

IOT TESTING SHIELD

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Abstract - This paper presents a low-cost, flexible home control and environmental monitoring system. It uses a micro web server embedded in the Arduino Mega 2560 microcontroller with IP connectivity to remotely access and manage devices and devices. These devices can be controlled via a web application or via a Bluetooth Android based smartphone app. The proposed system does not require a dedicated server PC to connect to similar systems and provides a new communication protocol for monitoring and controlling the home environment rather than the switching function. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plugs, temperature sensors, gas sensors and motion sensors can be integrated with the proposed home control system.

Keywords: Embedded micro-web server, Arduino Mega 2560 microcontroller, Home control system, Temperature Sensor, Relay.

1. Introduction

Nowadays, security systems play an important role in saving and investing lives. This can be achieved by combining different subsystems into a security system using a single control unit, such as surveillance, intrusion control, access control, and fire detection. The smart home includes lighting, heating and electronic devices, which can be controlled remotely via a smartphone or the Internet. An Internet-based home automation system focuses on the management of home electronics in or out of your home. Home automation gives a person the ability to remotely or automatically control the objects around the home. A home appliance is a device or device designed for a specific purpose, such as an electrical device such as a refrigerator. The terms apparatus and equipment are used interchangeably. Automation is the current state of things where things are automatically controlled, usually on or off certain devices, beyond, remotely or near. Automation reduces human judgment to the lowest possible level, but it does not eliminate it completely. The idea of remote management of home appliances via the internet is a reality anytime in the world today. A system that can track the status of consumer devices from the office desk, tune in to

the TV set to its favorite channel, take control, turn on the cooling system, turn on or off the air conditioner. Lights. This user can return home and find only the most comfortable and beautiful home. Recent developments in technology that allow the use of Bluetooth and Wi-Fi have enabled the ability to connect different devices. Using the WiFi Shield to act as a micro web server for the Arduino eliminates the need for wire connections between the Arduino board and the computer, reducing costs and allowing it to function as a standalone device. The Wi-Fi Shield requires a connection to the Internet from a wireless router or wireless hotspot, which acts as a gateway for the Arduino to communicate with the Internet. Taking this into account, the Internet-based home automation system is designed for remote control of home appliances.

2. Literature review

S. Anusha, M. Madhavi, R. Hemalatha. Developed IoT based home automation system using microcontroller and Java based Android application. The microcontroller used is ATmega328. They have also used the GSM module to help them use the system remotely.

Santosh Mugali¹, Bindu G², Subbalakshmi Chilukuri³, Deepthi G⁴, Kavya B⁵. A low-cost, flexible home control and monitoring system that uses a micro-web server embedded with IP connectivity to remotely access and manage devices and devices using the Android-based smartphone app. The proposed system does not require a dedicated server PC to connect to similar systems and provides a new communication protocol for monitoring and controlling the home environment rather than the switching function. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plug, temperature sensor and current sensor are integrated with the proposed home control system.

Madhu P¹, Dr. S Pradeep², Mallappa D³, Manjunath H⁴, Ningappa N⁵, Prashant M⁶. The design and design implementation of the new home automation system uses Wi-Fi technology as a network infrastructure that integrates its components. Their system consists of two main parts; The

first part is the system core web server (s) that manage, manage and monitor the homes of the customers. Users and system administrators can manage and control the system code locally (LAN) or remotely (Internet). The second part is the hardware interface module, which provides the right interface for sensors and the actuator of the home automation system. Unlike most home automation systems available on the market, the server can control most hardware interface modules as long as there is Wi-Fi network coverage. The system supports a wide range of home automation tools, such as power management components and security components. From a scalability and flexibility standpoint, the proposed system is better than commercially available home automation systems.

Ms. Priyanka V. Rathod¹, Ms. Bhagyashree K. Sarode², Prof. K. P. Mahure³. In a Bluetooth-based home automation system, the Arduino BT board is connected to the input output ports using the home relay. The Arduino BT Board's program relies on high-level interactive C language for microcontrollers; The connection is made via Bluetooth. Because password protection is provided, only authorized users are allowed access to the devices. Bluetooth connection is established between the Arduino BT board and the phone for wireless communication. This system uses Python script and can be installed in any Symbian OS environment, it is portable. Designs and implements the circuit to receive feedback from the phone, which indicates the state of the device.

