



SMART HOMES USING INTERNET-OF-THINGS

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Abstract - Smart home have gained immense popularity over the past decades as they enhance the comfort and value of life. Most smart home system is controlled by a smartphone and microcontroller. A smartphones application used control and monitors household tasks using wireless communication technologies. We explore concept of smart home using integration of IoT service and cloud computing, through implanting intelligence in sensor and actuator, networking of smart things using related technology, using cloud computing for easy access in dissimilar location Facilitate interface with smart things. Increase computations power, storage space and improve data exchanges efficiency. In this chapter we presented a structure of 3 components to create an advanced smart home concept and robust methods to implementation.

Keywords: *Internet of Things (IoT), Smart Home, Radio Frequency Identification RFID*

1. Introduction

Internet has transformed human's life by providing anytime, anywhere connectivity with someone. As much improvement in the technology has been come sensor, processor, transmitter, receiver, etc. are available in very low-priced rate. Hence these things can be used in day to day life. If anyone wants to expand service of internet then Internet of the Things can be said as development of internet services. Today's internet is now increasing toward IOT.

Internet-of-Things: The internet where existing network of internet to computer systems will join to real world object. Things can include any object, home devices, appliances, vehicles, etc. And when these things connect to internet in specific infrastructure via standard protocol then whole systems are said to be IOT.

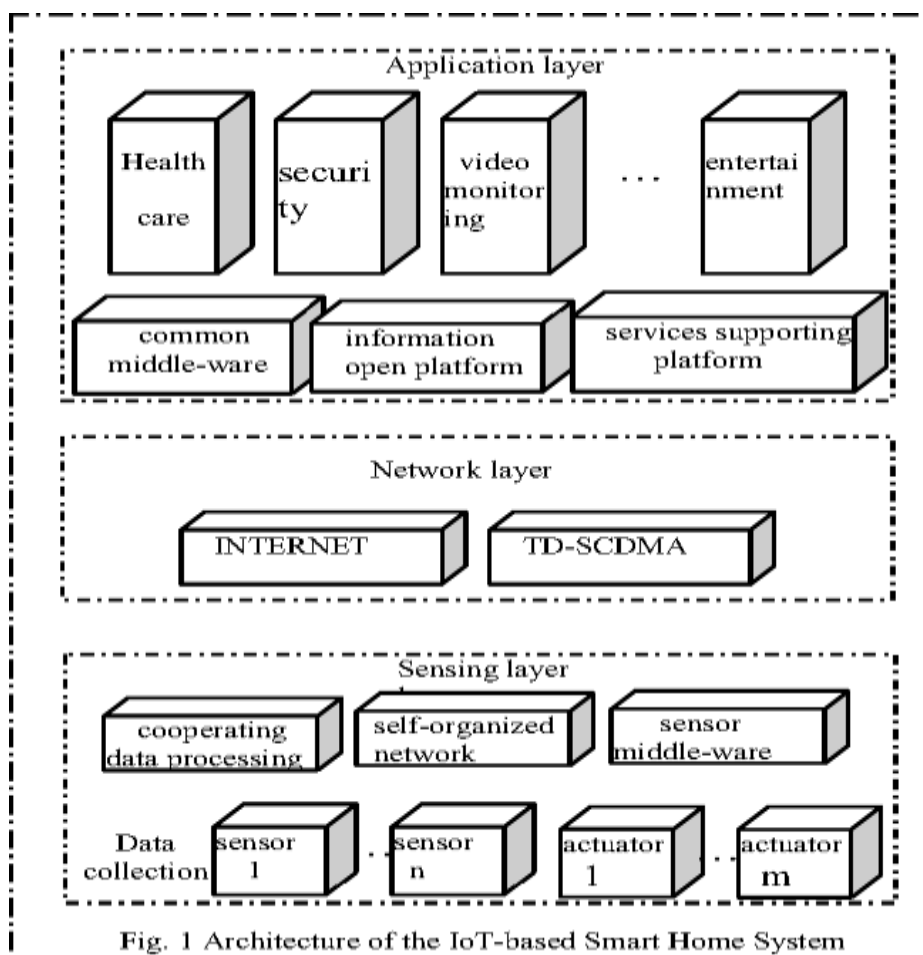
Things: Things can be virtual or real, moving but things will be active contributors in whole system. Things will communicate with each other, called as things-to-things communication. Things will also able to communicate or interact with human then it is called as things-to-human communication [4]. However internet of the thing is not just deep vision for the upcoming generation. It is before now here and is taking an impact on more than technological developments. This thing and communicating object which are used to communicate with internet could configure themselves self-sufficiently also can operate without human interference.

