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ADVANCED POWER SAFETY MAINTENANCE SYSTEM FROM EB USING GSM TECHNOLOGY

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Abstract— The main aim of this paper is to save our home electrical and electronic devices from natural disaster like thunder, storm, lightning, etc. Due to natural disaster we lost our valuable devices (TV, computers) but still now no monitoring and controlling device is manufactured. Our current safety maintenance is manually done by the EB provider, we knew that due to rain and wind season the lot of home appliance busted sometimes human life also lost by this problem. [1] The controlling devices of the whole system are by Microcontroller. The synchronization and execution of the entire process is monitored and controlled by a microcontroller. This is based on embedded system. [2] When augmented as a real time, will benefit the society and help in reducing the amount of accident from natural disaster. In this the fault voltage is detected and displayed. [4] The electrical loads are controlled using GSM technology.

Keywords **--** GSM, PIC Microcontroller, voltage measurement setup, relay, wind measurement setup, MAX232, lightening measurement setup.

I. INTRODUCTION

An embedded system is a special purpose computer system designed to perform a dedicated function. Unlike a general purpose computer, such as a personal computer, an embedded system performs one or few predefined tasks, usually with specific requirement. [3] Since the system is dedicated it specific tasks design engineers can optimize it reducing the size and cost of the product. Embedded system comprise of both hardware and software. [5] Embedded system is the fast growing technology in various fields like industrial automation,home appliances, automobiles etc.

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II. PIC MICROCONTROLLER

The peripheral features of PIC microcontroller are Timer0: 8-bit timer/counter with 8-bit prescaler (i) Timer1: 16-bit timer/counter with prescaler, can be incremented during sleep via external (ii) Crystal/clock (iii) Timer2: 8-bit timer/counter with 8-bit period register, prescaler andpostscaler (iv) Two Capture, Compare, PWM modules, Capture is 16-bit, max. Resolution is 12.5 ns (v) Compare is 16-bit, max. Resolution is 200 ns,PWM max. resolution is 10-bit,12-bit multi-channel Analog-to-Digital converter, (vi) On-chip absolute band gap voltage reference generator (vii) Synchronous Serial Port (SSP) with SPI (Master Mode) and I 2 C (viii) Universal Synchronous Asynchronous Receiver Transmitter supports high/low speeds and 9-bit (ix) Address mode (USART/SCI),Parallel Slave Port (PSP) 8-bits wide, with external RD, WR and CS controls (x) Programmable Brown-out detection circuitry for Brown-out Reset (BOR) (xi) Programmable Low-voltage detection circuitry.

Advanced Power Safety Maintenance System From Eb Using Gsm Technology

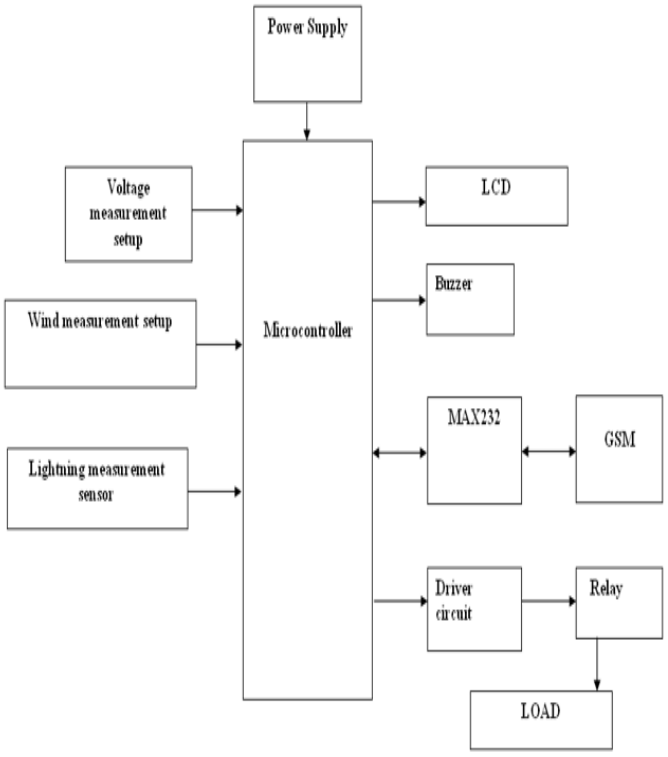


Figure1: Block diagram of advanced power safety maintenance system

III. COMPONENTS REQUIREMENT

1) Hardware requirement :

PIC micro controller, GSM, wind measurement setup, lightening measurement setup, voltage measurement setup, LCD display,relay, max 232

2) PIC microcontroller :

