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Novel Approach for User-Friendly Home Automation System on One Touch

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Abstract—The home Automation has been showing from last 10 to 15 years its far reaching and crucial importance in domestic and industrial world. The paper represents a research and development of an embedded project of Home Automation. There are many "already existing" home automation system which are also based on the "Central Unit" which controls everything but are quite expensive and less user-friendly. The main purpose of this project is to reduce the cost of the system providing a better interface which user-friendly as well. The basic idea of this the system is to have a server as the central controller which has multiple clients and is connected to the mobile device which is at remote location which sends the query to access the home devices and is also connected to circuitry present at the home using wireless connection(Zigbee Interface). In the case the system consist of the replicas of the home which is to be automated. It also has an asset of a Real time System

Keywords— *Home Automation, Home Server, Metaverse, User- Friendly, Virtual World*

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I. INTRODUCTION

The increasing number of consumer electronics and home appliances makes it necessary to connect them with one another for easy control. To achieve this, different types of home automation systems have emerged to offer networked control. With the rapidly development of cellular mobile technology comes the development of mobile phone-based home automation systems that integrate mobile technology into home automation. A hierarchical text menu as part of these systems helps a user select and control home devices. Furthermore, with the proliferation of the Internet, a variety of Internet-based remote home automation systems have been proposed. [2]Typically, these systems use the Internet as communication link and provide a graphic user interface (GUI) resembling a browser or a web-based menu. However these systems are less user-friendly and not particularly intuitive. To improve their user-friendliness and intuitiveness virtual smart home user interface has been proposed. It provides a user-friendly and intuitive virtual user interface and enables a user to control and monitor home appliances.[1] However, though it provides the virtual view of the home, it is less realistic than a virtual world, such as a 'metaverse' in which a user can touch the device and control the home device. In addition, the reference does not describe an information exchange format between the virtual and the real world. Therefore, a more realistic GUI is required before a user can control their home devices intuitively via a user-friendly interface, as if the user were in the actual home. The most realistic interface is a virtual world, also known as a 'metaverse'. Using this interface gives people a more realistic experience,[1] even allowing them to interact and communicate with each other. Virtual world technology greatly needs to be integrated into home automation systems to improve their user-friendliness and their intuitiveness by giving them a realistic interface and thus upgrading the field of home automation. Additionally, a standardized information exchange format between the virtual and the real world should be made available for general use. This paper proposes a user-friendly home automation system based on a virtual world. The architecture of the proposed home automation system is described and its mechanism is explained. Section II describes the proposed system architecture based on a virtual world and actual working of the system.

II. LIETERATURE SURVEY

Limitations of existing systems or the awareness of technological advances relating to the particular are involved in particular systems which competitors are developing. Automation systems projects' originate from many reasons: to achieve greater speed in accessing the devices, better accuracy and more real-time, faster device access, integration of business areas, reduced cost and better security.[1]The sources also vary project proposals originate with department managers, senior executives and systems analysis. When the request is made, the first systems activity, the preliminary working begins. The activity has some parts: feasibility study and request approval. The existing technology is also good and implemented but not as much user friendly and less costly. We develop the automation system that must user friendly. The user can easily interact with it the realistic view provide great likeness of user as he/she can see virtual view of his/her home and can easily interact with it by simple touch. So we develop the system that provides application i.e. the MAP gives the virtual view of the home with current status of all appliances that is to achieve user friendliness. We use IP and zigbee interface[4] for that purpose. The command from user passes to home server via internet using IP, then server sends query to the home circuitry. So the system will made fully real-time system. Here we can connect multiple users to the central server, from that we can reduce the cost of the system. Today's existing system is either on physical connection directly or pass message over wireless network using SIM. [3]The use of IP and zigbee[4] provides great flexibility about remote location. From any location on world you can able to access your home appliances.

A. EXISTING SYSTEM

Embedded system with cable connection is an essential aspect for controlling equipment. The wired connection exists between the end user and the actual home appliances. The signals that send from the user is get physically transmitted over to the home server. Then the servers that actually connect with the appliances with special type of the circuit execute the

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command as the user want. But it has the physical limited system that due to physical cable network the area get limited also that can't handle by remote location.[3]

Next one is the SMS system in which the SMS is used for the signaling that's need to special device like mobile phone with it that can be able to interpret the SMS into appropriate action. This system has the disadvantage of the time delay between command given and actual action done may be very long. And another one is ip based home automation system in which single server controls only single client vie ip protocol to control the home appliance.[1]

B. RELATED WORK DONE

The main purpose of develop of this system is to providing control mechanism over internet for Smart Home. We have created the main front page or the GUI of the User. The front GUI which is shown to the user's mobile device. This target appliances can viewed in the system as their current status. Like light is in ON state show with bright part over it. When we click on the portion of "light" the command get interpret as we want to switch off it. Then the status of the light get changed that show with removing the brightness of that portion where the bulb is present. We also provide the LCD[6] on the circuitry of the home that shows the status of the appliance within the room and the current status of them. Whether they is in ON state on in OFF state. When users touch the equipment the status of that equipment in status window also get changes.

