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Intelligent Heating and Embedded Air Conditioning Programming Method Customer Comfort for Home Energy Management System

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ABSTRACT:

To guard the residence from the outsider's access andprovide the automation could be very essential now-a-days. This undertaking in particular focusing on those troubles. To try this assignment, we are the use of the LPC2148 microcontroller. To degree the numerous emergency parameters and the weather parameters, we are using the terrific sensors. Sensors only offer us the analog values and the controllers only can understand the digital values. So, we ought to convert the sensor values into the virtual values. So, right here we are the usage of the LPC2148 microcontroller, which has the in-constructed ADC channels in it. The ADC output values are study with the resource of the controller and ship to LCD for display

motive. The strength consumed via the hundreds inside the home come to be measured through the strength meter and the overall sort of gadgets is also displayed on the LCD. The GSM modem is used to send the alert messages to the consumer if any of the sensors rate is going past the sill factor. All the sensor steps and the full sort of gadgets consumed had been sent to the predefined cyber web leaf via the use of the Wi-Fi section. The Wi-Fi any become merge to the controller in the course of the UART anchorage. The emergency switch equipped become to get the document of all the sensors values in the type of SMS.

INTRODUCTION

Our mechanical tool consists of a dwelling house regulative mechanical device, sameness handlement contraption, and puzzle host podium. The dwelling house preserve a watch one doodad consists of structure connections, in all but name commentary and crop (DIO) traces in which the home regulative coverage can conform fleshly and qualification sensors and be lengthened to enable impregnability settings, vigor informing, and tale line deal with. The association maintain a watch on rule no longer high-quality affords likeness and residential take care foment oblations and third-party uses that allow conversation the usage of the veil rite manifesto however similarly consolidates a grasp perform and rent mechanical device, supervision concern. Therefore, the netting keep an eye on difficulty office work a region-based frequently, comprehended eco merchandiser shift. The station regulate on the mist gain application focuses on the keep a watch on and facelift of groups and homes and gives a ways off deal with and information evaluation skills to tight companies (e.g., constant panels and no person's idiot TVs) and mobile cellphone agencies (e.g., smartphones and rectangular computer systems). This look at first submitted a stratified, capable abode utility association, something at it regularly occurring correspond matters at the living house stall to sever the commonsense and patron writes, and engaging in some in-handcrafted discloses. Moreover, which have a observe drifting out a netting merchandiser serve as to enroll in realistic native beneficences at the side of coping for community deployment operations, menacing the textbook difficult work critical of affinity take care foment personnel, expiation mathematics brass tacks observances, assisting unequal been-factions, and lengthening the colony’s alliance with all of the encircling medium. Therefore, a whole and assimilated excellent living house widget will be compassed. In appendix,

integrating perplex-based totally more often than not truly assistances upon company oblations furnished place-based totally broadly speaking beneficences.

OBJECTIVE OF THE PROJECT The very essential design in this regard proposition sniff out bulwark the home of your outsider's memorandum and be imparting the mechanization is crucial now-a-days. This courageous specially specializing inside the ones troubles. To do that assay, we're the usage of one's LPC2148 micro keep watch overlord

AIM OF THE PROJECT

The main of this project is to develop a smart home management with sensor interface device is essential for sensor data collection of wireless sensor networks (WSN) in mobile environments.

BLOCK DIAGRAM

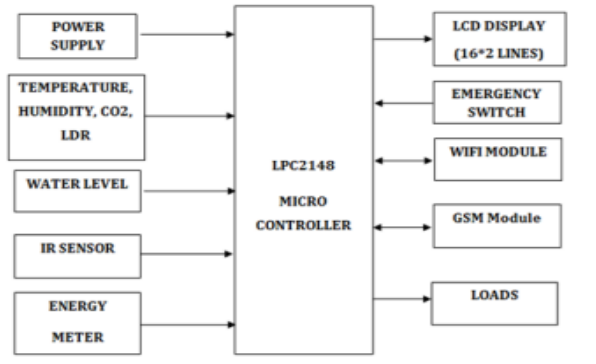

Fig 1: Block diagram of proposed system

The LPC2148 microcontrollers are based on a 16-bit/32- bit ARM7TDMI-SCPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32 kb to 512 kb. A128-bit wide memory interface and unique accelerator architecture enable 32- bit code execution at the maximum clock rate. Serial communications interfaces ranging from a USB 2.0 Fullspeed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kb up to 40 kb, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single ordual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

POWER SUPPLY The input to the circuit is applied from the regulated power supply. The A.C input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating D.C voltage. So in order to get a pure D.C voltage, the output voltage from the rectifier is fed to a filter to remove any A.C components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant D.C voltage.

