REMOTE CONTROL HOME APPLIANCE SYSTEM

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Abstract

The Remote Control Home Appliance System, which is being designed and discussed here, is a system which is a subsystem of a Smart Home. Smart Home, as the name says, It is a concept of making a home to be a smart home. A smart home consists of a home with its appliances and equipments as a smart one. It means that it can take decisions by its own based on its percepts. The percepts would be different based on what type of the sensors we are using. The main sensors which we are going to use in a Smart Home are the Temperature Sensors, Humidity Sensors, Ambient Light Sensors, Radiant Heat Sensors, Voltage sensors, etc.

Remote Control Home Appliance System, which is a subsystem of a Smart Home, is a practical level application of the Artificial Intelligence. This is the use of the Artificial Intelligence in the day to day life of tomorrow.

In this system, we have a web interface in which the user can login from a remote system and control the end devices which is at remote location.

Remote Control Home Appliance System (RCHAS)

Remote Control Home Appliance System is a system which is a subsystem of a Smart Home. Smart Home is a home which has highly advanced automated systems. It is an intelligent system as it can monitor many aspects of the daily life. There is an Universal Implementation Model for a Smart Home. Smart Home is also known as eHome. A smart home is called "intelligent" because the computer system inside the house has the ability to monitor and review many aspects of daily life. For example, the refrigerator may be able to catalog its own contents, recommend menus, recommend healthy alternatives, and order groceries. The smart home systems might even heed of cleaning the cat's litter box and watering the plants.

Universal Implementation Model of a Smart Home

This is an universal model of architecture in which a Smart Home could be implemented. The architecture could be described as follows.

Figure 1. Universal Implementation Model for a Smart Home.

There are four major components for the Universal Implementation Model for the Smart Home. They are

1. Central Management Unit(C.M.U)

2. User Interface

3. Home Equipment and Appliances Interface(HEAI)

4. External Communication Interface

Central Management Unit (C.M.U)

The CMU is the Heart of a Smart Home. As the name says, it is the central unit which manages the entire system. It has the capability

of taking decisions at different times as per the inputs given to them. Again, this has another four components. They are

a. Operating System (SHOS - Smart Home Operating System)

b. The Smart-Home Database (SHDB)

c. AI (Artificial Intelligence) Engine - Home Intelligence (HI)

d. Application Services (AS)
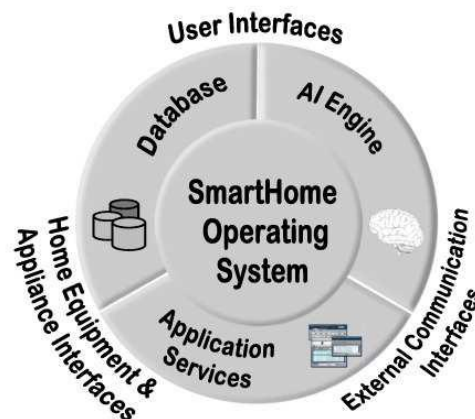
The architecture for the system is as follows,

Figure 2. Components of a Central Management Unit

a. Operating System (SHOS - Smart Home Operating System):- Smart Home operating system is an major part of the CMU. It is an operating system which is defined for taking actions in the real-time systems. For example, it can be a Linux Operating System where all the applications are written in and the actions are taken by its scheduler.

b. The Smart-Home Database (SHDB):- This is a database where we will store all of our information which includes what are the available equipments available, who all are authorized on what to perform etc.

c. AI (Artificial Intelligence) Engine - Home Intelligence (HI):- It is a self learning engine where we the system learns by itself and trains by itself that what action has to be taken. For example, in a situation where house is on fire, immediately it should take some actions. So, this will be a new situation where the artificial engine study about it and takes the action.

d. Application Services - These are the top layer where the applications are written.

User Interface

User Interface to the system can be in terms of a remote input, or a physical input given by the user to the system. This component deals with the interaction of the system with the user, how the system presented to the user.

Home Equipment and Appliances Interface(HEAI)

This takes cares about the interaction of the Central Management Unit with the End Devices. For example, if the CMU takes a decision to act on a particular end device, it will be given to this component. Thus the communication to the end device will be taken care by this component.