III.   PROBLEM STATEMENT

The main purpose of development of this system is to provide more flexibility with user-friendliness over internet for web-based applications. So we use Map technique that gives realistic view to user.

The MAP Position command Substitution method is applied. The command can of two types either ON-command or OFF-command to the electricity supply. The user interaction with MAP produces this command that then pass away through the internet. To pass the command over internet we use IP protocol over there. That time the destination address is of the home system server. Then the home server interpret this command to radio communication frequency signal that the all equipment able to catch it via transceiver. Then through designed circuitry the appropriate action take place as per command. The acknowledgement is send back to user via home server. The user know that his/her action take place rightly via the change in graphics change into the MAP.

A. Set Theory:

Let we assume that

A is Set of User-friendly Home Automation System based on Touch to control

U is set of Users
S is set of Server
H is set of Home Circuitry
So we can write that,
    A= {U,S,H|ϕA}
      Where

        U= {u1, u2, u3….., un|ϕU}
        S={s|ϕS}
        H= {h1, h2, h3,….., hn|ϕH}

1. *Dependencies & Relation:*
    Let Fd be the rule of D and R where D is Dependency and R is a Relation.
$$F(S) \rightarrow S \ U \ H$$
$$F(U) \rightarrow U \ U$$

2. Venn Diagram:
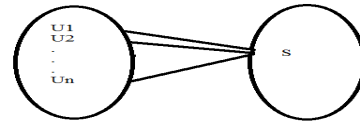   U R S:- (User relates Server)

Fig- 1 Venn Diagram 1
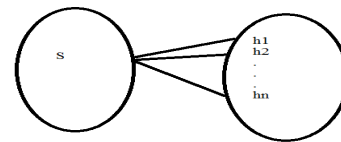S R H:- (Server Relates Home)

Fig- 2 Venn Diagram 2

B. Proposed System.

• We have prepared a master plan for project which will guide at us different time in different phases of software development as well as hardware development

• Providing smart Home application:

Now a day's more security applications are available for Home systems. In this project we introduced a low cost, dynamic and fully real time solution to the home automation using the internet. The novel approaching this paper discusses the migration of the control and monitoring of home appliances directly to the internet through special hardware and protocols.

Fig- 3 Panorama Image

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In this system on the client side the above panorama image will be placed, through that we can manage all the devices from the remote location.

On the home side the home circuitry placed in the home server mentioned in the above image it will be goes fully User-friendly.
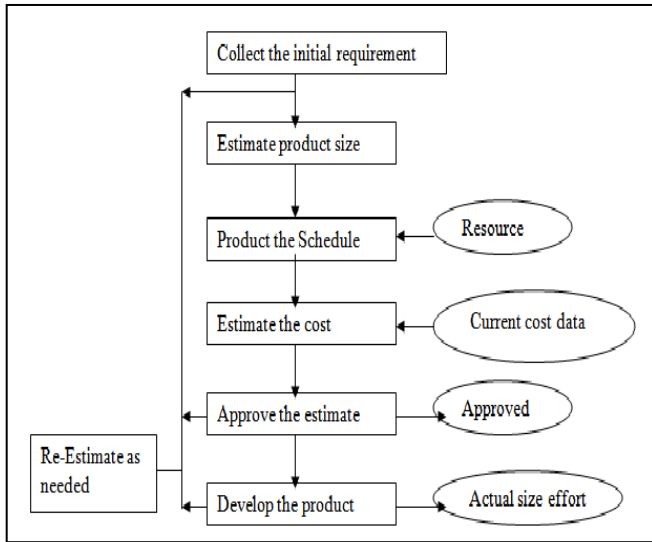
IV.   SYSTEM ARCHITECTURE

