ-3 gas sensor is SnO2, which has lower conductivity in clean air. When the target alcohol gas exist, the sensor conductivity is more higher along with das concentration raising.MQ-3 gas sensor has high sensitivity to alcohol and has good resistance to disturb of gasoline, smoke and vapour .The sensor could be used to detect alcohol with different concentration, it is with low cost and suitable for different applications.MQ-3 is semiconductor sensor for alcohol detection. It has very good sensitivity and fast response to alcohol.

G. Light & Buzzer

A buzzer is an audio indication device, which may be mechanical, electromechanical, or piezoelectric. Typically buzzer is used as alarm. When PIR or IR sensor senses the presence of intruder it sends signal to Arduino controller, then Arduino controller turns on buzzer and lights.

III. FLOWCHART
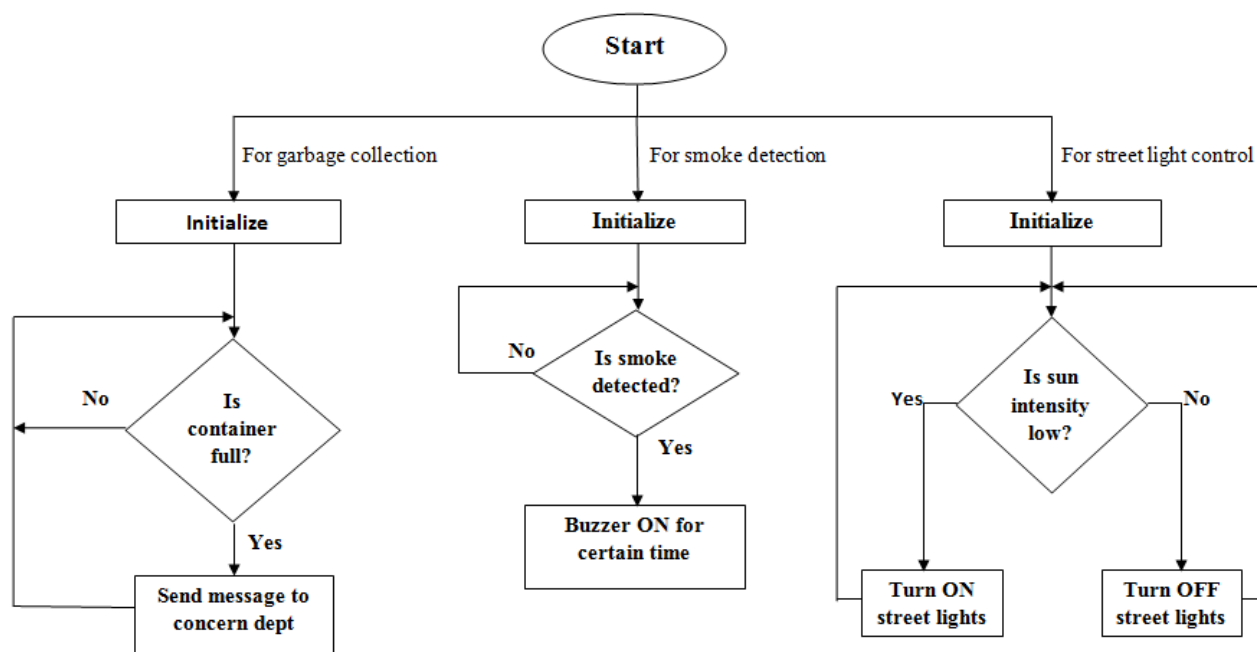
IV. SOFTWARE

The whole system is depending on the PIC 16F877 controller. PIC controller is programmed using MP lab software, Programming languages used is C. Program is compiled & burned using PIC kit-3. MP lab contains a text editor for writing code, a text console, a toolbar etc. The extension used to save file is .c. The editor has features for cutting or pasting and for searching or replacing text. The console is used to display text output , including error messages and other information. The toolbar contains buttons to verify and upload programs, create, open, and save, and open the serial monitor.

