IOT Based Home Appliances Using Personal WiFi and Cloud intelligent and Tetris Switch

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Abstract— **Hence automation is a new technique. That is getting widely affordable & derivable especially in the urban housing segment. The proposed system is intended to make home. Automation IOT (Internet of Thing) embedded & expandable which enables control of devices via webpage, hosted on an embedded web server which can be accessed via local wifi network or internet. Also the tots are formation as logic of building blocks makes the system highly expandable. The expansion system work by looping mains power from one block to another & communication is established by a low power ISM bond RF system. Thus a highly versatile home automation system is implemented using low cost esp8266 wifi module running NodeMcu. The module acts as a wifi web server & can operate as standard wifi server or connect to the internet over wifi.**

Index Terms— **Home Automation, Esp8266, NodeMcu, Lua Language, RF Module, ISM Band.**

I. INTRODUCTION

The Internet is a worldwide network of computer networks that connects university, government, commercial, and other computers in over 150 countries. There are thousands of networks, tens of thousands of computers, and millions of users on the Internet, with the numbers expanding daily. Using the Internet, you can send electronic mail, chat with colleagues around the world, and obtain information on a wide variety of subjects. The origins of the Internet date back nearly 40 years, with the U.S. military's funding of a research network dubbed Arpanet in 1969. Since then, the Internet has undergone more than just a name change. The number of computers connected to the Internet has grown exponentially, while the number of users has risen from a handful of computer scientists to 1.5 billion consumers. The network's reach has expanded beyond the United States to every corner of the globe. But its popularity has a dark side, as it has evolved from a friendly research network to a hotbed of criminal activity including fraud and identity theft.

II. LITERATURE REVIEW

In this research, based on the Cloud Intelligent Tetris Switch and Cloud Home as a Service (HaaS) server, the most home appliances with IOT embedded can be managed and controlled remotely. In addition, considering the implementation, the intelligent Tetris switch can be dynamically extended to different direction. The extension of

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switch or sockets can still be controlled by the remote cloud server. The corresponding functions of appliances can be also managed by the IOT module and switch. Hence, the life at home can be smart and intelligent. [1]

The IOT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems. It results improved efficiency, accuracy and economic benefit in addition to reduced human intervention. On the other hand, IOT systems could also be responsible for performing actions, not just sensing the things. Intelligent Shopping systems, for example could monitor specific users purchasing habits in a store by tracking their specific mobile phones. Other applications that the Internet of Things can provide enabling extended home security features and home automation. This paper relates smart home or home automation which induce technology for home atmosphere which is usage to provide ease and protection to its occupants. [2]

The home automation utilizing Internet of Things has been tentatively demonstrated to work attractively by interfacing basic machines to it and the apparatuses were effectively controlled remotely through web. The outlined framework screens the sensor information, as well as impels a procedure as indicated by the necessity. The venture has been effectively outlined and tried. Coordinating elements of all the equipment parts utilized have created it. Nearness of each module has been contemplated out and put painstakingly in this way adding to the best working of the unit. Furthermore, utilizing very propelled IC's and with the assistance of developing innovation the venture has been effectively executed. Installed frameworks are rising as an innovation with high potential. In the previous decades microchip based installed framework governed the market. The most recent decade saw the insurgency of Microcontroller based implanted frameworks. As to the prerequisites accumulated the manual work and the unpredictability in checking can be accomplished with the assistance of electronic gadgets. [3]

The main emphasis of this paper was to highlight major security issues of IOT particularly, focusing the security attacks and their countermeasures. Due to lack of security mechanism in IOT devices, many IOT devices become soft targets and even this is not in the victim's knowledge of being infected. In this paper, the security requirements are discussed such as confidentiality, integrity, and authentication, etc. In this survey, twelve different types of attacks are categorized as low-level attacks, medium-level attacks, high-level attacks, and extremely high-level attacks along with their nature/behavior as well as suggested solutions to

encounter these attacks are discussed. [4]

Various platforms are available that enable Home Automation systems quickly with low cost, high performance and without any complexity that are Arduino, Raspberry pi, Micro-controllers, etc. Here, in this review, different home automation systems such as the Web based, Bluetooth-based, Mobile-based, Zigbee-based, Cloud-based, Internet based have been explained. In future, home automation systems will much smarter and robust. We would be able to extend it to a scale of a level where it could be used in offices, colleges or factories.

