

Smart Storage for Home Application

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Abstract - With the openness, flexibility and features that Android offers, it has been widely adopted in applications beyond just Smart Phones. This paper presents the design and implementation of a low cost yet compact and secure Android smart phone based on home automation system. This design is based on the popular ARM 11 hardware board, in which cloud computing can be established, where the sensors and electrical appliances are connected to the input/output ports of the board. Seed block algorithm is used for providing secure access to the data. In order to enhance the system responsiveness and to make it more dynamic, we have been integrating a popular and stable LINUX OS.

Key Words: Seed block, Cloud computing, ARM 11 board, Home automation, Raspberry pi.

1. INTRODUCTION

With the continuous growth of mobile devices in its popularity and functionality the demand for advanced ubiquitous mobile applications in people’s daily lives is continuously increasing. Utilizing web services is the most open and interoperable way of providing remote service access or enabling applications to communicate with each other. An attractive market for home automation and networking is represented by busy families and individuals with physical limitations.

Here the idea is to present a flexible standalone, low cost smart home system, which is based on the Android app communicating with the micro-web server providing more than the switching functionalities. The ARM 11 board with WIFI support is used to eliminate the use of a personal computer (PC) keeping the cost of the overall system to a minimum.

In the proposed design, a low cost smart home system for remotely controlling and monitoring the smart home environment is presented. The system consists of an app developed using the Android platform and an ARM 11 WIFI based micro web-server. The ARM 11 is the main controller that hosts the micro web-server and performs the necessary actions that needs to be carried out. The relays are directly interfaced to the main controller. The smart home environment can be controlled and monitored from a remote

location using the smart home app, which will communicate with the micro web-server via the WIFI/Internet.

2. LITERATURE SURVEY

Sr. No	Title of paper	Technologies Used	Drawbacks
1	Implementati on of Cloud Server for Real Time Data Storage using Raspberry Pi,2015	Raspberry Pi, a cheaper microprocessor is used for storage.	No security for stored data and access permissions.
2	Seed Block Algorithm: A Remote Smart Data Back-up Technique for Cloud Computing, 2013	Helps user to collect information from any remote location in absence of network connectivity and file recovery in case of cloud destruction.	High cost, time complexity.
3	Secure Data Access Control Scheme for Smart Home,2015	Provides a secure data access control scheme and authentication.	Network connection dependency.
4	Secure authenticatio n scheme for IoT and cloud servers,2015	Provides robustness to application against multiple security attacks.	As it only supports user authentication by the server. This is unsafe as an attacker

			can impersonate as server to obtain information from the user.
5	Data storage auditing service in cloud computing: challenges, methods and opportunities, 2011	Efficient data owner and third party auditing.	High communication cost due to data retrieval.
6	Home automation using cloud network and mobile devices, 2013	These system uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world	These systems provide the user with limited access as the access area is restricted only within a specific range.
7	Android based security and home automation system, 2015	user is provided with multiple password based security which increases the daily life safety.	As Bluetooth is used for communication, this system is only suitable for short range communication.
8	A Load Balancing Algorithm For Private Cloud Storage, 2013	When the centralized coordinator receives the write request for a file, load balancer module in the centralized coordinator is used to distribute the chunks of	Does not provide encryption and decryption algorithm.

		that file in such a way to balance the load across the storage cluster	
9	Space Efficient And Reliable Storage System in the Cloud, 2015	Space Efficient And Reliable Storage system exploits the deduplication technique to reduce storage and traffic cost as well as increase the data reliability and the file retrieval speed.	Does not provide authentication to users.

3. SYSTEM DESIGN

The following figure gives a brief idea about the system architecture.

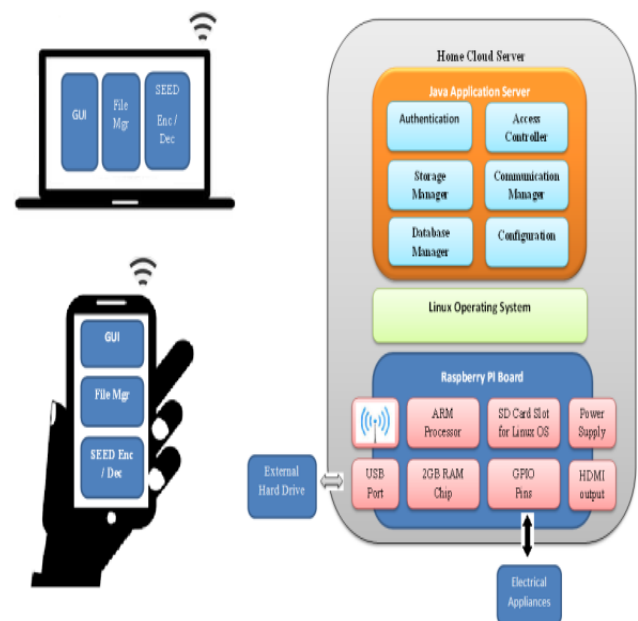


Fig - 1: Proposed System

4. MATHEMATICAL MODEL

- Let 'S' be the "Home cloud with automation support"

$$S = \{S_1, S_2, S_3, \dots, S_n\}$$

Set S is divided into 7 modules

S1= Request Handler (RH)

S2= Request Validator (RV)

S4= Configuration Manager (CM)

S5= Response Generator (RG)

S6= Database Manager (DM)

S7= Device Handler (DH)

2. Identify the inputs as I.

Inputs = {X1, X2, X3,, Xn}

X1= Files to upload

X2= Device ON/OFF request

3. Identify the output as O.

Outputs = {Y1, Y2, Y3,, Yn}

Y1= Device Switching

Y2= File storage

5. SEED ALGORITHM

With the help of SEED algorithm user can upload the encrypted files and while downloading, those files can be decrypted. SEED encrypted files upload mechanism to save user's private file. While uploading a private file, it will get XOR with users SEED number.

Let S be the SEED of user, F will be File to upload.

$$Y = S \oplus F$$

So the Y file will get uploaded to server. While downloading private file Y, it will get XOR with SEED to get original file back.

$$\text{Output file} = Y \oplus S$$

$$\text{Output file} = S \oplus F \oplus S$$

$$\text{Output file} = F \oplus 0$$

$$\text{Output file} = F$$

6. HARDWARE REQUIREMENTS

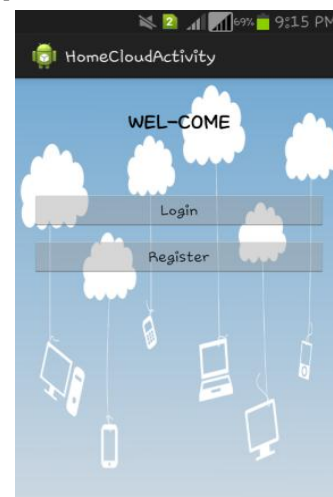
Raspberry pi is based on ARM based microcontroller and known as powerful tiny computer. A raspberry pi board with a prepared operating system SD card, USB keyboard, HDMI display, power supply It makes the Raspberry pi to work like a normal general purpose computer.



Fig -2: Raspberry pi board

7. APPLICATION SET-UP

Using Home cloud application files can be uploaded onto server and can be retrieved from it. One of the advantage is that it can be used for sharing data which ultimately saves storage space.



8. CONCLUSION

This system proposes a Smart storage system which uses Raspberry pi using which cluster of cloud can be formed. The proposed system will be cost-efficient, reliable as well as a feasible home cloud system which will help individuals to

upload and download files with effective usage of storage space. Various electrical appliances can be connected to provide home automation as well.

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