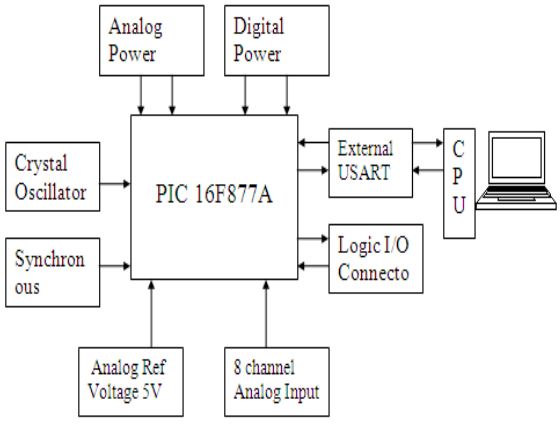


Figure 2: Block diagram of PIC

Process Instrumentation Controller (PIC) is enhanced version of microcontrollers. It is an embedded controller. PIC microcontroller contains several families. They are classified as three categories. Low End Family It has 33 instructions. For example, PIC 12XXX, Mid Range Family It has 35 instructions. For example, PIC 16XXX, High End Family It has 77 instructions. For example PIC 17XXX and PIC 18XXX.

3) Regulator :

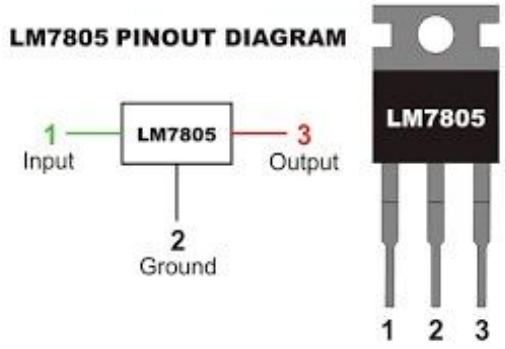


Figure 3: Pin diagram of regulator

It acts as the switch control device. It is a device or mechanisms that automatically control the voltage or current for a constant output supply.

4) GSM :

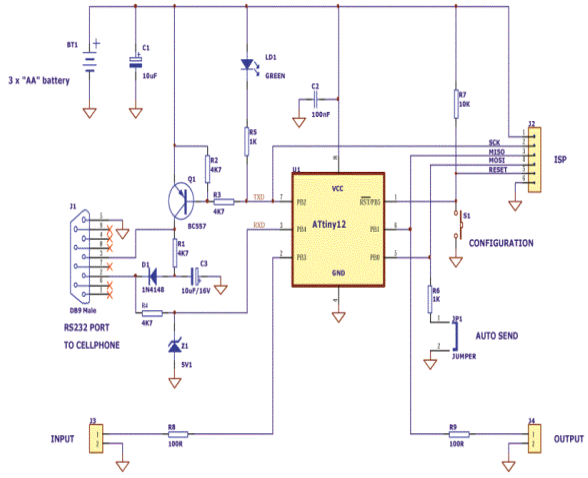


Figure 4: Circuit diagram of GSM

A GSM modem is a wireless modem that works with a GSM wireless network. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM

modem requires a SIM card from a wireless carrier in order to operate.

5) Relay :

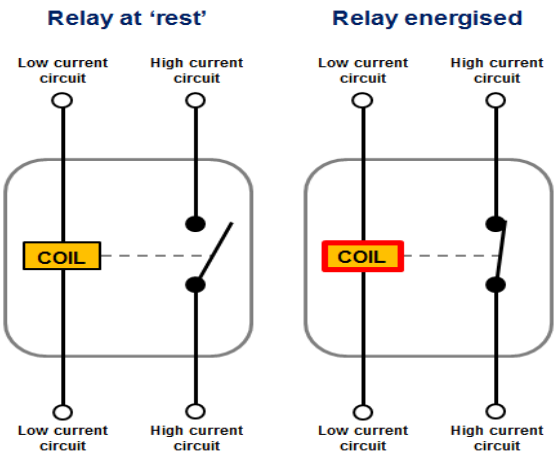


Figure 5: Circuit diagram of relay

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original from, the switch is operated by an electromagnet to open or close one or many sets of contacts.

6) Max 232 :

Dual RS-232 receiver / transmitter that meets all EIA RS232C specifications while using only a +5V power supply. It has four level translators.Two RS232 transmitters that convert TTL\ CMOS input levels into + 9V RS232 outputs. Two RS232 receivers that convert RS232 inputs to 5V TTL\CMOS output level.

