SMART APARTMENT WITH AUTOMATIC WATER MANAGEMENT AND SECURITY ALERT SYSTEM

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ABSTRACT

In this paper, we present a detailed model of a smart apartment with the use of Smart Water Management System and Security Alert System. Water Management concept is to measure and display the water consumption of individual flats. We adopt a pre-paid concept using smart card technology which is designed as detachable smart card, because it is supposed to be recharged when the debit is exhausted. Since security is prime concern in life these days. Every flat of the apartment is to be equipped with the MQ2 Sensor to sense gas leakage, IR Receiver to detect fire, MEMS to detect Earthquake and Limit Switch to measure the limit of dustbin.

KEYWORDS: Smart card, MQ2 Gas Sensor, IR Receiver, MEMS Sensor, Limit Switch

1.INTRODUCTION

The project "Smart Apartment with Automatic Water Management and Security Alert System" is a live project, prototype module constructed for the live demonstration. The system is designed for domestic applications like apartments and individual colony's where many families live together in one particular area. Generally, at these places, the source of water is from over headwater tank and the society or management of that particular colony or apartment collects some amount monthly as maintenance charge. Most of this amount is utilized for common electricity bill; this electricity bill is paid for energizing the water pumping motor and energizing the corridor or streetlights. In this regard, irrespective of water consumption, flat or lump sum amount is collected from the water consumers. This is a poor approach, because the consumption differs from consumer to consumer, a small family consumes less water, whereas the big family consumes more water and amount paid by both the families are same, this is injustice. To avoid this problem, this project work is taken up, which measures and controls the flow of water to the individual houses and according to the water consumption, amount will be charged from the house owners.

The demonstration module is designed with MQ2 Gas sensor has high sensitivity to

methane, propane and butane making it ideal for natural gas and LPG monitoring. This sensor is provided to detect the LPG Gas leakage. An IR detector is used for detecting the fire and an emergency situation is detected by the sensors in the apartment flat. In this regard the receiving part of the project work can be installed at the watchman or the security guard. This unit is designed to measure the garbage level in the bin through limit switch and earth quake is detected through MEMS sensor. This system uses the Arduino Mega microcontroller as the brain or center of operations which is also interfaced to the GSM for transmitting the SMS. Limit switch is one kind of force sensor. In this project, it is used to detect the maximum weight capability of the garbage bin and this switch is interfaced with Arduino microcontroller as input signal.

2.WATER MANAGEMENT USING SMART CARD DESIGNED WITH EEPROM:

Since it a proto type module, the system is designed with a pumping motor, means in other words the module is designed for one consumer only. In this concept, each and every flat or house should and must equip with one valve and two push-buttons for start and stop. Push buttons S1 and S2 are treated as start and stop the water flow, these are nothing but push to on type keys. Initially each and every consumer has to pay some amount to the organizer, according to the amount paid by the consumer, the organizer enters the data in to the Micro controller through keyboard to certain liters will be recharged into the smart card designed using EEPROM 93C46. During utilization of water, the consumer can energize and de-energize the valve as many times as he likes until the credit is exhausted. This is done through push buttons provided in his flat. Whenever the water is required; simply by

pressing the push button, the controller energizes his particular valve automatically by activating the pumping motor.

The water consumption of individual house can be displayed, as described above, according to the data entered into the micro controller, as the water is consumed, the display shows in decrement mode. When the total credit is exhausted, the display shows nil balance in the form of liters, and the smart card should be recharged again. In this condition if the consumer tries to energize the valve, the controller rejects the signal produced by the push button and it won't allow to energize the valve until the card is not recharged. Again, the consumer has to pay some amount to the organizer to recharge his card. The Figure of the smart card designed wuth EEPROM is shown in figure1.
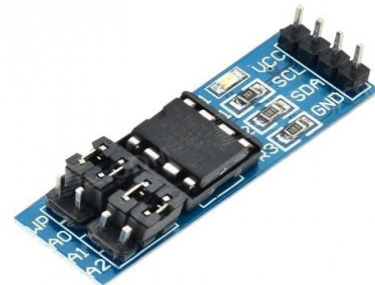

Figure 1: Smart card designed with EEPROM

2.DETECTION OF GAS LEAKAGE USING MQ2 GAS SENSOR:

MQ2 is a general purpose Sensor that has good sensitivity characteristics to a wide range of gases. This device is designed to operate with a stabilized 5V heater supply and a circuit voltage depends up the design.