Smart Home: Smart homes are the home or that living environment having technologies to allow all household devices utilizations to be controlled mechanically and can be controlled tenuously. Smart homes users can easily monitor all home appliances over internet. Home applications connect in predefined correct network architectures and using normal protocols. Basic idea for Smart Homes using IOTs are shown figure 2. Whole systems can divided into 2 parts: in a part consist all home devices and switch modules and RF transmitter receiver and in second part include all the processor, data, interface device, collector, GPRS module that will converse with internet.

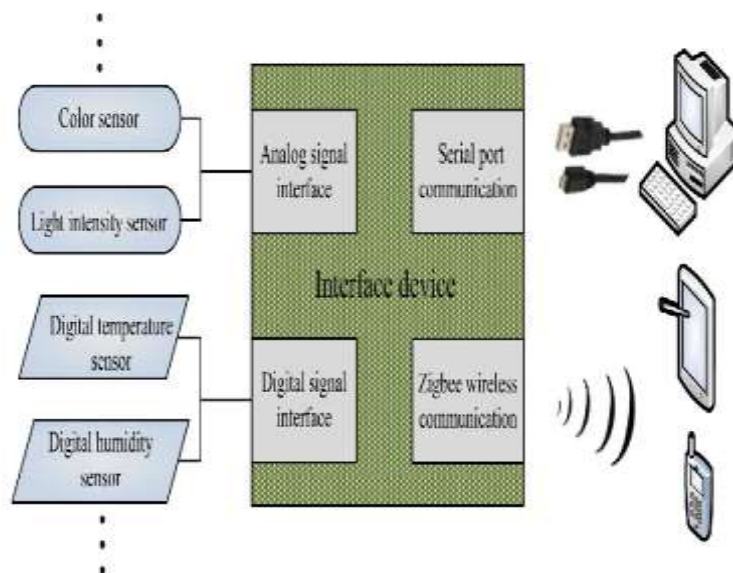
Switch modules associated to device that when it changes states, state of the household devices connects it will also changes. Relays can use as switch modules. It is electromagnetic device called as relay adjustment. It separates circuits electrically and connects them pleasingly. In basic relay there are 3 contactor which is normally open, normally closed and common. COMs are normally associated to NC. At normal form when household device are not in the working mode then relay are on NO state. When it get signal then change state to NC and device will get on working states. Switch module will be connecting to smart central controllers through the RF transceiver. Each switch module will has one transceiver or one transceiver can be connects to all switch modules. Each switch module device will be recognized by the assigning unique individuality to them. One RF transceiver will attaches at smart central controllers. RF module connect among themselves at 433MHz. 433MHZ spectrum is especially made for RF communication. Smart essential controller will act as interface device among household devices and internet servers. Smart fundamental manager will not single device. It will be setup of the device like microcontroller, CPLD processor, RF transceiver, GPRS etc. Microcontroller can use as main controller and for data processing. Data gaining can be simply done by microcontroller hence it can act interface devices.

2. Related Work And Ethodlgie Used

Smart home system is separated into 3 layers: network layer, application layer, and sensing layers. Preliminary from bottom, sensing layers are accountable for data collection from all homes appliance and it sends data to middle layer that is network layers. Network layers use internet for transfer data to upper most request layers which have dissimilar application on dissimilar level for different purposes. Data group and data dispensation at detecting layer it is used microprocessors SAMSUNG S3C2440A which are type of the ARM microcontroller.



A reconfigurable smart sensors boundaries device that mix data collection, wired and wireless broadcast together are already design for the industrial Wireless Sensors Network in the IOT atmosphere using CPLD.



working diagram of the reconfigurable smart sensor interface device.