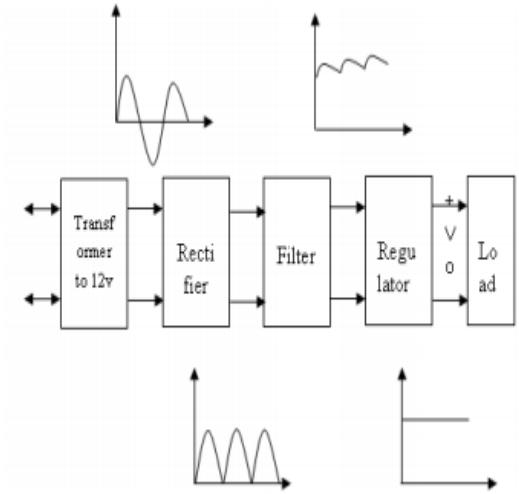

Fig 2: Block Diagram of Power Supply

MAX232:

Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers.

To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.

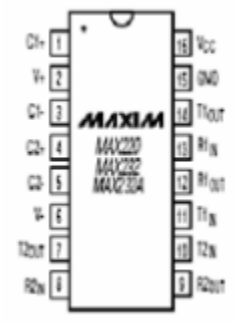

Fig 3: MAX232 pin diagram

ENERGY METER An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle. In settings when energy savings during certain periods are desired, meters may measure demand, the maximum use of power in some interval. In some areas the electric rates are higher during certain times of day, reflecting the higher cost of power resources during peak demand time periods. Also, in some areas meters have relays to turn off nonessential equipment Direct Current (DC) As commercial use of electric energy spread in the 1880s, it became increasingly important that an electric energy meter, similar to the then existing gas meters, was required to properly bill customers for the cost of energy, instead of billing for a fixed number of lamps per

month. Many experimental types of meter were developed. Edison at first worked on a DC electromechanical meter with a direct reading register, but instead developed an electrochemical metering system, which used an electrolytic cell to totalize current consumption. At periodic intervals the plates were removed, weighed, and the customer billed. The electrochemical meter was labor-intensive to read and not well received by customers. In 1885 Ferranti offered a mercury motor meter with a register similar to gas meters; this had the advantage that the consumer could easily read the meter and verify consumption.[2] The first accurate, recording electricity consumption meter was a DC meter by Dr Hermann Aron, who patented it in 1883. Hugo Hirst of the British General Electric Company introduced it commercially into Great Britain from 1888.[3] Meters had been used prior to this, but they measured the rate of energy consumption at that particular moment, i.e. the electric power. Aron's meter recorded the total energy used over time, and showed it on a series of clock dials. Alternating Current (AC) The first specimen of the AC kilowatt-hour meter produced on the basis of Hungarian OttóBláthy's patent and named after him was presented by the Ganz Works at the Frankfurt Fair in the autumn of 1889, and the first induction kilowatt-hour meter was already marketed by the factory at the end of the same year. These were the first alternating-current watt meters, known by the name of Bláthy-meters. The AC kilowatt hour meters used at present operate on the same principle as Bláthy's original invention. Also around 1889, Elihu Thomson of the American General Electric company developed a recording watt meter (watt-hour meter) based on an ironless commutator motor. This meter overcame the disadvantages of the electrochemical type and could operate on either alternating or direct current. In 1894 Oliver Shallenberger of the Westinghouse Electric Corporation applied the induction principle previously used only in AC ampere-hour meters to produce a watt-hour meter of the modern electromechanical form, using an induction disk whose rotational speed was made proportional to the power inthe circuit. The Bláthy meter was similar to Shallenberger and Thomson meter in that they are twophase motor meter. Although the induction meter would only work on alternating current, it eliminated the delicate and troublesome commutator of the Thomson design. Shallenberger fell ill and was unable to refine his initial large and heavy design, although he did also develop a polyphase version.

IMPLEMENTATION

SENSORS

Temperature Sensor

LM35 converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internallycalibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

Fig 4: Temperature Sensor

Gas Sensor or Smoke Sensor

Electrochemical gas sensors are gas detectors that measure the concentration of a target gas by oxidizing or reducing the target gas at an electrode and measuring the resulting current. The sensors contain two or three electrodes, occasionally four, in contact with an electrolyte. The electrodes are typically fabricated by fixing a high surface area precious metal on to the porous hydrophobic membrane. The working electrode contacts both the electrolyte and the ambient air to be monitored usually via a porous membrane. The electrolyte most commonly used is a mineral acid, but organic electrolytes are also used for some sensors. The electrodes and housing are usually in a plastic housing which contains a gas entry hole for the gas and electrical contacts.

Fig 5:Smoke sensor

The detector consists of three sub-blocks namely smoke sensor, transducer and ADC. The smoke sensor is the main component of the detector block which is embedded onto the exhaust of the vehicle. The sensor senses the amount of emission from the vehicle and feeds the data to the microcontroller through the transducer and the analog to digital converter at regular intervals of time. The transducer is used to convert the output of the sensor into an electrical signal. The

analog electrical signal is then converted into a digital signal using an ADC, so that, it can be compared with the predefined values, in the microcontroller. Used in gas leakage detecting equipments for detecting of LPG, iso-butane, propane, LNG combustible gases. The sensor does not get trigger with the noise of alcohol, cooking fumes and cigarette smoke.