7) LDR :

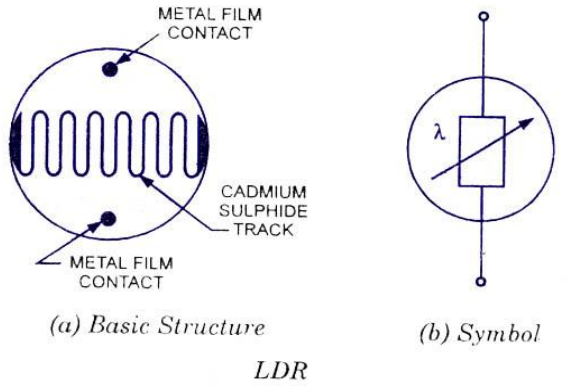


Figure 6: Basic structure and symbol of LDR

A photo resistor (or light-dependent resistor, LDR, or photo-conductive cell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light-activated and dark-activated switching circuits.

A photoresistor is made of a high resistance semiconductor. In the dark, a photoresistor can have a resistance as high as several mega ohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands.

A photoelectric device can be either intrinsic or extrinsic. An intrinsic semiconductor has its own charge carriers and is not an efficient semiconductor, for example, silicon. In intrinsic devices the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap. Extrinsic devices have impurities, also called dopants, added whose ground state energy is closer to the conduction band; since the electrons do not have as far to jump, lower energy photons (that is, longer wavelengths and lower frequencies) are sufficient to trigger the device. If a sample of silicon has some of its atoms replaced by phosphorus atoms (impurities), there will be extra electrons available for conduction. This is an example of an extrinsic semiconductor.

8) Relay :

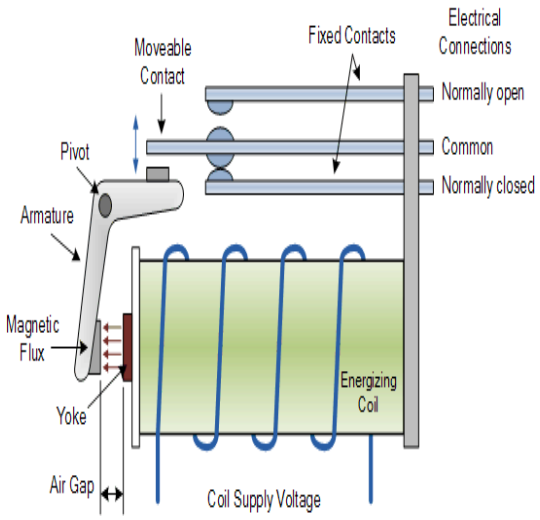


Figure 7:Schematic diagram of relay

Electro magnetically operated remote controlled switches with one or more sets of contacts. Contacts, which are opened when energized, are called "Normally open" (NO) or simply open contacts. Contacts, which are closed when energized, are called "Normally closed" (NC) or simply open contacts.

9) Microphone :

The microphone sound sensor, as the name says, detects sound. It gives a measurement of how loud a sound is. There are a wide variety of these sensors. A microphone, colloquially mic or mike is an acoustic-to-electric transducer or sensor that converts sound in air into an electrical signal. Microphones are used in many applications such as telephones, hearing aids, public address systems for concert halls and public events, motion picture production, live and recorded audio engineering, two-way radios, megaphones, radio and television broadcasting and in computers for recording voice, speech recognition, VoIP and for non-acoustic purposes such as ultrasonic checking or knock sensors.

Most microphones today use electromagnetic induction (dynamic microphones), capacitance change (condenser microphones) or piezoelectricity (piezoelectric microphones) to produce an electrical signal from air pressure variations. Microphones typically need to be connected to a pre amplifier before the signal can be amplified with an audio power amplifier or recorded.

10) LCD display:

Familiar 7-segment light emitting diode (LED) displays.A 14-pin access is provided (14 holes for solder pin insertion or for a Familiar 7-segment light emitting diode eight data lines. Three control lines three power lines.

IV. RESULT AND DISCUSSION

1) Normal condition :

Figure 8: Snapshot of normal condition

2) Abnormal condition (wind speed) :

