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GSM Based Environmental Condition Monitoring System in Home Applications

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ABSTRACT: Some of the challenges are security and quality of service management and network configuration. Effective implementation for Wireless Communication used for monitoring regular environmental conditional process by means of low cost omnipresent sensing unit. The detailed view about the reliable parameter measurement by means of smart sensors is described. The data like temperature, humidity and pressure monitoring will be done with the help of smart sensors. This project illustrates an effective low-cost and flexible solution for power management, condition monitoring and energy management in home. The basic operations include remote management and control of domestic devices such as electric lamp; water heater etc., unobtrusive monitoring of domestic utilizations and providing ambient intelligence to reduce the energy consumption through GSM technology are the key functions of the developed system.

KEYWORDS: Arduino MEGA, Sensors, GSM, Switch, Motors.

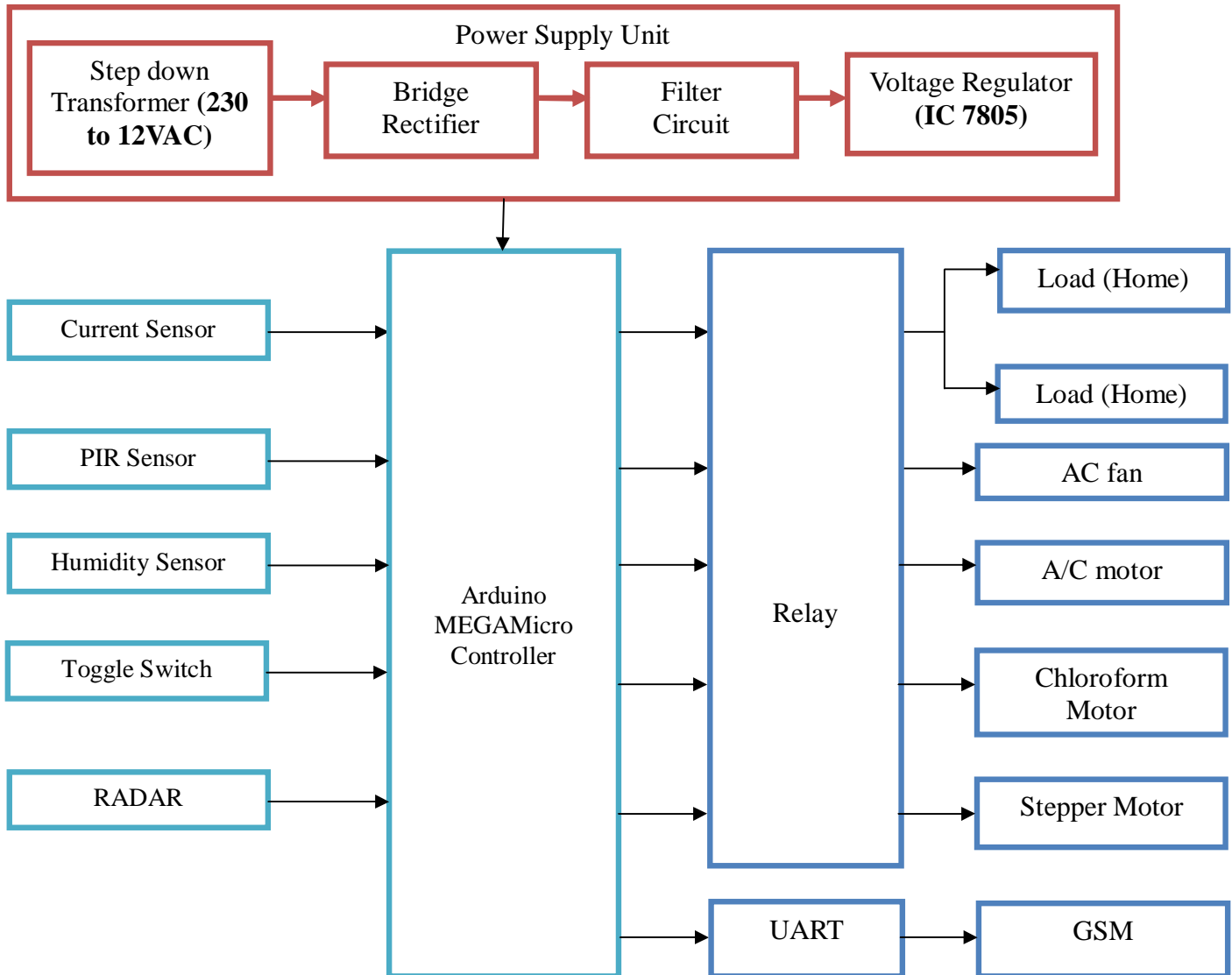
I. INTRODUCTION

Accordingly, the network protocol and algorithm is used in the closed system. Each sensor node has micro controller, storage memory, transceiver, ADC and power supply for gathering and processing the data. These sensor nodes are randomly distributed in the sensor field. Instead of raw data, the sensor nodes send the partially processed data while transmits to other connected nodes and route the data back to the sink node and end user. Homes of the 21st century will become more and more self-controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind. Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high.

II. REVIEW OF EXISTING DEVICES

In existing method there is no advanced technology for measuring the reading of electric bill in home's, humans are placed for take readings from home, in such cases no one is present in home and previous month current reading will be noted and also no one person which is not present in the home means fan is not switched off when person leaves from home. It will cause the waste of electricity. Whenever persons enter in the room and it will not automatically adjust environment based on the temperature and humidity.