Aganit Thakur¹, Manisha Dewangan, Priya Lalwani³. The Wi-Fi based home automation system consists mainly of three modules, the server, the hardware interface module, and the software package. The system model shows the layout picture. WiFi technology uses a server and hardware interface module to communicate with each other. The server uses the same technology to login to a web-based application. Because the server is connected to the Internet, remote users can access the server's web-based application over the Internet using a compatible web browser. The software server of the latest home automation system is divided into application software and microcontroller (Arduino) firmware. The Arduino software comes with a microcontroller built into C language and IDE. The Arduino software is notorious for collecting events from connected sensors and then applying functionality to actuators and preprogramming the server. Another task is to report the server to the DB and record the history. Server application software package for a specific home automation system A web-based application built using Asp.net. A server that

supports asp.net technology with any Internet navigator can access server application software from an internal network or Internet if the Internet has a real IP. Server application software is offensive and manages the entire home automation system, setup and configuration. The Home Automation Server uses the database to store system components, and we choose to use XML files to save the system log.

3. Existing system

A distributed home automation system includes a server and sensors. The server manages and monitors various sensors and can be easily configured to handle more hardware interface modules (sensors). The Intel Galileo Development Board works as a web server with a built-in WiFi card port. The automation system can be accessed from any local PC or mobile handheld device connected to the Internet using the server's IP or the web browser browser of any local PC on the same LAN. WiFi technology was chosen as the network infrastructure that connects the server and the sensor. WiFi has been selected to improve system security (using a secure Wi-Fi connection) and increase system mobility and scalability. For example, while you're away from your home, you're connected to a mobile microcontroller with the help of a data cable and RS232 level converter, and you want to 'turn on' any machine and textile machinery (or) industrially. Printing. You need to send an SMS, including fan, air cooler, and associated machine number and mode type to the mobile phone. It is associated with a microcontroller in the company or at home.

4. Proposed system

The basic block diagram of a smart home system is shown in Figure 1. The microcontroller is used to obtain physical state values through connected sensors [4]. Temperature Sensor Reed Temperature values, gas sensor smoke and cooking gas are detected to prevent fires. The Light Dependent Resistor (LDR) automatically controls light transfer, which determines daylight intensity. In addition, to incorporate security into our design, the motion detector is integrated with Passive Infrared Sensor (PIR) to detect movement in the home while the security system is on. The relay switch is used to send control signals from the microcontroller to the electronic device used to turn the switch on and off. The web portal is created using a single-component authentication system (username and password) to check the authenticity of the home user. It also serves as an input tool for controlling household appliances and as an output device for reading physical condition values. The mobile application

uses the same approach to serve as an input and output device.

4.1 Block diagram

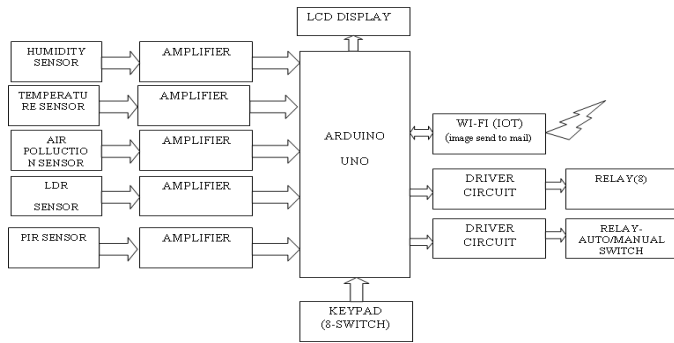


FIGURE-1. Block Diagram of Proposed System

4.2 Temperature Sensor

The thermistor is a type of resistor whose resistance varies with temperature. The term is the portment of heat and resistance. The thermistor is widely used as internal current limits, temperature sensors, self-reset setting and self-contained heating elements in current protectors. Thermistors differ from Resistance Temperature Detectors (RTDs), and the material used in the thermistor is usually ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful in large temperature ranges, but thermistors achieve high accuracy over a limited temperature range [typically from -90 to C to 130 ° C].

4.3 IOT (Internet of Things)

The Internet of Things (IoT) is a network of physical devices, appliances, vehicles, electronics, software, actuators, sensors and connectors.

4.4 LCD Display

Liquid Crystal Display (LCD) is a thin and flat electronic visual display that uses light modulating properties of liquid crystals (LCs). LCs do not emit direct light. They are used in many applications, including computer monitors, instrument panels, television, signage, and aircraft cockpit displays. They are common in consumer devices such as gaming devices, video players, watches, clocks, telephones and calculators. LCDs have replaced cathode ray tube (CRT) displays in most applications.



