Automatic Gas Cylinder Management

[1] Dhanya G.S, [2] MulumTejas, [3] Mujasim Pasha I, [4] Raghavendra D, [5] Veeresh K.R
[1] Assistant Professor, [2, 3, 4, 5] UG Scholars
[1][2][3][4][5] Department of Electronics and Communication Engineering, Sri Sairam College of Engineering, Anekal, Bangalore

Abstract- In the present scenario, we face a huge issue sometimes as we may require cooking during late night or any other work related to our LPG. However it would be too late to realize the value of that gas unless we realize it is over, by then it is too late as it takes 2-3 days to deliver a new cylinder. The aim of our project is to design and develop a device which is capable of detecting the depletion of gas and book cylinder automatically, to switch off the regulator when the gas is not used and to track the status of cylinder delivery, The cylinder management system would help improve productivity, as well as improve the quality, reliability and efficiency of the cylinder management process. We use WI-FI module in this project for checking the status of cylinder delivery. It is a non-renewable resource for the society to conserve the energy in the best possible way. Making the cylinder automatic relieves home-makers from the pain they take whenever there is emergency in the requirement for the cylinder and we do not know when the cylinder will go empty.

I. INTRODUCTION

In busy daily life, public expect every single work to be automated, may it be at office or at home. People do not spend their precious time towards household despite of working outside and earning a lot of money. Home-makers takes a lot of pain in cooking food and if the cylinder is empty without any indication then they has to take up some other means to cook food for the family to avoid such problems. We have come up with the Project of automatic gas cylinder management where we continuously monitor the level of gas in the cylinder and book it once it has reached a minimum weight. Whenever the gas level becomes low a booking message will be sent to the booking Centre and also to our mobile. Gas booking process is completed and we receive a confirmation message to our mobile. And also when there isno movement of people in the kitchen or if the gas is not used for a longer time then the regulator is automatically switched off which in turn avoids any leakage in gas and no one is present to notice it. This avoids sudden fire accidents caused by carelessness of people. Our project is programmed using an 8051 microcontroller with part number 4Tmega328P We`use the microcontroller with this part number because it provides the facility of In-System Programming. We Program the microcontroller in normal mode with 1kB EEPROM, 2 kB SRAM,, at an operating frequency of 20 MHz and one data pointer. This project requires less memory hence we are not using any external memory.

AUTOMATIC BOOKING DEVICE
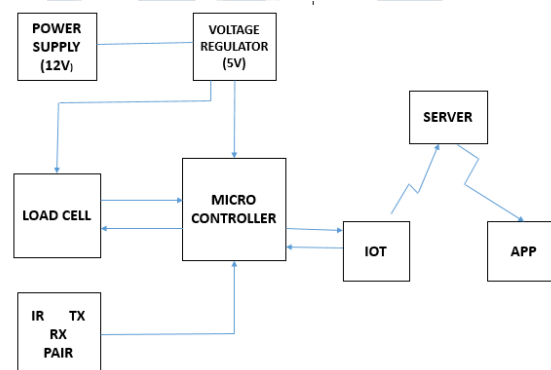
Block Diagram 1
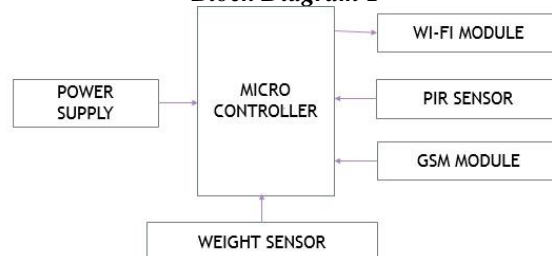

Block Diagram 2

Automatic booking device is one of the modules in the project which is installed at the base of the cylinder. As shown in Fig 1, it consists of components like 8051 Microcontroller, GSM module, load cell type weight the gas level becomes low a booking message will be sent to the booking centre and also to our mobile. Gas booking process is completed and we get an acknowledgement to our mobile that the gas is booked. And also when there is no movement

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of people in the kitchen or if the gas is not used for a longer time then the regulator is automatically switched off which in turn avoids any leakage in gas and no one is present to notice it. This avoids sudden fire accidents caused by carelessness of people. Whenever a cylinder is booked and is to be delivered, sometimes it may happen that the cylinder is taken by a wrong person. Our project avoids this by providing an WI-FI module totrack each cylinder with a unique identification code, with which only the person having the unique number can get the particular cylinder.

Our project is programmed using an ATmega328P. We use the microcontroller with this part number because it provides the facility of In-System Programming. We Program the microcontroller in normal mode with 1KB ROM, 2KB SRAM, at an operating frequency of 20 MHz and one data pointer. Our project requires less memory hence we are not using any external memory.

FLOW CHART
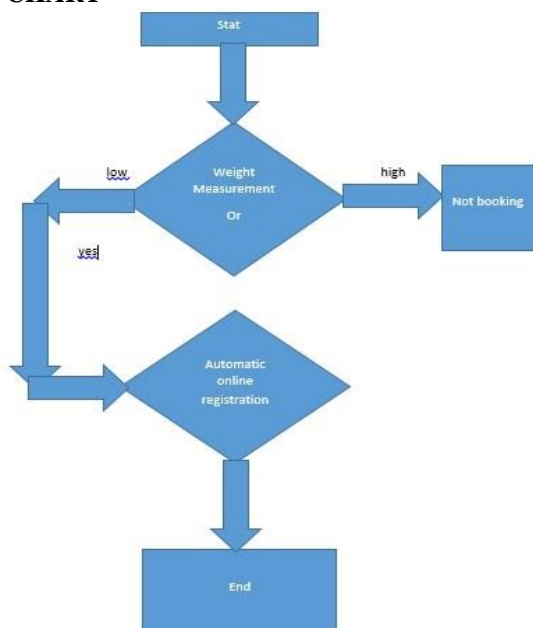
II. PROPOSED WORK

In present refill booking is done using both IVRS/SMS management system.