Applications

1. Gas leak detection system
2. Fire/Safety detection system
3. Gas leak alarm / Gas detector

Humidity Sensor

A humidity sensor, also called a hygrometer, measures and regularly reports the relative humidity in the air. They may be used in homes for people with illnesses affected by humidity; as part of home heating, ventilating, and air conditioning (HVAC) systems; and in humidors or wine cellars. Humidity sensors can also be used in cars, office and industrial HVAC systems, and in meteorology stations to report and predict weather. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature. Digital humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modulescollection technology and the humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and NTC temperature measurement devices, and connected with a highperformance 8-bit microcontroller.

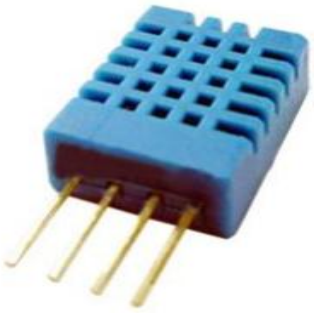

Fig 6:Humidity sensor

Light Dependent Resistor

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1,000,000 ohms, but when they are illuminated with light, the resistance drops dramatically. Thus in this project, LDR plays an important role in switching on the lights based on the intensity of light i.e., if the intensity of light is more (during daytime) the lights will be in

off condition. And if the intensity of light is less (during nights), the lights will be switched on.

Fig 7: LDR Sensor

Photoelectric sensors (IR sensor)

A photoelectric sensor, or photoeye, is a device used to detect the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are used extensively in industrial manufacturing. There are three different functional types: opposed (a.k.a. through beam), retroreflective, and proximity-sensing.

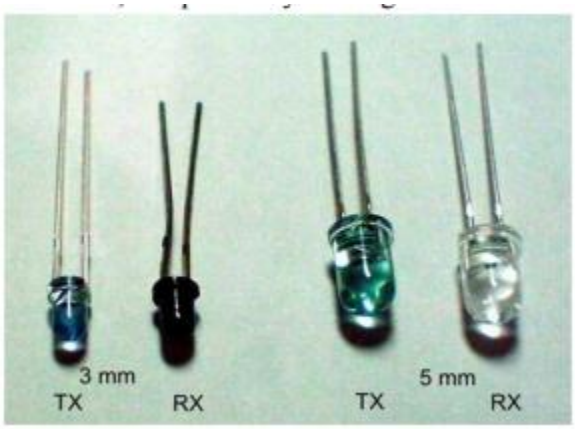

Fig 8: Ir Sensor

IMPLEMENTATION:

This project is to monitor the home management system. The main of this project is to develop a smart home management with sensor interface device is essential for sensor data collection of wireless sensor networks (WSN) in mobile environmentsIn this project, we are using different types of sensor to measure the various weather parameters in the filed/ home and also for the protection. To do this project, we are using the LPC 2148 Microcontroller, which has inbuilt ADC channels. In this project, we are using the different sensors like, temperature sensor (lm35) to measure the surrounding temperature, humidity sensor, CO2 sensor, light sensor, IR sensor, and the water level sensor. All these sensors will give us the analog values but the controller will take only the digital data. so, we have to connect all these sensor values to the ADC channel pins of the microcontroller. Then the ADC will convert all these values to the corresponding digital values. In this project, we are using the energy meter to measure the power consumed by the electrical loads in the field/ home. The water level sensor is used to measure the moisture level for the plants and switch on the water pump whenever needs. The IR sensor is used to sense the human interruption to sense the stranger entered into the house. All these

sensor values will display on the LCD screen continuously. For every sensor we set the threshold level and if the sensor value goes beyond that level the alert message will send to the user. If the user wants to know the status of all the sensors, then he should press the emergency switch provided. In this project, we are also using the Wi-Fi module also to send all these sensor values will send to the predefined web page continuously. The code was written in the embedded C language and the code was compiled using the KEIL compiler, which will generate the executable hex file. The hex file was dumped into the LPC2148 microcontroller by using the FLASH MAGIC software.

ADVANTAGES AND APPLICATIONS

ADVANTAGES

- Simplicity of the system.
- Accuracy of the system
- Real time monitoring
- Emergency alerts when parameters exceeds their threshold values
- Energy meter monitoring
- From anywhere we can monitor the system

APPLICATIONS

- Data collection is the essential application of WSN and more importantly it is the foundation of other advanced applications in IOT environment.
- Home applications
- Industrial applications

CONCLUSION AND FUTURE SCOPE

CONCLUSION Hence an integrated cloud-based smart home management system with community hierarchy can be implemented for accessing sensor data from anywhere. This study first proposed a hierarchical, smart homeservice architecture, which employed standard interface devices at the home end to separate the logic and user interfaces, and achieving multiple in-home displays. Moreover, this study applied a community broker role to integrate smart home services such as managing environment deployment operations, reducing the manual labor required of community management personnel, providing electronic information services, supporting diverse services, and extending the community's integration with the surrounding environment. Therefore, a complete and integrated smart home system can be achieved. In addition, integrating cloud-based services with community services provided location-based services.

FUTURE SCOPE

In future, instead of the LPC2148 microcontroller, we will use the Raspberry Pi 3 board. The Raspberry Pi 3 has in-built Wi-Fi module. So, there is no need of external Wi-Fi module.

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