

Wireless Automation System Based on 8051 Microcontroller with Surveillance

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Abstract: -- In concentration to the advancement of technology, the ability of performing things is becoming easier day by day .In contrast with the unit; it explains its needs and usages and it is designed with 8051 microcontroller. Accessing this unit is based on the concept of wired/wireless communication. Security is the second major concern of this unit to emphasize anti-theft.

Keywords:- Home Automation, WAN, IP Address 8051 Microcontroller, Security, Surveillance RS232

I. INTRODUCTION

Generally Automatic systems are preferred now a days as it reduces the burden of a common man. We see almost of all things are becoming centralized. On the other hand, automation systems installed in commercial buildings do not only increase comfort, but also allow centralized control of heating, ventilation, air condition and lighting. Hence, they contribute to an overall cost reduction and also to energy saving which is certainly a main issue today. Existing, well established systems are based on wired and maximum extent of Bluetooth and as far as wireless is being implemented for a shorter distance. Whereas accessing the same unit elsewhere in the world makes it more convenient in operation and user friendly. This helps in continuous monitoring of the current place elsewhere.

Obviously, wireless systems can come to help here. Wireless based systems, used every day and everywhere, ranges from wireless home networks and mobile phones to garage door openers. Taking into consideration of wireless technologies it has several advantages that cannot be achieved by wired network.

- a) Installation cost reduction: Mainly, the switchboards are totally removed. As there is no physical requirement of On/Off of equipment's, where it reduces the material cost.
- b) Security and Surveillance: The major advantage is that the concerned place is 24/7 monitored at your fingertips.

- c) Integration of mobile devices: With wireless networks, associating mobile devices such as PDAs and Smartphones with the automation system becomes possible everywhere and at any time, as a device's exact physical location is no longer crucial for a connection (as long as the device is in reach of the network).

II. TECHNOLOGY IMPLEMENTED

Over Years 8051 Microcontroller is the basic Microcontrollers which are being used to program and perform specific tasks. Nowadays With same Microcontroller many new applications are being formed. Such as Data monitoring, Simulations, and today's trend with automation systems. As we know 8051 has a very simple architecture, in which the controller can be programmed with simple "C Language". With advancement of Technology C language is becoming very vast nowadays.

III. SYSTEM FEATURE

With the advancement of technology, C language is becoming the key language for any IT companies. As the system works based on wireless, IP Address will play a major role on this system. Using the IP Address a system can be accessed sitting elsewhere (Anywhere until the user is connected to the WAN). Here with the help of the IP address the concerned place is being monitored 24/7.

Wi-Fi technology is selected to be the network infrastructure that connects server and hardware

interface modules. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability. Even if, user intends to add new hardware interface modules out of the coverage of central access point, repeaters or managed wireless LAN will perfectly solve that problem.

The main functions of the server is to manage, control, and monitor distrusted system components, that enables hardware interface modules to execute their assigned tasks (through actuators), and to report server with triggered events (from sensors). Hardware interface modules are directly connected to sensors and actuator through direct wires connections. Hardware interface modules has the capabilities to control energy management systems like lighting, thermostats and HVAC (heating, ventilation, and cooling) systems, and security systems (door locks, cameras, motion detectors, fire alarms...).

IV. DESIGN AND STRUCTURE IMPLEMENTATION

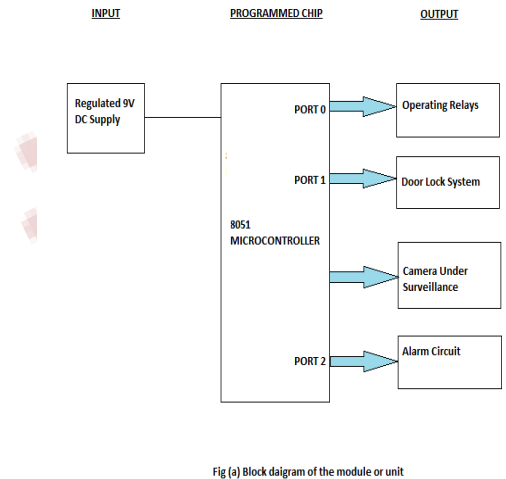


Fig (a) Block daigram of the module or unit

Figure (a) describes the block diagram of this 8051 module which defines the connectivity with the module and the supply. Further figure (b) gives the architecture of this unit

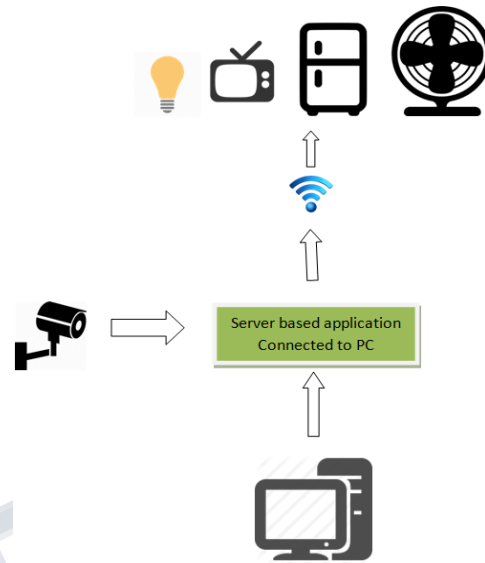


Figure (b) Architecture of the Home automation system.