FIGURE-2. LCD Display

4.5 Arduino UNO

Arduino Uno is an ATmega328P based microcontroller board. It has 6 analog inputs, 14 digital input / output output pins (6 of which can be used as PWMP outputs), 16 MHz quartz crystal, power jack, ICSP header and reset button, and a USB connection. It contains everything needed to support the microcontroller; Connect it to a computer with a USB cable, or power it with an AC-to-DC adapter or battery. You can tinker with your UNO without worrying too much about anything wrong, in the worst case scenario you can replace this chip for a few dollars and start again.

4.6 WiFi

WiFi enabled devices such as a video game console, personal computer, smartphone or digital audio player can connect to the Internet when the wireless network is connected to the Internet.

4.7 Moisture sensor

Also known as a humidity sensor and hygrometer, the relative humidity of the air is measured and reported regularly. They can be used in homes with moisture-related diseases; As part of home heating, ventilating and air conditioning (HVAC) systems; In humidifiers or wine cellars. Moisture sensors can be used in cars, offices, industrial HVAC systems, and weather forecasting and forecasting. Moisture sensor experiences relative humidity. This means that it measures the temperature and humidity of the air. Relative humidity, expressed as a percentage, is the ratio of the actual humidity in the air to the highest humidity in the air. The air is warm and can retain much moisture, so the relative humidity changes with the fluctuation in temperature. The most common moisture sensor is called "capacitive measurement". This system relies on electrical capacitance or the ability to create an electric field between two adjacent electrical conductors. The sensor consists of two metal plates and a non-conductive polymer film between them. The film collects moisture from the air and moisture causes small changes in the voltage between the

two plates. Changes in voltage are converted to digital readings showing air humidity.

4.8 LDR Sensor

LDR is a (variable) resistance component that varies according to the intensity of light. This allows it to be used in light sensing circuits. The most common LDR is the resistance to increasing the intensity of light falling on the device (as shown in the image above). The resistance of an LDR may typically have the following resistances:

Daylight= 5000Ω (5k ohm)

Dark = 20000000Ω (20m ohm)

4.9 Relay

Relay power switch. The current flowing through the coil of the relay creates a magnetic field that attracts the lever and changes the switch contacts. Since the coil current can be switched on or off, the relays have two switch positions, which are double throw switches. The relays allow one circuit to be moved to the second circuit completely separate from the first. For example, a low-voltage battery circuit can use a relay to replace a 230V AC main circuit. There is no electrical connection in the relay between the two circuits; The link is magnetic and automatic. The relay's coil runs through a relatively large current, usually 30 mA for a 12 V relay, but can reach up to 100 mA for relays designed to operate from low voltages. Most currents (chips) do not provide this current and the transistor is commonly used to increase the small IC current to the large value required for the relay coil. The maximum current output current of the popular 555 Timer IC is 200 mA, so these devices can provide relay coils without amplification. Relays are usually SPDT or DPDT, but they may have additional set of switch contacts, for example relays with 4 sets of change contacts are easily available. Most relays are designed for PCB machining, but you can solder the wires directly to the pins to prevent the relay's plastic case from melting. The animated image shows the relay running with its coil and switch contacts. You can see that the lever on the left is attracted by the magnetism when the coil is switched on. This lever moves the switch contacts. Also on the front is a set of contacts (SPDT), which makes the relay DPDT.

5. Results

The system ensures the safety of the research laboratory by constantly monitoring the environment and tracking the

availability of an individual. Environment parameters are sent to the server, which can be accessed through the smartphone app.

6. Conclusion

In this paper, we propose and implement an Android based smartphone for a low cost, flexible home control and monitoring system. Specific architecture uses the micro web server and Bluetooth communication as an interoperable application layer to communicate with the remote user and home devices. Any Android-based smartphone with built-in support for Wi-Fi can be used to access and manage home devices. When a Wi-Fi connection is unavailable, mobile cellular networks such as 3G or 4G can be used to access the system. The system also uses the Google Speech Recognition Engine, eliminating the need for an external voice recognition module. Future works include integrating SMS and call alerts and reducing wiring changes to install specific systems in pre-existing homes by creating a wireless network in the home environment to control and monitor the smart home environment.

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