External Communication Interface

This component deals with the communication with external world like the www through the interfaces like internet, intranet etc.

Remote Control Home Appliance System (RCHAS)

RHCAS is a subsystem of a Smart Home. In RCHAS, there is a web interface which is available for the user to control the end devices. The user can login to the system and control the end devices remotely.

Hardware Requirements

- Beagle bone Black - Central Management Unit

- Micro Sd Card - For SHOS Loading(Linux in my project), SHDB, Application Services

- End Devices - 4 Led Bulb's, 400 ohm resistor connected in serial to the Led Bulbs.

Software Requirements

- Linux Operating System installed on a Micro Sd Card and loaded to Beagle bone Black.

- Python installed inside the Linux System

- Php5 installed inside the Linux System

- MySql installed inside the Linux System

- Apache or lighttpd server installed inside the Linux System
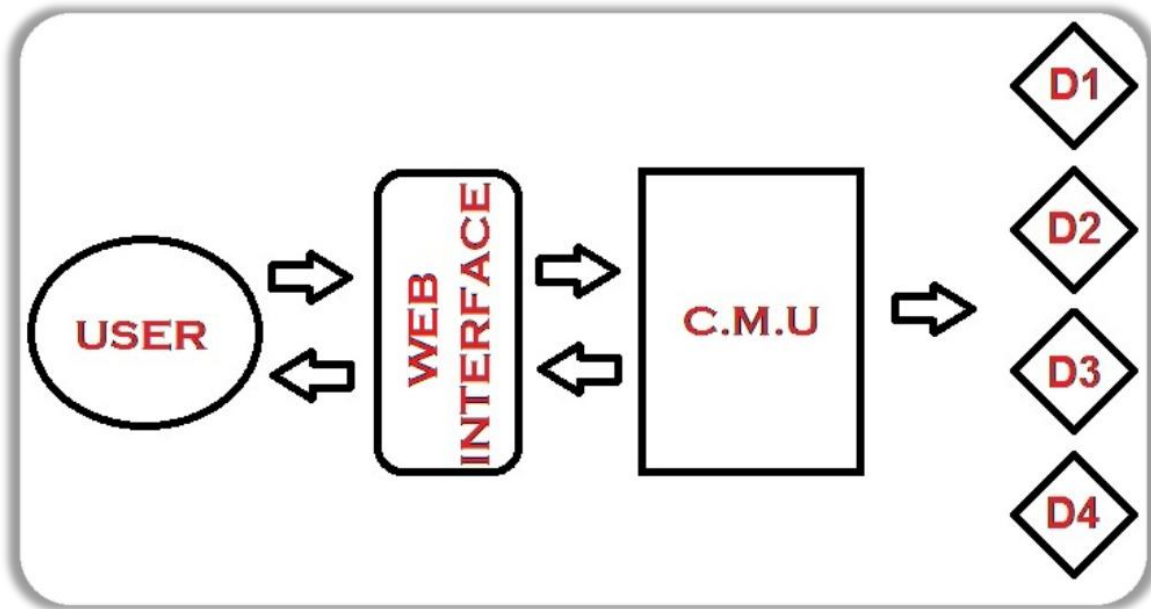
System Design

Figure 3. RCHAS System Design

There is a front end which is available for the user where he can login to the system. Once after successful login to the system, the can control the end devices D1, D2, D3, D4 etc.

Implementation

There is a Apache Server or lighttpd server running at port 80 of the Beagle bone Black. So, this listens to any of the incoming requests. Thus once we type the ip address of the board, it takes us to the login page which is configured with the server. Thus, the user will get the option to login to the system, where the user name validated across the password from a MySql database. After successful login, he can get into the page where the end devices are listed.