Hence it can be concluded that the required goals and objectives of a home automation system can be targeted by the above technologies. [5]

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. It also stores the sensor parameters in the cloud (Gmail) in a timely manner. This will help the user to analyze the condition of various parameters in the home anytime anywhere. Such a system can easily be made and it is not very costly. With the improvement of sensor technology, the system will become more efficient and useful. For instance, a more accurate weather forecast can help better decision making in supplying water and reducing water wastage. If soil nutrition measuring instrument can be installed, then the system can be re-engineered to make it able to supply fertilizer to the land precisely. Using this system, one can save manpower, water to improve production and ultimately increase profit. The automated irrigation system is feasible and cost effective for optimizing water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of plant growth and irrigation system efficiently. [6]

As we saw in literature section the scope of internet on things on current era. We also saw what home automation is and the issues that still need to be solved. So in this paper basically we study about internet of things and we did the comparative study on home automation technique. There are still lots of future scope on home automation using IOT. [7]

IOT will evolve over time with ever increasing advances and capability of smart devices such as sensor, actuators, robust communication and harvesting knowledge and intelligence from arrays of vast amount of data moving from an information age to intelligence age. This will change our current mode of lifestyle and work habits in a significant and perhaps in a disruptive way. There are several efforts in different standard organizations such asETSI, Open Mobile Alliance, OneM2M, IEEE, ITU-T and forums are focused on various standard activities and architectural aspects supporting IOT. It is expected that work in many of the overlapping areas could converge in near future. [8]

This paper presents the design and the implementation of an interactive Smart home security system with Email alert, Web enabled video streaming and remote control of Voice alert and Door accessing system using Smart Phone. The Smart mobile Phone based monitor and automatic control of equipment is forming a trend in automation field. Replacing PC with low-cost single chip processor which can make administrators to get parameters of different remote devices and send control information to field equipments at any time through Internet. [9]

The IOT framework for Smart Home using Cloud Computing is working satisfactorily as described in this paper. The system allows the user to control the home appliances remotely via Internet using a Java Based PC application and an Android Mobile application. The system was tested on various home appliances like bulb, tube light and table fan. The system design can be expanded to include different sensors like PVR, hall effect etc., It can also be enhanced by including more features like sending alarm messages to the users via SMS/Email upon detecting anomalies. Also the system can provide remote firmware upgradation for the IOT devices. Overall the framework is scalable and can be extended to other applications like Smart Buildings. [10]

The IOT promises to deliver a step change in individuals" quality of life and enterprises" productivity. Through a widely distributed, locally intelligent network of smart devices, the IOT has the potential to enable extensions and enhancements to fundamental services in transportation, logistics, security, utilities, education, healthcare and other areas, while providing a new ecosystem for application development. A concerted effort is required to move the industry beyond the early stages of market development towards maturity, driven by common understanding of the distinct nature of the opportunity. This market has distinct characteristics in the areas of service distribution, business and charging models, capabilities required to deliver IOT services, and the differing demands these services will place on mobile networks. [11]

This study first proposed a hierarchical, smart home-service architecture, which employed standard interface devices at the home end to separate the logic and user interfaces, and achieving multiple in-home displays. Moreover, this study applied a community broker role to integrate smart home services such as managing environment deployment operations, reducing the manual labor required of community management personnel, providing electronic information services, supporting diverse services, and extending the community's integration with the surrounding environment. Therefore, a complete and integrated smart home system can be achieved. In addition, integrating cloud-based services with community services provided location-based services. [12]

III. METHODOLOGY

3.1 Master Unit Circuit Diagram

In this circuit we can see here we used 5volt, 1 amp. Rating SMPS power and we convert this 5v in to 3volt for supply power to esp8266 module. Here we used diodes for drop voltage 5volt to 3 volt then we supply esp8266 module. And we connect Tx, Rx of esp8266 to MAX232 then signals goes to Pic microcontroller and using HT12E encoder IC we encodes the signals then transmittes signals by using RF

