IOT-BASED ADVANCE HOME AUTOMATION SYSTEM USING SMART PHONE

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ABSTRACT
In 20st century the people wants the world on their hands. Internet of Things (IoT) is an ideal emerging technology to influence the internet and communication technologies, traditionally in the object-oriented paradigm everything in the world is considered as an object, but in the Internet of Things everything in the world is considered as a smart object, and allows them to communicate each other through the internet technologies. The Internet of Things can be described as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet where the devices are intelligently connected enabling new forms of communication between things and people. The home appliances are controlled by the Arduino which receives commands from the Internet, which operates according to the commands received from the mobile application via the internet. In our proposed system, the home server is built upon an Internet technology which receives commands from the client and the command is processed via Arduino, which allows a user to control and monitor sensors related to the home by using any Android capable smart phone or via the internet.

Keywords:
Arduino, Internet of things, Smart phone,Sensor(PIR,LM35,LDR)

INTRODUCTION

The popularity of term “Internet of Things” (IoT) has been grow thing greatly in the recent years due to exponential increase of small and costless devices that implement communication interface and which allow them to connect to wide area network. Their mutual communication, followed by collecting and further processing of data, provides insights into certain statistics and information that were previously not available. A detailed analysis and the processing of collected data allows these devices to contribute to improving of the environment and thus become truly “smart”, with the aim to transform the user’s life in a positive way.

A rapid increase in number of smart phones and tablets in market is significantly contributing to this trend. Due to wishes and needs of an average user to increase comfort and generally improve everyday life made (Internet of Thing) quickly found use in smart homes. The variety of devices and a wide range of their capabilities provide many use cases tailored to home automation, among which the most significant are those that target to optimize and reduce energy consumption.

A wide variety of devices brings challenges and difficulties in communication between them. Today, there are several well established protocols in home automation market. Some of those are Bluetooth, ZigBee and Wi-Fi. It allows short range communication between devices. It can lose connection in certain conditions due to noise.

Fig 1: Introduction of Internet of Things

In past home automations, a network topology consisted of sensor nodes for data collection and transmission. servers or gateways for information collection and analysis [2], and the relationship between a sensor and an actuator was clearly defined .Such difference is one of the most definitive features that distinguish the IoT-based smart homes and the past home automations. Therefore, in the future smart homes, a new type of IoT is needed to provide various services and to improve human life, without user intervention.

RELECTED WORK

This paper proposes a Home Automation system that consist of smart phone, cloud networking, wireless communication, and embedded system to provide the user with remote control and monitor of various lights and home appliances within their home. This system uses a smart phone application to provide a user interface to the user. The main objective of this paper is to design and implement a control and monitor system for smart home. Smart home system consists of many systems that controlled by ATmega328 IC as the main controlling system in this paper. Also, remote control system was supported to N the smart house system as a sub controlling system.

The smart phone is connected to the internet to monitor and control the home devices from anywhere, anytime in the world using ATmega328 IC. The prime job of this paper is to help handicapped and old aged people. It gives basic idea of how to control various home appliances using Android phone. The design consists of interface between android phone with home automation application. User can interact with the android phone and send signal to ATmega328 IC which in turn will control other embedded devices and sensors.

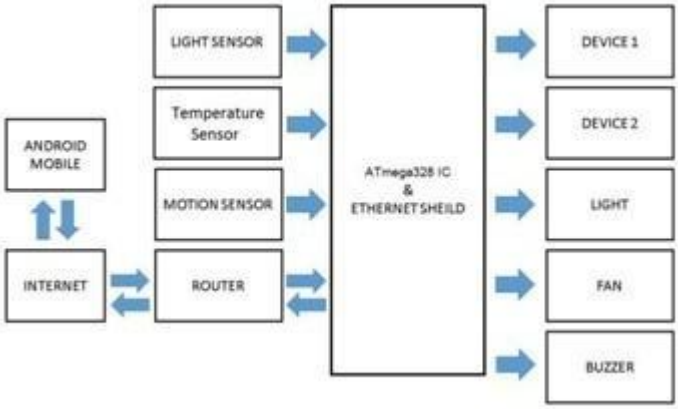
The home appliances are controlled by the Arduino which receives commands from the Internet, which operates according to the commands received from the mobile application via the internet. In our proposed system, the home server is built upon an Internet technology which receives commands from the client and the command is processed via Arduino, which allows a user to control and monitor sensors related to the home by using any Android capable smart phone or via the internet.