V. HOME AUTOMATION SYSTEM APPLICATIONS

This Home automation Systems has many Capabilities of working, such as

- ♣ Temperature and humidity
- ♣ Motion detection
- ♣ Fire and smoke detection
- ♣ Door status
- ♣ Light level
- ♣ Video monitoring the proposed home

The proposed home automation system can control the following appliance Serine

- ♣ Lights on/off/dim
- ♣ HVAC on/off
- ♣ Door lock
- ♣ Window shutdown On/off different
- ♣ Appliances.

Assumption made in Home automation systems

- ♣ The computer must always be connected to WAN.
- ♣ Each User must have a User ID and password
- ♣ There is only one Administrator.
- ♣ Server must always run under windows system

- ♣ There should be Internet connection available.
- ♣ Proper browsers should be installed
- ♣ Proper Hardware Components are available
- ♣ User is capable of using a computer

VI. CONCEPT USED FOR SOFTWARE

Software of the Home Automation system is divided to server application software, and Microcontroller firmware. Server Application software package for the home automation is a web based application ,which runs on the Windows OS, with the help of the server application the system can be accessed elsewhere . With reference to with surveillance camera it is based on the IP Camera, which can be accessed at the users place. Server application software is responsible of setup, configuration, maintain the whole home automation system. Server uses database to keep log of home automation system components,

Keil microvision is the software used to program the microcontroller, in which C language is being used.

VII. DESCRIPTION

As in the microcontroller there are 4-ports present, in which this module, port 0-is interfaced to the relay for the operation (having a rating of 20A,220v each) of the home appliances such as light, fan, TV, heating appliances etc. And port 1-is interfaced with door locking system and alarm system which are all automated.

Port 3- is interfaced with RS232 so as to Transfer and receive the data serially. As serial data can only be interfaced to port 3.This serial data can be transferred and received wireless using WAN. IP Camera is being used for camera surveillance, which is 24/7 monitored for security and antitheft purpose. And connected to the pc . The data is being logged via serial communication that is UART in the module. The data's are continuously updated to the users in real time. The data are either updated in computer or any smart phones.

VIII. BENEFITS

- ♣ Adds safety through appliances and lighting control
- ♣ Secures home through automated door locks

- ♣ Increase awareness through security cameras
- ♣ Increase convenience through temperature adjustments
- ♣ Saves time, money and increases convenience
- ♣ Contributes to economy
- ♣ Increase peace of mind
- ♣ Allows user to control when they are out of town
- ♣ Keeps tabs your children

IX. CHALLENGES FACED

During the home automation system there were many challenges faced which gave the drawback to this system.

- ♣ They majorly cannot be implemented in the areas where there is no connectivity
- ♣ Comparatively more power consumption
- ♣ During power failure need of backup is necessary which in turns increases the cost
- ♣ If there is any damage due to rupturing of cables or fibers the entire system gets crashed
- ♣ Human errors may lead to destruction of the machine
- ♣ Serial communication can only be interfaced with port 3.

X. SYSTEM REQUIREMENTS

The following list gives an overview of the most important Requirements of the proposed system

1) User friendly interface: User can easily manage system Locally or remotely home automation system, through Easy web based interface.

2) Security and authentication: Only authorized user can login to the system (locally, or remotely) in order to manage, control, & monitor. If system detects intruders it should immediately alert the system owner and lock login capability for a while.

3) Low cost per node / High node count: Thinking of Building automation, hundreds of nodes may be needed to provide automation. However, the market requires competitive performance (compared to wired networks) to be delivered at this low system cost. Additionally, also

protocols need to scale to high node count e.g., ensuring message delivery

4) Large area coverage: Another challenge lies in the fact that devices of a building automation system are dispersed over large areas. Since transceivers must not consume so much power, they cannot be built with a transmission range sufficient for sensors to reach associated controllers or actuators directly. Also, they may rely on an infrastructure of access points and a wired backbone network (or particularly sensitive receivers).

5) System Scalability: Scalability is the ability of a system, network, or process, to handle growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth. For example, system Upgrade/downgrade by adding/removing hardware Interface module should be easy and systematic task.

XI. CONCLUSION

This paper proposes a low cost, secure, ubiquitously Accessible, auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the Wi-Fi technology to connects system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provide home security and is cost-effective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

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