V. FUTURE SCOPE

We can also add solenoid valve in the system to extinguish the fire, which will automatically get started as the fire smoke is detected by the sensor.
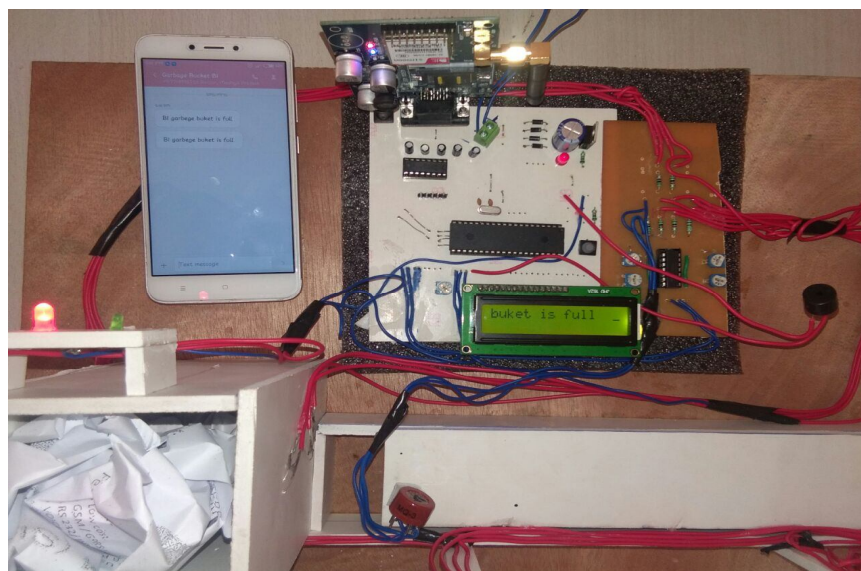
VI. RESULT

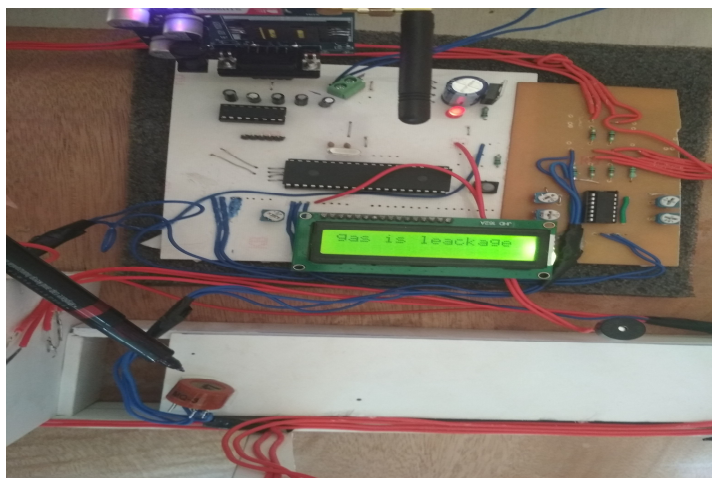Fig. Result when Garbage bin is full.
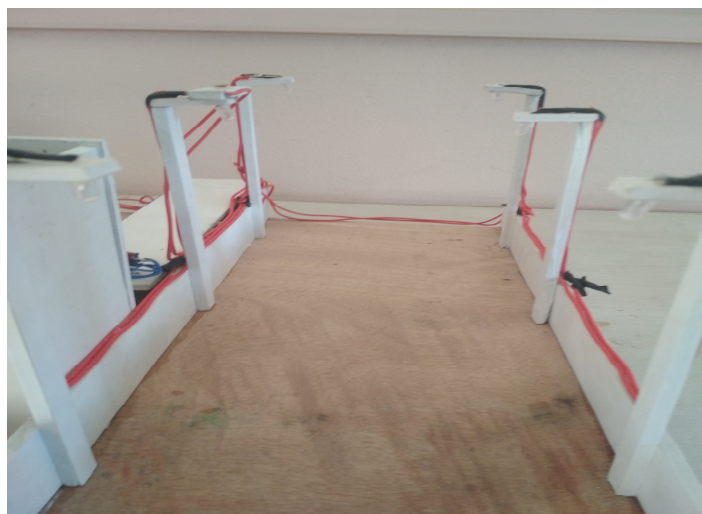
Fig. Result when leaked gas is detected.

Fig. Result during day time-lights are off

Fig. Result during night time- lights are on

VII. CONCLUSION

The garbage problem is very common in every society. This system will overcome this problem and also no diseases can be spread in the society, which indirectly will help to the Nation's growth. Fatal happening due to the explosion of the gases can be avoided if such smoke or gas indication system is used in such areas which will avoid mortality. Use of automatic controlled street lights gives the efficient use of energy.

VIII.   ACKNOWLEDGMENT

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