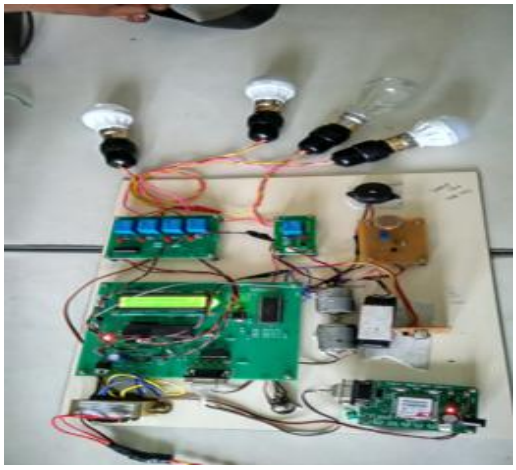
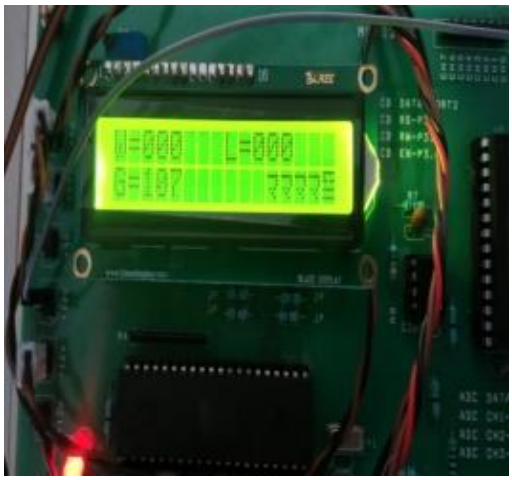


Figure 9: Snapshot of abnormal condition of wind speed

3) Abnormal condition (light sense) :

Figure 10: Snapshot of light sensing

4) Abnormal condition (Generated voltage) :



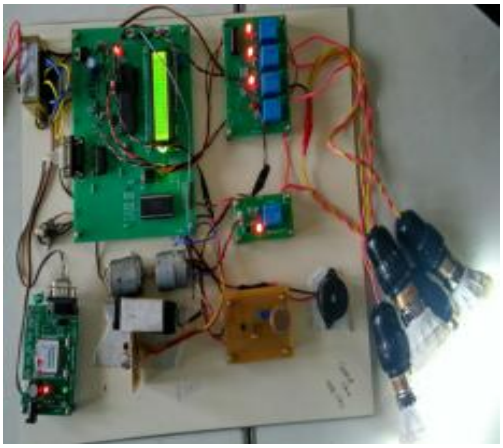


Figure11: Snapshot of generated voltage

5) On off control using GSM :

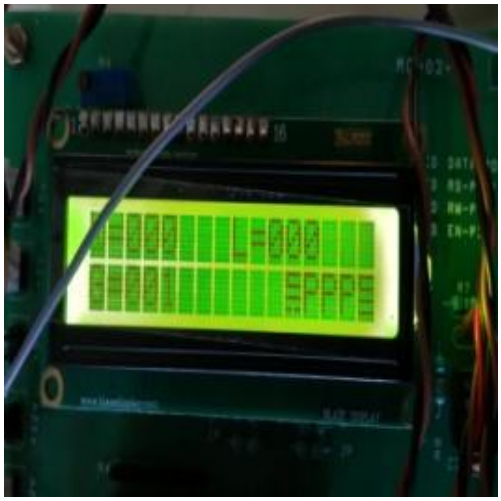
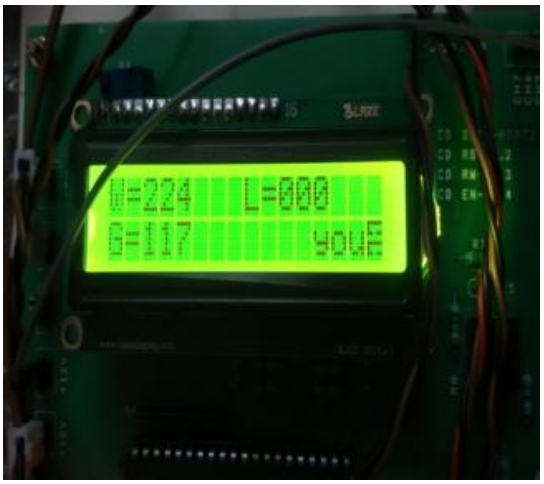


Figure12: Snapshot of on off control using GSM

6) Abnormal condition overview :



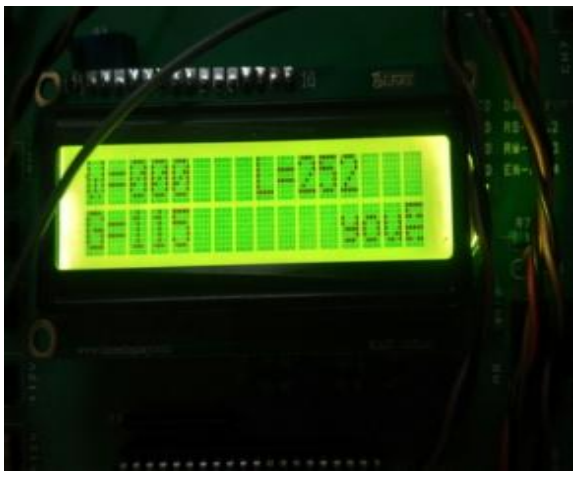


Figure13: Snapshot of abnormal condition overview

7) Abnormal condition (wind speed) GSM messaging :