III. SYSTEM DESCRIPTION



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IV. THE PROPOSED METHODOLOGY TO DEVELOP THE ASSISTING TOOLS

A. ARDUINO UNO

The Arduino Mega2560 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

B. SENSORS

1) Current Sensor

A current sensor is a device that detects electric current (AC or DC) in a wire, and generates a signal proportional to it. The generated signal could be analog voltage or current or even digital output. It can be then utilized to display the measured current in an ammeter or can be stored for further analysis in a data acquisition system or can be utilized for control purpose.

2) Passive Infra-Red Sensor

A Passive Infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. PIRs are basically made of a pyroelectric sensor (which you can see above as the round metal can with a rectangular crystal in the center), which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted.

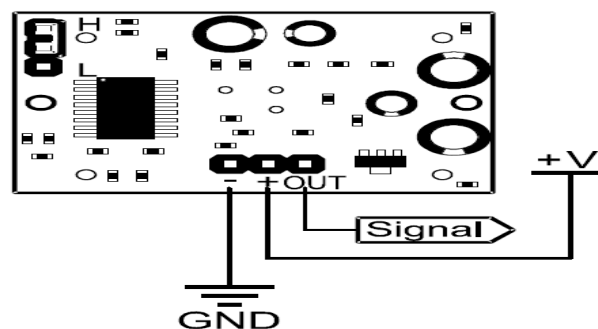


Fig. PIR pin diagram

3) Humidity Sensor

A humidity sensor is a device that measures the relative humidity of in a given area. A humidity sensor can be used in both indoors and outdoors. Humidity sensors are available in both analog and digital forms. This sensor module converts relative humidity to voltage and can be used in weather monitoring application.

4) HC-SR04 Radar Sensor

The principle of RADAR distance measurement used the already-known air spreading velocity, measuring the time from launch to reflection when it encountered obstacle, and then calculate the distance between the transmitter and the obstacle according to the time and the velocity. Thus, the principle of RADAR distance measurement is the same with radar.



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C. DC MOTOR

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Stepper motor is a specially designed DC motor that can be driven by giving excitation pulses to the phase windings. They cannot be driven by just connecting the positive and negative leads of the power supply. They are driven by a stepping sequence which is generated by a controller.

Printers are a great source for stepper motors. Old dot matrix printers have one big stepper motors and one small. These are the stepper motors that I was able to scavenge out of old dot matrix printers from my dad's office.

A stepper motor is a type of DC motor which has a full rotation divided in an equal number of steps. It is a type of actuator highly compatible with numerical control means, as it is essentially an electromechanical converter of digital impulses into proportional movement of its shaft, providing precise speed, position and direction control in an open-loop fashion, without requiring encoders, end-of-line switches or other types of sensors as conventional electric motors require.

D. SWITCH

The switch is then said to be on, and electric current flows around the circuit. When the spring is released so that it does not push against the metal strips, the switch is open and the current flow is cut off.

E. GSM

GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. There are various cell sizes in a GSM system such as macro, micro, Pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, Pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

F. VOLTAGE REGULATOR

Voltage regulator ICs are available with fixed or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current and overheating.

G. POWER SUPPLY UNIT

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

H. RELAY

We know that most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.

V. CODING

```
void setup() {  
    pinMode(A0,INPUT);  
    pinMode(2,INPUT);  
    pinMode(A2,INPUT);  
    pinMode(A3,INPUT);  
    pinMode(3,INPUT);  
    pinMode(4,OUTPUT);  
    pinMode(5,OUTPUT);  
    pinMode(6,OUTPUT);  
    pinMode(7,OUTPUT);  
    pinMode(8,OUTPUT);  
}
```



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```
pinMode(9,OUTPUT);
pinMode(10,OUTPUT);
Serial.begin(9600);
}
void loop() {
  int a,b,c,d,e;
  a=analogRead(A0);
  b=digitalRead(2);
  c=analogRead(A2);
  d=analogRead(A3);
  e=digitalRead(3);
  if (a>600)
  {
    digitalWrite(4,1);
  }
  else
  {
    digitalWrite(4,0);
  }
  if (b==1)
  {
    digitalWrite(5,1);
    digitalWrite(6,0);
  }
  else
  {
    digitalWrite(5,0);
    digitalWrite(6,0);
  }
  if (c<500)
  {
    digitalWrite(7,1);
    digitalWrite(8,0);
  }
  else
  {
    digitalWrite(7,0);
    digitalWrite(8,0);
  }
  if (e==1 && d<100)
  {
    digitalWrite(9,1);
    digitalWrite(10,0);
    Serial.println (" Theft detected");
  }
  else
  {
    digitalWrite(9,0);
    digitalWrite(10,0);
  }
}
```

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A. Applications

- Can be used for the home security
- can be used as automations.

B. Advantage

- Avoid high usage of electricity.
- Automatically adjust the room environment condition.
- Smart Work.

VI.EXPERIMENTAL RESULT





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VII. CONCLUSION

In this paper, The GSM based home monitoring system has been designed and tested with the network. If any unwanted situation occurs, user can get alerts anywhere from the GSM technology. The smart home monitoring system controlling all home appliances sensors were connected directly. The advanced technology can be used in this system.so, operation performed by a equipment is fast and reliable. Sensor unit used in this project to ensure high efficiency and stable. Cost of the system can be reduced with the existing system.

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