The most suitable application for the MQ2 is the detection of methane, propane and butane, which makes it an excellent Sensor for domestic gas or smoke detectors. The initial stabilization time of the MQ2 is very short and the relative and elapsed characteristics are very good over a long period of Operation. MQ2 has a very low sensitivity to 'noise-gases', which considerably reduces the Problem of nuisance alarming. The MQ2 is most practically employed in a circuit design, which maintains circuit voltages at fixed value of 5V. This voltage rating is very practical when determining design specifications because of the wide range of available components. This makes the use of the MQ2 an especially economical way to design low-cost, highly reliable gas detection circuits.
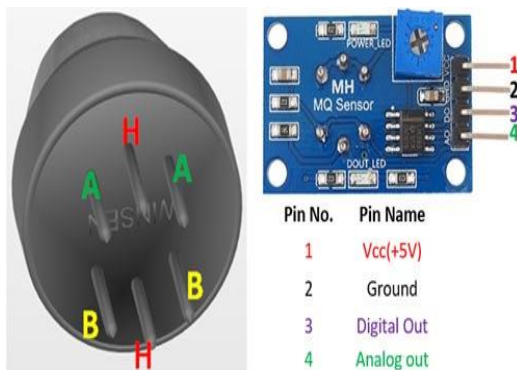

Figure 2: MQ2 Gas Sensor.

3.FIRE DETECTION USING IR RECEIVER:

IR diode is a simple and compact device used for sensing the presence of fire during any fire accident, hot gasses are emitted with the unique spectral pattern in the IR region. The module makes use of IR sensor and comparator to detect fire. The device weighing about 5 grams, can be easily mounted on the wherever required. It gives the high output on detecting the fire. An

appropriate action can be taken based on this output i.e., transmitting the information to the monitoring unit at the Security gard through Zigbee. The visual indication of output is provided by an on-board LED.

Figure 3: IR Receiver.

4.DETECTION OF EARTHQUAKE USING MEMS SENSOR:

Micro - Small size, micro fabricated structures

Electro - Electrical signal / control (In / Out)

Mechanical - Mechanical functionality (In / Out)

System Structures, Devices, Systems, Control

Earthquake early warning efforts aim to detect earthquakes and provide seconds of warning for surrounding populations. Here a working module rapidly detecting and characterizing earthquakes with the Quake-Catcher Network (QCN), which connects low-cost Micro Electro Mechanical Systems (MEMS) accelerometers to a volunteer network of an embedded system is designed.

Large magnitude earthquakes may cause significant losses of life and property. The concept is to detect the vibrations or jerks in the Earth, raise the alarm and alert the concern people by sending the information through the GSM technology to the mobile phone and Zigbee to the apartment flats. This concept can be proved practically with MEMS accelerometer mechanism.
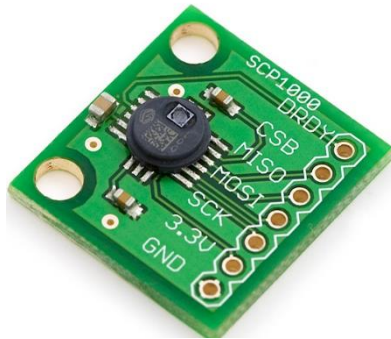
Figure 4: MEMS (Micro electro mechanical system).

5.MEASURING OF MAXIMUM CAPABILITY OF GARBAGE BIN USING LIMIT SWITCH.

Limit switch is one kind of force sensor. In this project, it is used to detect the maximum weight capability of the garbage bin and this switch is interfaced with Arduino microcontroller as input signal. This limit switch is having long lever & when little pressure is applied to the lever, switch will be activated automatically. It is placed at the bottom of the garbage bin and if the weight reaches the maximum with standing capability of the garbage bin, it will be automatically pressed.
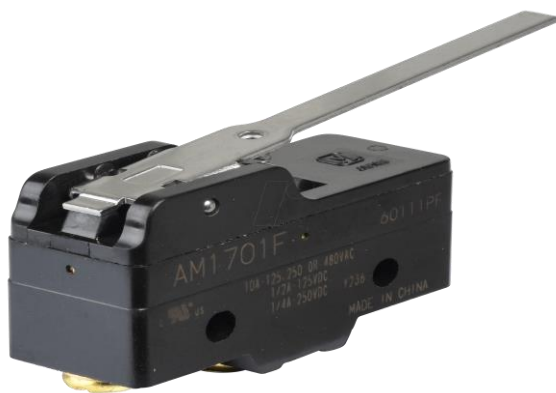

Figure 5: Limit Switch

6.CONCLUSION:

Because of deficiency of this kind of electronic monitoring systems, flat owners are in lot of confusion, and there is no vigilance about the consumption of water and safety and security systems. Irrespective of consumption, each flat owner is paying some fixed amount monthly as maintenance charge. By implementing this system, confusion can be avoided, and exact amount can be paid depending up on the water consumption. And also, the safety and security of the flats can be enhanced.

REFERENCES.

1. Linear Integrated Circuits – By: D. Roy Choudhury, Shail Jain
2. Digital Electronics. By JOSEPH J.CARR
3. Fundamental of Radio Communication: By A.SHEINGOLD
4. Basic Radio and Television: By S.P.SHARMA
5. Digital and Analog Communication System By: K. sam Shanmugam
6. Op-Amps Hand Book - By: MALVIND
7. The concepts and Features of Micro-controllers - By: Raj Kamal
8. The 8051 Micro-controller Architecture, programming & Applications - By: Kenneth J. Ayala
9. Programming and Customizing the 8051 Micro-controller - By: Myke Predko
10. Electronic Circuit guide book – Sensors – By JOSEPH J.CARR