transmitter. Here we used transformer based 5volt regulated power supply for supply PIC microcontroller and HT12E encoder IC. And here we can see relays is used for switching the load which operates by PIC microcontroller.
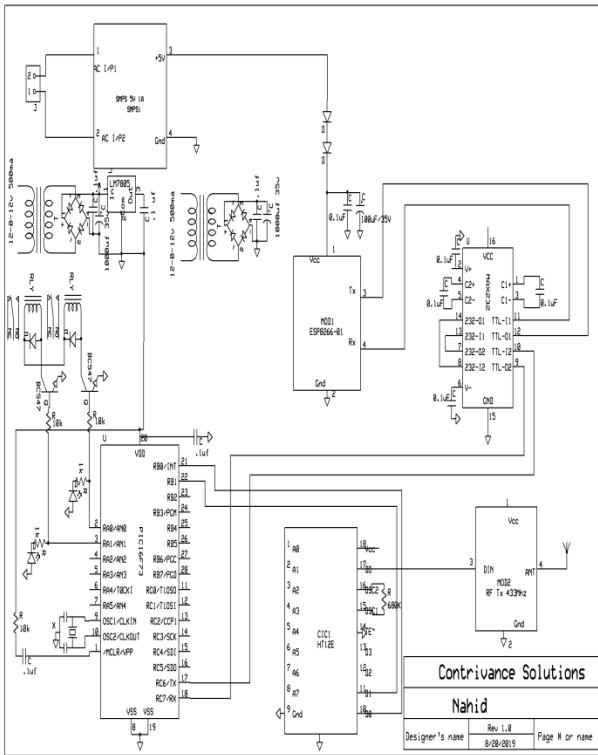

Fig: 1.1 Master Unit Circuit Diagram

3.2 Slave Unit Circuit Diagram

In this circuit diagram we can see here we used 12 volt step down transformer which is connected with 220volt A.C. mains at primary side. Then we take output of 12 volt A.C. at the secondary side of transformer coil. Then we used bridge rectifier circuit for converts this 12 volt A.C. into 12 Volt D.C. then we filter this D.C. voltage by using filter capacitor then we used 7805 IC for regulated 12 volt D.C. at 5volt D.C. then we have 5volt pure D.C. power that is used for supply PIC microcontroller and HT12D decoder IC. Then Decoder is connect with RF receiver for receive the transmitter signals. And here we used relays for switching load which is controlled by PIC microcontroller.
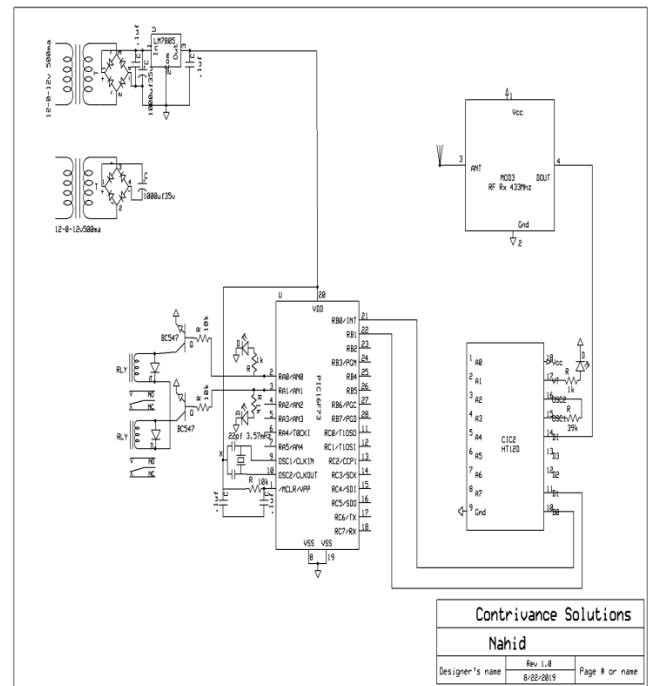