The current status of the device, whether it is switched ON or OFF will be displayed initially. After that, the user will be given the option to control the devices. The advantage of this is that the user is given the option to control his end devices remotely.
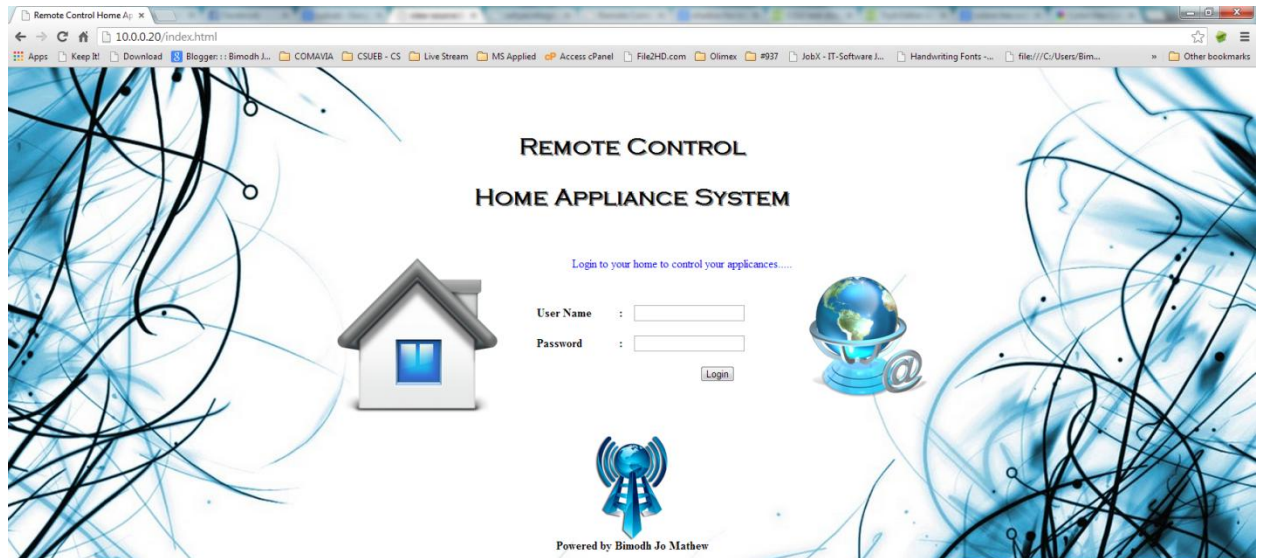
Output Screen Shots