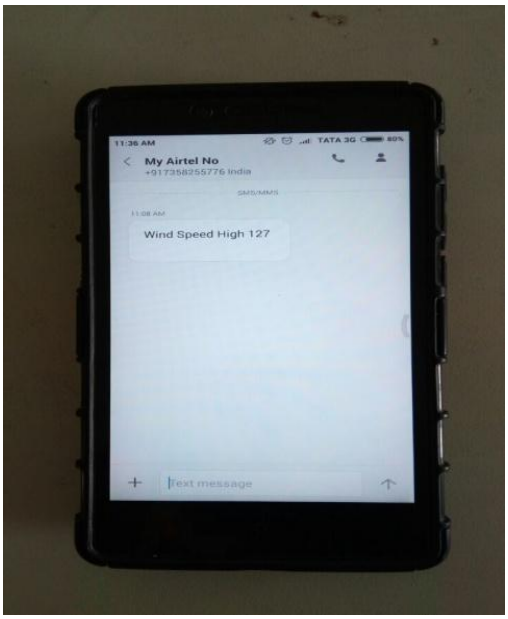


Figure14: Snapshot of (wind speed) GSM messaging

8) Abnormal condition (light sense) GSM messaging:

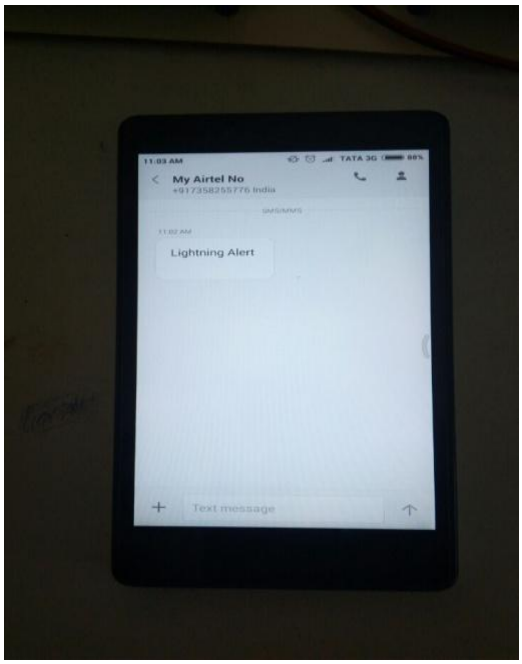


Figure15: Snapshot of(light sense) GSM messaging

The output of the hardware shows the case study on wind speed, lightening illumination and generated voltage.

If disaster occurs the power supply is cut off and sends message signal to the GSM which is viewed via mobile phone.

By this method the disaster is viewed by mobile phone and the amount of wind speed is shown via SMS.

V. HARDWARE SETUP

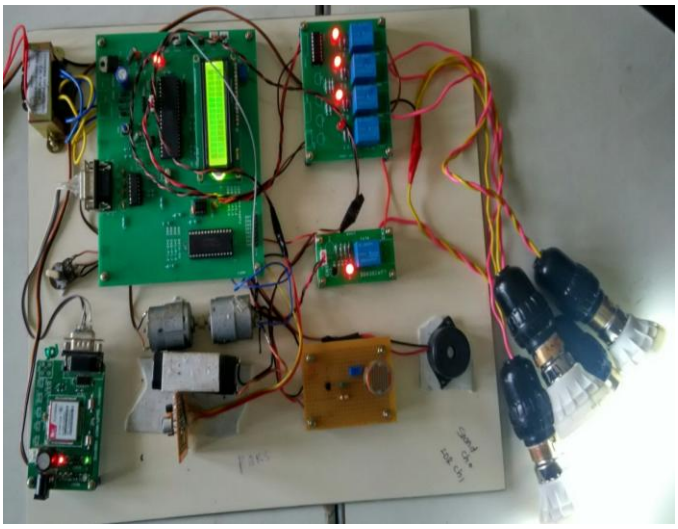


Figure 16: Hardware setup

VI. CONCLUSION

Hence by the fault can be detected by using GSM technology and also in the instant manner by LCD display. By using GSM technology we can switch ON and switch OFF the Load by using mobile phone messaging. In this way the power safety protection is detected and maintained. It is based on embedded system.

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