Fig: 1.2 Slave Unit Circuit Diagram

3.3 System Block Diagram

In this block Block diagram we can see 1st we input 220 volt, 50 hz A.C. supply. Then it goes to SMPS and loop power slave then SMPS converts this 220 volt A.C. supply in to 5 volt pure D.C. here we used 5v, 1 amp. SMPS power supply and 220 volt A.C. power goes to step down transformer it convert in to 12 volt A.C. then it convert into D.C. using rectifier circuit then by using voltage regulator I.C. 12 volt D.C. regulated at 5v and it is used for supply RF transmitter, Receiver and HT12E encoder and Pic microcontroller. SMPS power Goes to level controller and after the SMPS 5v power we required to convert this into 3 volt because ESP 8266 wifi module work at 3 volt. And here we used 12 volt relay for switching the load.
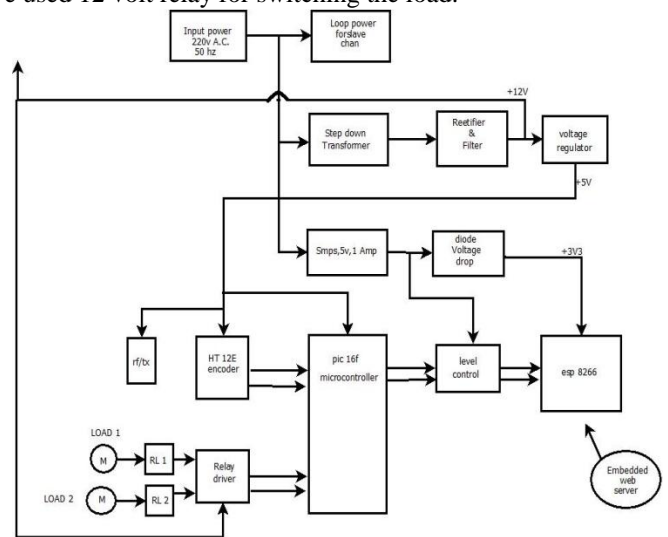

Fig: 1.3 System Block Diagram

3.4 Embedded Web Server Flow Chart

In this flow chart we can see 1st code is start then define cariuaut D0,D2,D3, out temp as local. Then assign /d0=d1=d3=0 the wifi: set mode colitis station AP then

configure SSI D and password that is NAHID0001, 12345678. Then gpio. Mode (1,gpio.Dutput,gpio.mode (2), gpio. Output).gpio.mode (6)gpio.ouput), gpio mode(7,gpio.output) then srv=net. Create Server (net.Tcp) the call alarm then out=(d3*5)+(d2*7)+(d1*2)+(d0*1) and print (stning) char(out+65)then Algorithm will be then Algorithm will be stop.
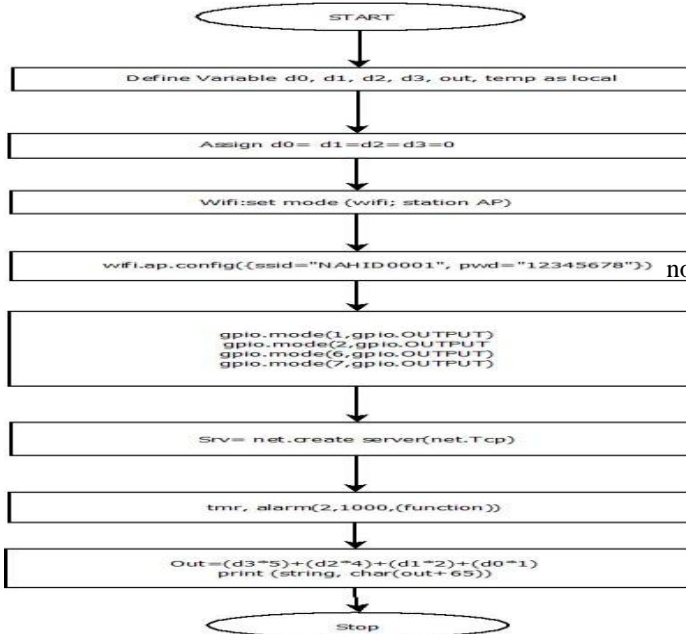

START

Define Variable d0, d1, d2, d3, out, temp as local

Assign d0= d1=d2=d3=0

Wifi:set mode (wifi; station AP)

wifi.ap.config({ssid="NAHID0001", pwd="12345678"})

gpio.mode(1,gpio.OUTPUT)
gpio.mode(2,gpio.OUTPUT)
gpio.mode(6,gpio.OUTPUT)
gpio.mode(7,gpio.OUTPUT)

Srv= net.create server(net.Tcp)

tmr, alarm(2,1000,(function))