SYSTEM ANALYSIS

Home automation systems face some main challenges, these are high cost of ownership, inflexibility, difficulty in achieving security and poor manageability. The main intention of this research is to design and implement a home automation system using IoT that is able to control and monitor most of the home appliances through an easy possible android application. This will decrease the deployment cost and will increase the ability of upgrading, and system configuration.

Problem Definition

Home automation systems face some main challenges, these are high cost of ownership, inflexibility, difficulty in achieving security and poor manageability. The main intention of this research is to design and implement a home automation system using IoT that is able to control and monitor most of the home appliances through an easy possible android application. This will decrease the deployment cost and will increase the ability of upgrading, and system configuration.



Proposed System Design And Feature

In this proposed design of smart home automation system consists of internet, ATmega328 IC, sensor, home devices, smart phone, Ethernet Shield.

As above proposed system, sensor sense the home status then send status information to ATmega328 IC. ATmega328 IC process this status information then using Ethernet shield monitoring information send to smart phone. smart application developed to user interface for monitoring and controlling home appliances.

The proposed of smart home automation system is to monitor home parameter they are following:

[1] Temperature
[2] Motion
[3] Light

The proposed of smart home automation system is to control home appliance they are following:

[1] Fans ON/OFF/ dim/medium / full
[2] LDR ON/OFF slow / medium / fast
[3] Security alarm ON/OFF Other application ON/OFF

HARDWARE DESCRIPTION

ATmega328 IC:

The Atmega328 is a very much popular microcontroller chip produced by Atmel [4]. It is an 8-bit microcontroller that has 32K of flash memory, 1K of EEPROM, and 2K of internal SRAM

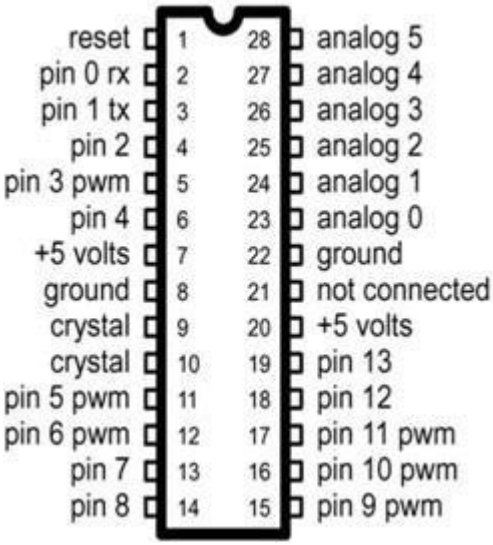


Fig.3: Pinout of the Atmega328

It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins

Fig.4: Atmega328 IC

These I/O pins account for 20 of the pins. Unlike the Atmega168 which has 16K of flash program memory and 512 bytes of internal SRAM, the Atmega328 has 32K of flash program memory and 2K of Internal SRAM. It has 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory. The AT Mega328 operate in very less power. It operates in between 1.8-5.0 volte's

Ethernet Shield

Fig. 5: Ethernet Shield

The Ethernet Shield is an Arduino-compatible expansion board ("shield") that gives your Arduino the ability to communicate as either a client or a server on an Ethernet network. The Arduino Ethernet Shield connects your Arduino to the internet in a minute. Just plug this Ethernet module onto your Arduino board. connect it to your network with an RJ45 cable and follow a few simple instructions and start controlling your world through the internet. It is freely available and open-source Hardware. It allows Arduino Board to connect through high speed internet. There is an onboard microSD card slot. It can be used to store files for serving over the internet. The onboard microSD card reader is accessible through the SD library.

Relay Board

A relay board is a probability model of the communication between a sender and a receiver aided by one or more intermediate relay nodes. This is a 4 Channel Relay module, it can be controlled directly by a wide range of microcontrollers such as Arduino. It is used to control various appliances, and other equipment's with large current. 4 Channel Relays are included in this module, with "NC" ports mean "Normally connected to COM" and "NO" ports mean "Normally open to COM". This module also added with 4 LEDS to show the status of relays.

