Home Automation, Security and Storage System Using Cloud Computing
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Abstract— Home Automation, Security And Storage using cloud network is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world. An Automated Home is sometimes called a smart home. This network uses a consolidation of a mobile phone application and PC based program to provide the means of user interface to the consumer. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. In this paper we have developed a Home Automation system that employs the integration of multi-touch mobile devices, cloud networking, wireless communication to provide the user with remote control of various lights and appliances within their home. The home automation system differs from other systems by allowing the user to operate the system without the dependency of a mobile carrier. This system is designed to be low cost and expandable allowing a variety of devices to be controlled. The Home Security and Storage system makes use of sensors, video cameras for remote sensing and surveillance, streams live video and records it for future playback and a central device to secure an area. Currently the devices are standalone and not require the users to be physically present to operate the devices with no interaction possible between two different devices. The system is also limited by its computational resources and storage capacity. For this project, I have developed a cloud based client server architecture to address these limitations and also to provide security and sharing functionalities along with remote diagnostics. This project has a device level framework to communicate with and exchange information with a cloud server. The project also addresses the primary limitations of cloud computing namely security, privacy and user control.

Key words: Mobile cloud computing, Home security and automation, video cameras, sensors, Internet, Cloud Server

I. INTRODUCTION

A. Home Automation:
In previous work, many of the home automation systems are locally controlled and it uses a controller within a home to achieve home automation. In this project, we use cloud server for home security system which allows the users to control their home appliances from any of the devices such as (mobile device, personal computer, tablets, notebooks etc.), by accessing corresponding home server through website.

B. Home Security:
Home security system controls and operates motion detectors, video cameras for surveillance, stream live videos. The proposed home security solutions hinges on our novel Integration of cameras and motion detectors into a website. For instance, when motion is detected, the cameras automatically initiate recording and the home server alert the homeowner, neighbor and police station of the possible intrusion. If any exploitation is occurred, the temperature sensor automatically alerts the home owner, neighbour and fire station of possible incidents.

C. Storage:
In this system we provide each and every user with a separate storage in cloud database by login authentication. In that storage, the recorded videos and user activity logs are stored. This system also includes storage and security for user files and documents.

II. EXISTING SYSTEMS

A. Wireless home and industrial automation security system using GSM:
- The microcontroller will continuously monitor all the sensors and if it senses any security problem then the microcontroller will send the SMS to the user mobile through GSM modem.
- The Microcontroller also turns ON and OFF the electrical appliances in home and industry based on SMS received from the user.

B. Disadvantage:
1) Wireless and Industrial Automation Security System Using GSM:
In this system the automation of the electrical appliances in home and industry based on SMS received from the user.
2) Advanced Universal Remote Controller for Home Automation and Security:
- A URC Touch Panel Wi-Fi-based control and monitoring.
- The URC touch panel is connected to wireless TCP/IP switcher through the Wi-Fi protocol, and both door camera and lock are also connected to the switcher through corresponding converters. When a visitor pushes a door bell, a captured image of the visitor with a door camera can be displayed on the portable URC in a real-time mode.

C. Disadvantages:
1) Advanced Universal Remote Controller For Home Automation And Security:
- In this system the automation and security is depend upon the a URC Touch Panel.
- And in this the infrared remote is altered by URC touch panel.
III. HOME AUTOMATION SYSTEM ARCHITECTURE

![System Architecture Diagram](image)

The system consists of a real-time home monitoring sub-system and a light control sub-system. A home server with a home camera caters for home status through video to client. It also works as a home gateway to provide interoperability between the heterogeneous ZigBee and Internet and local and remote control over the home’s light devices through the light control sub-system.

A client can access the home server through a web service or smartphone. The client can monitor home status through a real-time monitoring sub-system and control the lights through the On/off control panel.

A. Zigbee:
ZigBee is a standards-based technology that addresses the unique requirements of most remote monitoring and control and sensory network applications. ZigBee builds upon the physical layer and medium access control defined in IEEE 802.15.4 for low-rate WPANs. The specification goes on to complete the standard by adding four main components: network layer, application layer, ZigBee device objects (ZDOs) and manufacturer defined application objects which allow for customization and favor total integration.

The initial markets for ZigBee included Consumer Electronics, Energy Management and Efficiency, Health Care, Home Automation, Telecommunication Services, Building Automation, and Industrial Automation. The core ZigBee specifications define smart, cost-effective and energy-efficient mesh networks. It is a self-configuring, self-healing system of redundant, low-cost, very low-power nodes. ZigBee is available as two feature sets, ZigBee PRO and ZigBee.

B. Home Automation Sub-System:
Home automation sub-system is composed of a server which works as a gateway, ZigBee coordinator, end-device, switch node and a light as shown in below fig.

![Home Automation Sub-system Diagram](image)

C. Features of Home Automation, Security and Storage System:
Some features and possibilities listed below assume an open cloud Platform as a Service with an API available to Web developers but most of the features will also be available in a closed commercial or a private cloud system that provides means for home automation.

D. Worldwide Availability of the Data:
Cloud providers will usually have a much higher reliability and availability than private Web servers. The provider might also have certain SLAs stating the capabilities and limits of the service so that a customer can assess his risks based on these data.

E. Cost Reduction for the Customer:
No permanently online Web server is required. This means no more maintenance costs for a privately owned server. The cloud provider will usually bill the customer for computing time and bandwidth but often those costs are less compared to the potential risks of running the system on your own.