Fig. 2: Reconfigurable Smart Sensors Interface for Industrials WSN

For industrials wireless sensors network in IOT situation problems are regarding with data attainment of multi sensor nodes. If microcontrollers are used as crossing point device it performs task by way of the interrupt, which make these multisensory attainment interface not really parallel in collecting multisensory data though microcontroller has the advantages of low price and low power consumption. CPLD is complex programmable logics device. Both microcontroller and CPLD are near about same. But both have their advantages and disadvantages. CPLD/FPGA is used in business wireless sensor network. FPGA are field programmable gates array which have unique hardware logics resistor; it has time to time performance and synchronicity. CPLD/FPGA has been more request because of it advantage above microcontrollers. It is frequently used in the wireless sensors network as they interface device. CPLD/FPGA can be acquire multisensory data in similar and advances real time presentation of system. Hardware figure of the CPLD is shown lower. Smart home mechanism system use smart central manager to set up radio

Frequency 433MHz wireless sensors and actuators network. Radio frequency module, switch units, etc. have designed to control the directly all kind of the appliance by Ming Wang et al., and Sarita Agrawal. Smart systems hold function of appliances screen, controller and management, home safety, energy figures and study. RF identification use by Gaurav Tripathi. Ming Wang and Sarita Agrawal are very useful for the security resolution. This equipment allots unique individuality to every household's devices. So, each device can uniquely recognize. Range of RF can decrease. It's very easy to set up and has low cost. RFID tag takes low power to function and tag can active.

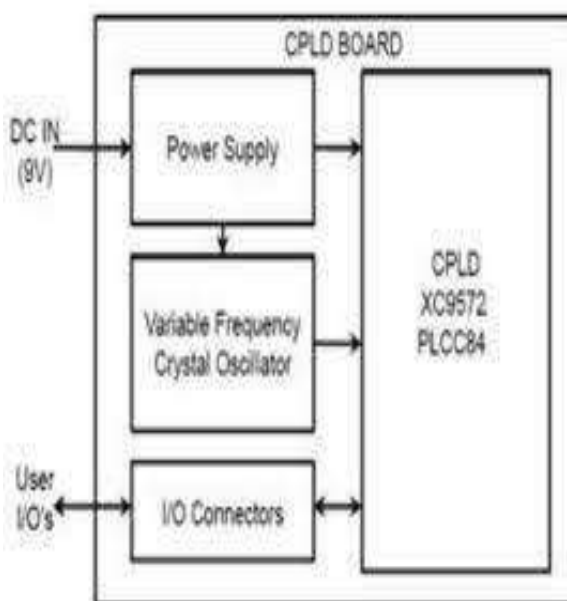


Fig. 3: Hardware block diagrams of CPLD

A FPGA based to Grid Friendly Appliance controller has already designed by Yu-Qing Bao and Yang Li in [10]. FPGA chips are used to make the GFA supervisor. GFA have benefit of use FPGA chips that it could use for real time applications. To manage the safe and well-organized communication between humans and machines are very problematic for the smart home. Tongtong Li, Xiaochen Tang gave architecture of Secure Access Gateway for the home area networks [11] which serve as boundary among remote user and managed device. Gianluca Ippoliti, Sauro Longhi and many have given interoperability frameworks which are realized with software LabVIEW and integrate real and virtual environment to enable vertical solution in dissimilar and multi-functional domotic applications [12]. They have provided complete homes automation designs together with detail about of implementations the virtual environment. Scheme of established interoperable Real/Virtual framework is shown in figure below.