Fig. 6: 4 Channel Relay board

PIR Motion Sensor

A Passive Infrared Sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. A PIR-based motion detectors is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-lighting systems

Fig. 7: PIR Motion Sensor

Feature

[1] working voltage range: DC 4.5-20V
[2] Quiescent Current :50uA
[3] high output level 3.3 V / Low 0V
[4] Trigger L trigger cannot be repeated / H repeated trigger
[5] circuit board dimensions :32 * 24 mm maximum 110 ° angle sensor
[6] 7 m maximum sensing distance

Application

[1] Security products
[2] Body induction toys
[3] Body induction lamps
[4] Industrial automation control etc. *C. LM35 Temperature Sensor*

Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. Above temperature sensor has three terminals and required Maximum of 5.5 V supply.

Fig.8: LM 35

This type of sensor consists of a material that performs the operation according to temperature to vary the resistance[6]. This change of resistance is sensed by circuit and it calculates temperature. When the voltage increases then the temperature also rises. We can see this operation by using a diode. Temperature sensors directly connected to microprocessor input and thus capable of direct and reliable communication with microprocessors[number]. The sensor unit can communicate effectively with low-cost processors without the need of A/D converters.

Feature

[1] Calibrated Directly in Celsius (Centigrade)
[2] Linear + 10-mV/°C Scale Factor
[3] 0.5°C Ensured Accuracy (at 25°C)
[4] Rated for Full −55°C to 150°C Range
[5] Suitable for Remote Applications
[6] Low-Cost Due to Wafer-Level Trimming
[7] Operates from 4 V to 30 V

[8] Less than 60-µA Current Drain
[9] Low Self-Heating, 0.08°C in Still Air
[10] Non-Linearity Only ±¼°C Typical
[11] Low-Impedance Output, 0.1 Ω for 1-mA Load

Application

[1] Power Supplies
[2] Battery Management
[3] HVAC

LDR Light Sensor

A light dependent resistor also known as a LDR, photoresist, photoconductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity[7]. LDRs (Light Dependent Resistors) are a very useful tool in a light/dark circuits. A LDRs can have a variety of resistance and functions. For example, it can be used to turn on a light when the LDR is in darkness or to turn off a light when the LDR is in light[8]. It can also work the other way around so when the LDR is in light it turns on the circuit and when it's in darkness the resistance increase and disrupts the circuit[9

Fig.9: LDR Light Sensor

Feature

[1] Quick Response
[2] Reliable Performance
[3] Epoxy or hermetical package
[4] Good Characteristic of Spectrum

Application

[1] Photo switch
[2] Photoelectric Control
[3] Auto Flash for Camera
[4] Electronic Toys, Industrial Control

SOFTWARE DESCRIPTION

Android SDK

Android software development is the process by which new applications are created for the Android operating system. Applications are usually developed in Java programming language using the Android Software Development Kit(SDK), but other development environments are also available. To build the android application to receive the live video feed from the camera and to send the control signals to control the robot.

Arduino IDE

The Arduino open source IDE makes it easy to write code and upload it on any Arduino board. It runs on Windows, Mac OS X, Linux and many other operating systems. The environment is written in java and based on Processing and other open source software.

CONCLUSION

Internet of thing is growing technology and increasing use in various applications such as smart lab, smart car, military area, smart office, industry. In this paper, Internet of Things technology use for smart home automation. we propose new architecture for efficient monitoring and control system that consist of smart phone, Atmega328 IC, various sensors and home appliances. Sensors collect the parameter (light, motion etc.) data pass to

ATmega328 IC. This parameter data analysis, processing and compare operation done by ATmega328 IC then output send to the smart phone(user) thought internet. Using internet monitoring and control the various home parameter from anywhere by smart phone.

FUTURE ENHANCEMENTS

The same system can be developed at a very large scale for computer lab's where monitor and control PC form time based system. Here we provide time based system that means we can apply time interval of each practical. Suppose in college there is a practical section of 2 hour. The PC can be ON for that 2 hour only otherwise they shutdown automatically. User need to set the timer of practical section.

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