Presently implementation is booking of cylinder using Wi-Fi module through building an app, if any troubleshooting in Wi-Fi we can proceed through the GSM module .the weight sensor monitors the gas level when it reaches reaches the minimum level it sends a message automatically to the booking center.The PIR sensor is a passive infrared sensor and the measured distance is 10-15m. The PIR sensor is used to detect the motion of the humans in the surrounding

areas if there is no motion in the surrounding areas it automatically turns off the regulator.

8051 Microcontroller

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. frequency of 20 MHz. In Normal mode, we have 1 kB EEPROM, 2 kB SRAM, one data pointer and operating frequency of 11.0592MHz. Since we require only less memory we utilize the microcontroller in normal mode. There are four ports in the microcontroller and each port has 8 pins. Each pin connected to port 0 through the pull up should be connected with 10kΩ resistors which are given inbuilt by the manufacturer for ports 1, 2 and 3 but for port 0 the choice to connect or not is given to the user. If we are connecting any external memory to port 0 then, pull up resistors are not required. When any other external devices are to be interfaced then they are resistors.

The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter(8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

GSM Module

GSM means Global System for Mobile communications. It is a serial port device. GSM module has different modules based on the facilities they provide to the user may it be calling facility, messaging facility, video conferencing etc., Since automatic booking project only requires SMS facility we use SIM300 Module which is one of the basic modules. This is shown in Fig 3. It consists of four pins Tx, Rx, Vcc and GND. Tx and Rx pins are connected to Rx and Tx pins of Microcontroller. SIM card is inserted at the socket provided at the back of GSM module.

An LED is provided for the indication of network access. Initially when the SIM is inserted the LED blinks faster and

when the SIM gets registered itself to the network, the blinking rate reduces. Various instructions are given to the GSM module to make it active.

GSM SIM300 Module

"AT" command is given to wake up the GSM module, similarly the GSM module is functioned by adding the command with AT. For example, "AT+CMGF=1" instruction is given to set the GSM to text mode.

Weight Sensor

In this project we use load cell type weight sensor as shown below. It consists of two ends one is fixed end and the other one is a reference end (free end). Cylinder is kept on the free end such that its weight is calculated based on the strain caused.

Load cell type weight sensor

The strain gauge can weigh a maximum of 50KG since we have considered the maximum weight of the cylinder, the least count for the weight to be expressed in binary data is 157 gms. This is calculated as

$50000/255 = 196.078 \approx 197$ gms

i.e., for binary data 00000001 means 157 gms

The analog weight is converted to digital bits using an A/D converter which is connected to the strain gauge fixed end.

PIR Sensor

PIR Sensor means Passive Infrared Sensor. This is used to sense any movement of human beings. In this project, we use it to continuously monitor the motion of people in front of the gas stove. If there is no movement of people for a longer time then an output is generated to switch off the regulator. PIR Sensor works on the basis of Infrared rays. Change in colour is determined when there is detection of movement of people. Each object can absorb the colour differently. Based on the amount of Infrared rays absorbed, motion is detected.IR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation. For

numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are flat control and minimal effort, have a wide lens range, and are simple to interface with.
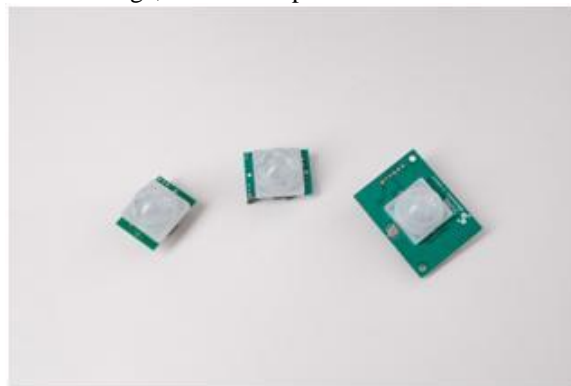
Most PIR sensors have a 3-pin connection at the side or bottom. One pin will be ground, another will be signal and the last pin will be power. Power is usually up to 5V. Sometimes bigger modules don't have direct output and instead just operate a relay which case there is ground, power and the two switch associations. Interfacing PIR with microcontroller is very easy and simple. The PIR acts as a digital output so all you need to do is listening for the pin to flip high or low. The motion can be detected by checking for a high signal on a single I/O pin. Once the sensor warms up the output will remain low until there is motion, at which time the output will swing high for a couple of seconds, then return low. If motion continues the output will cycle in this manner until the sensors line of sight of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity fittingly. This is because of the settling time included in studying nature's domain. This could be anyplace from 10-60 seconds.

PIR Sensor

A delay time is given for detecting movement after which the DC motor rotates to switch off the regulator.

ADVANTAGES
- Health : It will help the people to release their stress and save energy.

➢ Disaster Management : Avoiding sudden fire accidents caused due to carelessness of the people.
➢ Societal: Provide awareness through the society.

III. CONCLUSION

To prevent sudden fire accidents and create the awareness among society. Save Gas – nonrenewable resource. It helps to save people's life and save the public property from getting destroyed. It is a solution for the society to conserve energy in best possible way. This mainly avoids sudden fire accidents caused by carelessness of people. The regulator is automatically turned off which in turns to avoid any leakage of gas making the cylinder automatic relieves Homemakers from the pain they take.

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