F. Highly Reduced Risk of Losing the Data:
Storage is replicated in the cloud.

G. Highly Reduced Risk of Server Outage:
Cloud computing is highly distributed.

H. Cloud Platforms Support Multiple Protocols:
To talk to automation devices, the user does not have to stick to a certain vendor. Of course not all cloud platforms support every proprietary protocols and formats, but the user/customer can choose from a wider range of devices and the provider might integrate more functionality (protocols/formats) over time as the platform expands.

I. Cloud Platforms Offer Device Data in a Uniform Way:
This essentially means that a middleware is integrated directly into the cloud system to offer a common API to theWeb application developer. This has the advantage that the user does not have to care about different vendors himself but is presented with a consistent interface to interact with his devices.
J. Easy and Efficient:
A cloud platform can offer easy and efficient ways to interact with devices and automate certain routines for the user.

K. Home Security System:
![Block Diagram for Home Security System](image)

Fig. 3: Block Diagram for Home Security System

With the increased availability and the potentially massive processing power of the cloud, things like face and speech recognition, burglar detection, automatic alarming and many other security services can be made available to the customer. Examples of such use cases are:

L. Automatic Burglar Detection:
Based on the location of the legitimate users (or some other factor, like the current time), the system can potentially detect intruders and inform the home owner. The home owner can then take steps to counter the intrusion (possibly by using the system itself).

M. Automatically Inform Emergency Services:
Emergency services like police, fire brigade or even emergency medical services can be notified automatically based on the available data. Video cameras and motion detectors can be used to detect intruders, smoke/heat detectors can be used to alert the fire brigade and wearable electronics can monitor vital signs and notify an ambulance in case of an emergency.

N. User Recognition:
Users can be recognised based on their appearance or their voice; this can be used by the system to offer individualised services/routines for each user. An example would be to play specific music based on the recognised person.

O. Intrusion Detection System:
When the user is at remote premises and if there is a security breach then he is informed about it through SMS. The user in turn can control the gas valve and door lock through the reply SMS. The working of the security monitoring and control system is as follows. Three sensors namely PIR, vibration and magnetic read switch are used. Vibration and magnetic read switch are installed at doors and windows. PIR sensor is sensitive to the infrared radiation emitted by human being and hence used for human detection. Vibration sensor is used for monitoring vibration and hence used for detecting window breaking. Magnetic read switch is used for sensing door breaking or door opening. When the intrusion is detected by these sensors, it then sends the signal immediately to the microcontroller. The microcontroller converts the analog signals in to digital signals for transmitting it to the zigbee. The zigbee is interfaced with the microcontroller using the max 232 converter which provides serial communication. The Zigbee end device then transmits the signal to the zigbee coordinator. The ZC is interfaced with the microcontroller by means of max 232 converter. A GSM/GPRS module consists of a GSM modem with standard communication interface max 232 converter, so that it can be easily interfaced with a microcontroller. The power supply circuit is also built in the module that can be activated by using a suitable adaptor. AT commands are sent by the microcontroller to the GSM module for communication with the GSM cellular network. Once intrusion is detected, a text message is sent to the owner indicating security breach. On receiving the text message, the user can use the Skype account in the mobile phone for making a video call. The Smartphone with net connectivity, present in the home feeds the owner with a live video. On viewing the video the user can know whether the intruder is a known person or not. Then the user can communicate with the system through reply SMS. If there is a reply SMS from the user, the GSM module communicates with MCU in the same manner, but in reverse direction. The mobile phone number is first scanned, if it is authorized, then further communication is made. Then accordingly the owner can control the faint gas valve and lock the door. The faint gas valve is activated by SMS sent by the owner, the DC motor starts working. The shaft of the DC motor exerts a force on the gas sprayer and as a result the gas starts spraying throughout the room. Then finally the user can lock the door by sending the corresponding command... to the GSM module. Thus the system is not only used for monitoring but also for controlling purpose ensuring the reliability and safety of home.

![Intrusion Detection](image)

Fig. 4: Intrusion Detection

![LCD display showing intrusion detection](image)

Fig. 5: LCD display showing intrusion detection
P. Privacy and Storage:

Privacy concerns deal with the fact that by uploading all the information about your surroundings, your cloud service provider can potentially analyze all this data and your life becomes transparent to the company, which is able to make a profit from your behaviour by either selling your profiling information to third parties.

Security concerns deal primarily with the fact that the information that gets sent from a home to the cloud could potentially be used to harm a user in some physical or financial way.

IV. CONCLUDING REMARKS

Recently, the home environment has seen a rapid introduction of networked digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Moreover, with the rapid expansion of the Internet, there is the added potential for the remote control and monitoring of such networked devices. ZigBee has become one of the most promising technologies for home networks. ZigBee is a specification for a suite of networking, security and application software layers using small, low-power, low data rate communication technology based on IEEE 802.15.4 standard for personal area networks. Moreover, owing to the rapid growth of mobile technology, high-performance smartphones are widespread and in increasing cases they are being utilized as a terminal device. This paper proposes design and implementation of a remote monitoring and controlling system based on ZigBee networks. Real-time remote monitoring is implemented with JMF which is a multimedia extension API of Java. The remote controlling is implemented using ZigBee networks. The client program in a smartphone is implemented on the android platform. Clients can monitor their homes and send light control commands using the web or a smartphone. This system can be applied in many areas such as elderly protecting systems, cultural heritage or forest fire monitoring systems, managing systems for agricultural cultivation and so on. As a future work, we consider expansion of the system using various sensors and actuators.

REFERENCES


[10] Figure 8 Wireless, Z-Stack/Z-Tool Serial Port Interface, (2005).