Out=(d3*5)+(d2*4)+(d1*2)+(d0*1)
print (string, char(out+65))

Stop

Fig: 1.4 Embedded Web Server Flow Chart
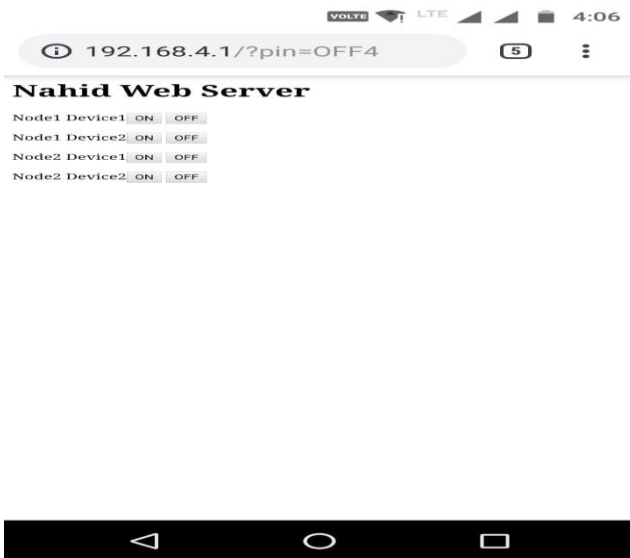
IV. RESULT

Process Result

Fig.5.1

In this image we can see a web server that named as nahid web server. Open this web server 1st on wifi then open web browser and enter IP address 192.168.4.1 then a web page will be open that is shown in this image. In this web page we can on and off buttons to control each loads. When we push on on button then his load is on and when we press off button then the load is off. So as we on and off all 4 loads.

Fig.5.2

In this image we can see now all the loads of the master node and slave node is off.

Fig: 5.3

In this image we can see lode 1 of the master nod is on now.

Fig 5.6

In this image we can see load 1and load2 of the master node and load 3 and load 4 of the slave node is on now.

Table 1.1 Operation Perform Table

S.NO.	Operation	Node	Load status
1	All button OFF	Master and slave	All load off
2	Node1device1 ON others OFF	Master	Load 1
3	Node1device2 ON others OFF	Master	Load 2
4	Node1device1, Node1device2 ON others OFF	Master	Load 1 and load 2
5	All node 1 and all node 2 ON	Master and slave	Load1, load2, load3 and load 4
6	Node2 device1 ON and others OFF	Slave	Load3
7	Node1device1 ON	Master	Load 1
8	Node2 device1 and node2 device2 ON and others OFF	Slave	Load 3 and Load 4
9	Node1 device1 and node1 device2	Master	Laod1 and Load 2
`10	Node1 device1 ON and others OFF	Master	1

V. CONCLUSION

As proposed a highly expandable & multi connection home automation system is presented. The proposed system enables control of various devices via a web page hosted on esp8266 wifi module is an advancement module comprising of a 80 Mhz. Microcontroller with full Tcp/Ip stock and wifi transceiver. The web page hosted on esp8266 or the esp8266 can connected internet over wifi & act as a node addressable by internet IP address. The expandability of the system is attributed to the tetris like building block architecture employed the number of devices to be controlled can be added as blocks of the four or more channels. The power can be looped in a dairy chain fusion & instruction transmitted over low power ISM band 433 Mhz Rf modules with suitable encoder/ decoder. Our current configuration uses hottek 2 series (8 Bit address/4bit data). encoder/decoder pair which enables up to 255 slave nodes to be connected to the master node, generally the number of devices to be controlled even in elite urban housing are mostly lower than 255X2 (Considering slave node to control devices).

VI. FUTURE SCOPE

Home automation is a rapidly emerging technology & is expected to be a part of most of the house holds by the next decode. The author has proposed a IOT based expendable home automation system that can be controlled via the internet or by local network. But with the growing expectation & complexity of home automation systems the developed systems need to be upgraded to keep pace with the growing technology. One of the sought upgrades is incorporation of a feedback mechanism to determine weather particular device has been powered or not. Also to achieve feedback the master-slave communication will need to be bidirectional instead of unidirectional communication employed currently this can be achieved by using RF transceivers such as zigbee or z-wave. Another sought after change is the incorporation of analogue/step control instead of on/off control for application such as speed or light dimming control.

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