A. *Architecture*

Fig- 4 Control flow

First step is simple user must apply the setup for the home then submit the form to apply for login into their respective accounts. When to use Client must need to login to system then he/she can be able to request the MAP of their home. The realistic base MAP will provide to user with current status window. Then he/she can easily interact with MAP by simple Touch.
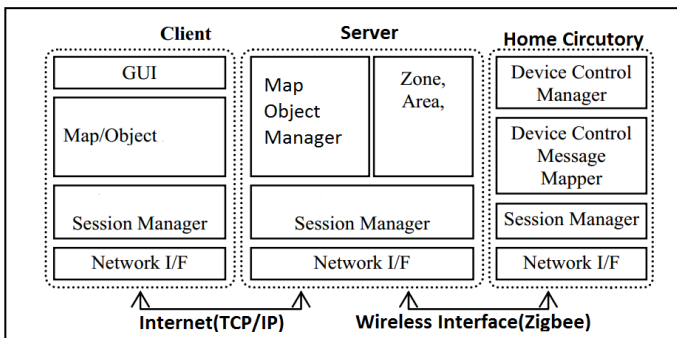

Fig- 4 System Architecture

Architecture can divide in three parts
1) Client- Client is any user with mobile device placed on remote location from which he/she can send the query to the server. It involves the GUI of the home. Session Manager which manages all the Server requests and manages the map of the home. It also involves the network interface which mainly uses internet.
2) Server- It is a central unit which handles the multiple users. It involve all the session manager, zone attribute

manager, n the map object manager which manages the map of all the client and it manages all the request from different users through the wireless interface. It also receives the status from home n send to the user.
3) Home Circuitry- It involves the Arm7 Microcontroller[5], LCD(16*2 alpha numeric)[6], zigbee[4] device for the wireless interface, UART's, Relays. This circuitry accepts the query from server which is sent by user n operates on the home appliances. It has the device control manager which manages all the home devices either On or OFF using ARM7 Microcontroller[5].
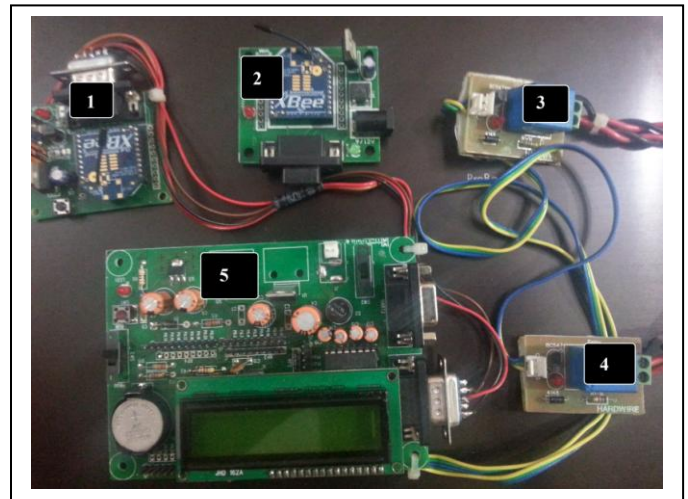
Hardware Circuitry Diagram

Fig- 5 Hardware Circuitry Diagram

In circuitry diagram
1. It shows the first zigbee[4] device which is used to Connect the server via wireless interface.
2. It shows second zigbee[4] device which located on to the server which connected to the home circuitry.
3. These are the relays which are used before the home appliance.
4. Same as above. It consist of ARM7 Microcontroller[5] which controls the actual device and LCD (16*2 Alfa numeric)[6] which shows the status of the devices either it is On or OFF.

B. *Working Principle*

User first login to the system via mobile device like smart-phone, PDA's, Tablets etc through the wireless Internet connection. After successfully logon to the system user can see the panorama image (virtual view) of his/her home. From that he/she can know the actual status of home appliances of his/her home. On which he/she can touch on the particular appliance to control of changing the status of that appliance. Server receives the status request and send it to the particular home circuitry with the help of wireless interface (zigbee interface). Home circuitry receives that request from the another zigbee device and send it to the ARM7 Microcontroller[5] and it does the same request. Like that as per the client request the appliance will goes ON/OFF, and it gives the return status reply to the

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server , it redirect that status to the clients mobile device on the virtual view.

CONCLUSIONS

The automated home can be simple groping of the controls which controls the appliances, so the system can control the devices like all electricians appliances components and furniture. It can be controlled from the remote location. In this processed system the single server can handle multiple clients so we can reduce the maximum cost of that system. The system provides the virtual view so it can be very user-friendly and fully real-time system. User can control devices through any remote location over wireless interface. The system is less power consumption, has low cost, less space required and has a high speed

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