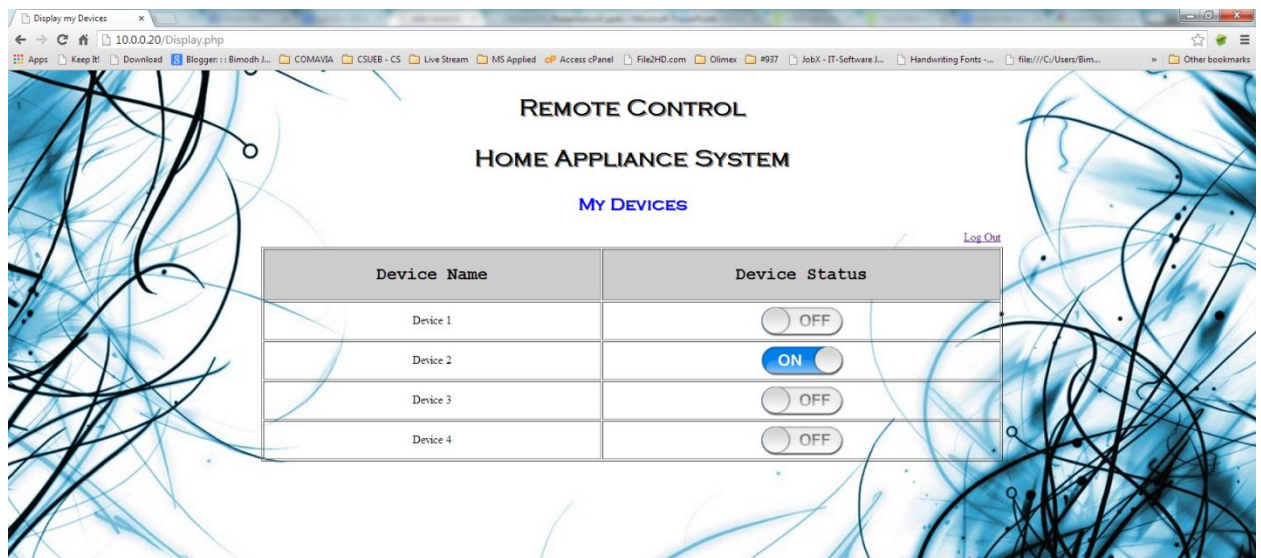*Figure 4.* Login Screen to the User

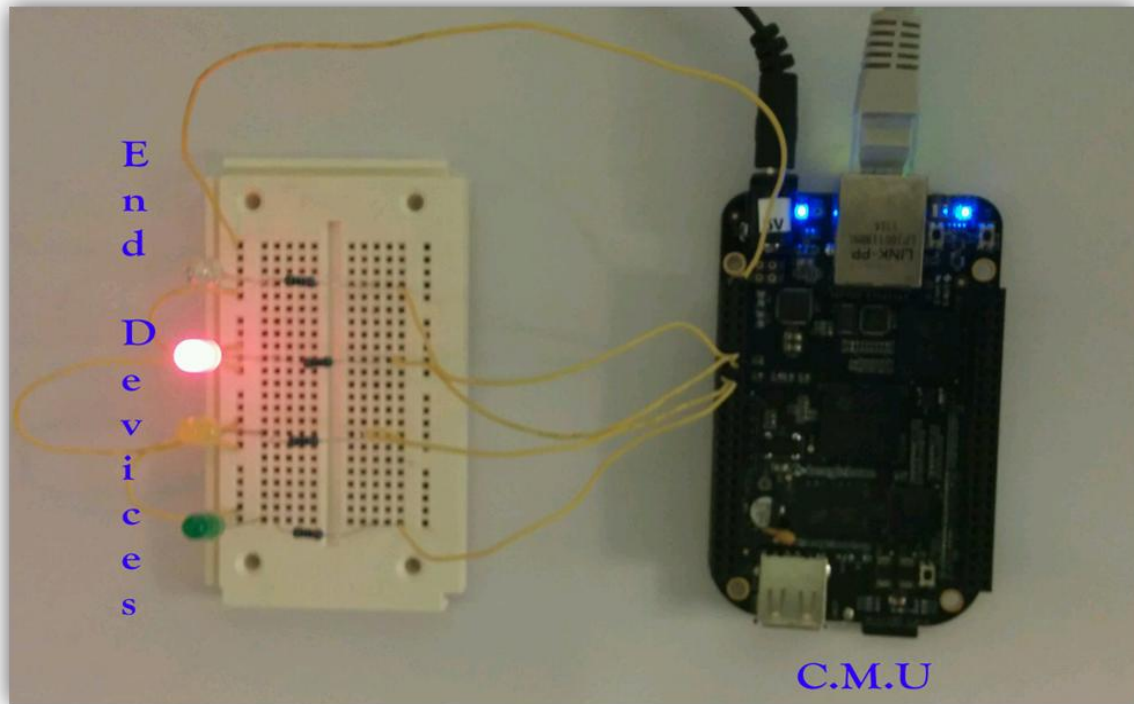*Figure 5.* Device Listed and Control Page

Figure 6. CMU Connected and output of CMU Connected to the End Devices, which are

LED   bulbs, And controlled remotely from another system via internet.

Conclusion

Remote Control Home Appliance System could be used in our day to day life. This gives

the end users to control devices remotely. This eliminates the need for physically present at the

location to control the devices. The expanded version of the same, the Smart Home, will be

really useful in our day to day life of tomorrow, which makes the life ease to move on.

Reference

Bregman D., Korman A., A Universal Implementation Model for the Smart Home, International Journal of Smart Home, Vol.3, No.3, July 2009.

Dori, D. Object-Process Methodology: A Holistic Systems Paradigm. Springer Verlag, Heidelberg, New York, 2002.

Jones O., Maillardet R, Robinson, A., Introduction to Scientific Programming and Simulation Using R. Chapman & Hall/crc, 2009.

Breiman, L., Friedman J.,. Olshen R.A., Stone C, Classification And Regression Trees. Chapman & Hall/crc, 1984.

http://elinux.org/Beagleboard:BeagleBoneBlack

http://www.farnell.com/datasheets/1685587.pdf

http://www.farnell.com/datasheets/1701090.pdf