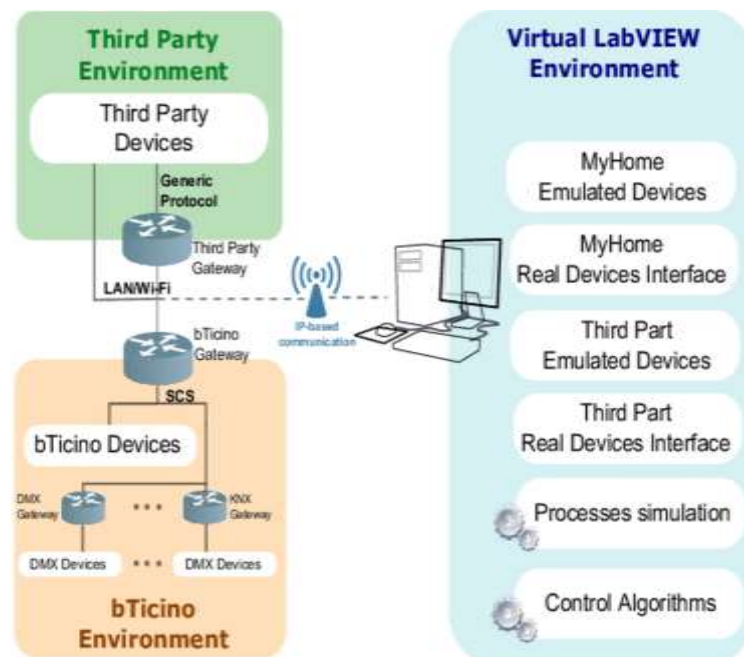


Fig. 3: Scheme of Developed Interoperable Virtual /Real Framework

For wireless sensors network there is several nodes linked to internet; hence problem of the safety come. Main problem in this type of network are how to establish initial session key between wireless sensors node and how to switch center. For problems of security and issues A trivial key establishment protocols for smart home energy managing systems have been also made the system for control and to monitor home appliances using simple PIC Microcontroller and GSM modem in [15]. Systems give successful output. They are use mobile network to monitors and controls house hold device, presents simple Internet of the Things enabler, a smart homes solution that permits user to stipulate and centrally controller Internet of the Things smart object. Unlike current system, SITE support End-User Development. Hence, it defines simple language for specification of control rules for smart objects. It is provides users interface to vividly illustrate data received from smartobjects[17]. Every device that connects to internet needs IP address [3]. People are still working on IPv4 which has very low address space. As Lots of user increasing people need to move towards IPv6 which offers large address space. Vittorio Miori et al., has proposed an interesting approach of DomoNet, Which is ‘ecosystem’ software created to overcome issue of compatibility with pre-existing system of smart home, lack of interoperability smart home which are due to fact that current market repetition efficiently bind consumer to the proprietary technologie, thereby imposing them to purchase device compliant to a specific manufacturer’s system to enjoy full interoperability. DomoNet has coded using Java and open source librarie and tools IPv6 and DomoNet link together and work together [3]. For better performance of system and to provides better services by the system network should have the capability of self-organization.

3. Problems And Challenges

There are many problems, issues and key challenges could be come in Smart Homes. As application of the IoT is increasing rapidly it is difficult to handle all the applications in IoT situation. It come out problems that how to succeed and control these various increasing applications. Whole systems could not more comfortable, secure if these increasing applications not controlled professionally and conveniently. Security is less on the server side as no special method for authentication is used. This could leads to the insecure system. An attacker can get access to victims home and he would break the whole Smart home system. Connectivity

is also the problem could occur [4]. It also comes into challenge that how to achieve connectivity at any place any time [4]. For communication towards internet 3G services are used [8]. But it could have signal problem hence it will not connected every time. The functioning of smart home systems in IOT environment should be done in real time. RF identification is used at 433MHz.

3.1 Standards: Standardizations are very indispensable for IOT environment as it expanding internationally. Challenges are comes related which standard should be used, which will provide secure medium, how it will make system more reliable.

3.2 Identification: Identification is required for all device so that each expedient can identify uniquely.

3.3 Privacy: The user's data should be confidential. Connection should be done with providing privacy.

3.4 Authentication: Authentication is must to secure Smart Home systems from an attacker. Server has to give access only authentic users.

3.5 Security: The system should able to take appropriate actions on security threats. And systems should able to reconfigure by it after attacks.

3.6 Integration: The main challenge with IOT is to integrate applications IoT environment.

3.7 Coordination: Coordination is required between the globally connected objects, humans, programs, process, etc.

3.8 Data Storage: As applications of IOT are increasing, amount of the data getting collected is huge. The challenge is where to storage the huge data. Huge database can solve this problem. Artificial intelligence algorithms must be applied extract meaning data from redundant data.

3.9 Network Self-Organization: Network structure should created in such way that each device associated to it could self-organize them. Actually it is network which should be able self-organize.

4. Results & Conclusion

Internet of the Thing has much application in dissimilar areas. IOT has at present designed for WSN. It has developed for Smart Homess. This paper grants architecture of IOT and architecture of Smart Homes using IoT. There is some problems originate in IOT and Smart Home. New technologies could help to minimize few of them. This paper grants challenge and problem that can come. New technologies and methodologies which are already used to improve applications of IOT have been discussed in this paper. CPLD controllers, RF modules, zigbee modules are currently in used for IoT.

5. References

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