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IOT BASED SECURITY SYSTEM FOR SMART HOME

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Abstract: Internet of Things (IOT) is an idea about remotely connecting and monitoring real world objects (things) through the Internet. When it is related with our residence, thisconcept can be appropriately incorporated to make it smarter, safer andautomated. This paper focuses on buildingof a smart wirelesshome security system which sends alerts to the owner by using Internet in case of any intrude.

Internet of things can share information and complete tasks while you are busy with other activities from industrial machine to consumer home appliances.The aim of IOT is to unify everything in our world under a common infrastructure, giving us control of things around us as well as keeping us informed of the state of the things.

The influence obtained by preferring this system is that the user can receive alerts and the status sent by the wi-fi connected microcontroller managed system onhis phone from any distance irrespective of whether his mobilephone is connected to the internet or not.

Keyword- **IOT, State, Smart Homes, Common infrastructure.**

I. INTRODUCTION

Wireless Home security and Home automation are the dual aim of this paper. If any sort of human movement is sensed near the entrance of his house, the currently built prototype of thesystem sends alerts to the owner over voice calls using theInternet and raises an alarm upon theuser's discretion. In case of critical situation, the provision for sending alert messages toconcerned security isalso built into the system. But if the ownerrecognize that the person entering his house is an unexpected guestbut not an intruder,then instead oftriggering thesecurity alarm, the user/owner can make arrangements such asswitching on variousappliances insidethe house, opening the door which are also connected andcontrolledby themicro-controller in the system to welcome his guest. When the user himself enters the room, he can make arrangements from his doorstepthat without manually having to switch onthe electrical appliances or his favorite T.V. channel. Thus the dual problems of home security and home automation can be solvedby using thesame set of sensors.Even where Internet connectivity may not be readily available the alerts and the status of the IOT system can be accessedby the user from anywhere (since it is not compulsory for themobile phone to be connected to internet only boardis requiredto have an access to Wi-Fi).

The existing infra-red (IR) or Blue-tooth remote controlspresent in the market are in general appliance specified andthe same cannot be used interchangeably.Thus functions such as turn on an air-conditionerwhile returning home cannot be possible with such systems. Incontrast, simple solutionfor wireless home automation and home security systems is cost effective. The difficulties faced by current home security/surveillancesystems in providing information pertaining to the situationto users while being away from home is tried to overcomein this project.

II. IMPLEMENTATION SETUP

A. Components required:

1) TI CC3200 LaunchPad
2) Accessible Wi-fi
3) Pir motion detector Sensor
4) Alarm
5) Relays for connecting home appliances, electromechanically controlled windows or doors ,
6) Mobile phone to receive Voice Call
7) Energia (Software)

B. *TI CC3200 Launchpad*:

The TI CC3200 Launch pad consists of Applications Micro-controller, Wi-Fi Network Processor, and Power-Management subsystems. It uses ARM Cortex M4 Core Processor at 80MHz. It has embedded memory including RAM (256 KB). Thededicated ARM micro-controller also hasanetworkprocessingsubsystem in it. Its features include:

• USB interface using FTDI USB drivers
• The board is powered through USB for the Launch Pad and external BoosterPack
• It is operated from 2 AA- batteries.
• GNU Debugger (GDB) supports over Open On chip debugger (OpenOCD)
• Two 20-pin connectors enable compatibility with BoosterPacks which have addedfunctions
• Flash memory is updated through USB using Simple Link Programmer. The board can be programmed through Energies IDE overthe USB cable. The accessible Wi-Fi used by the board should be proxy less and can be of WPA or WEP type.

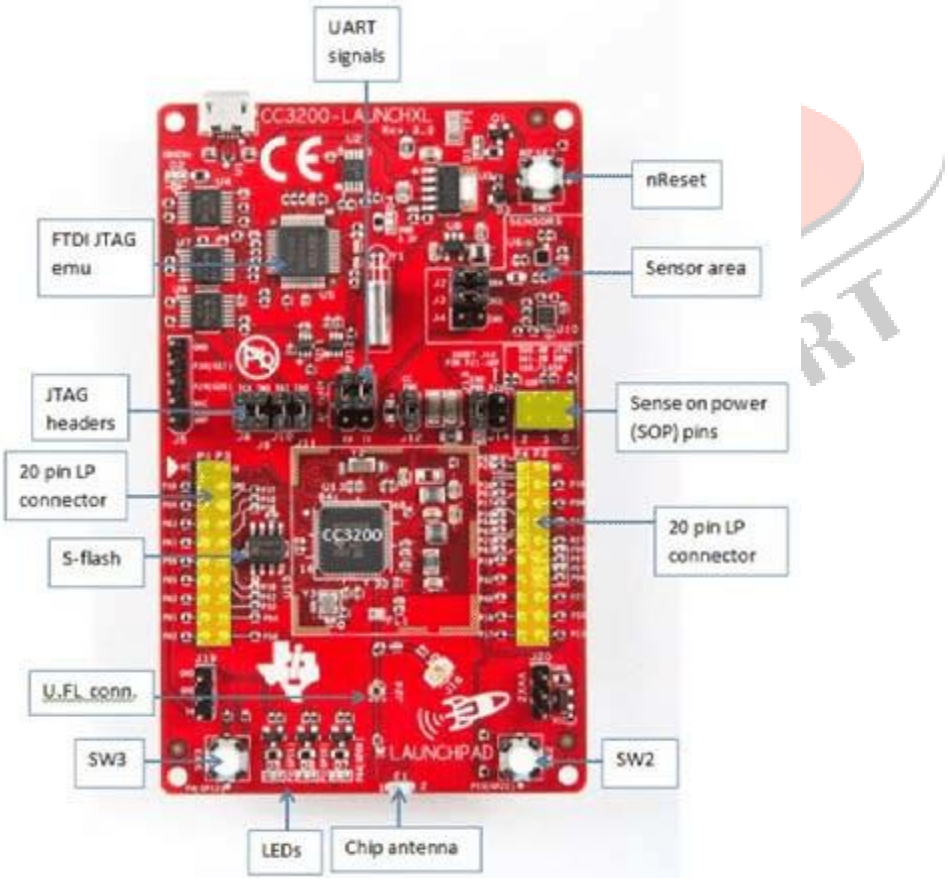

***Fig*-CC3200 Launchpad board**

C. Setup

The motion sensor is connectedto a digital in-out pin ofTexas board. The board is powered by external 12V batteryor 12V adapter. Through relay the home appliances are connected tomainswhich in turn is connected to another digitalpinof the board. The board is programmed so that it can have access to the local Wi-Fi. Enable the voice call featureof the mobile phone.

III. WORKING OF PIR MOTION SENSOR

Everyday thermal energy emitted by human beings is of wavelength around 9-10 micro-meter. Pyro-electric or Passive InfraredSensor (PIR) [6], [7] is an electronic device which is designed
to detect this I wavelength when a human being is in its proximity. To have a wide range for recognition a simple lens isused.Toignore domestic pets by setting ahigher sensitivity threshold,or by ensuring that the floor of the roomremains out of focus, sensors may be calibrated in such a way.

IV. WORKING OF PROTOTYPE

There are two ways of using prototype:
1) As a smart security system
2) As a smart home automation system

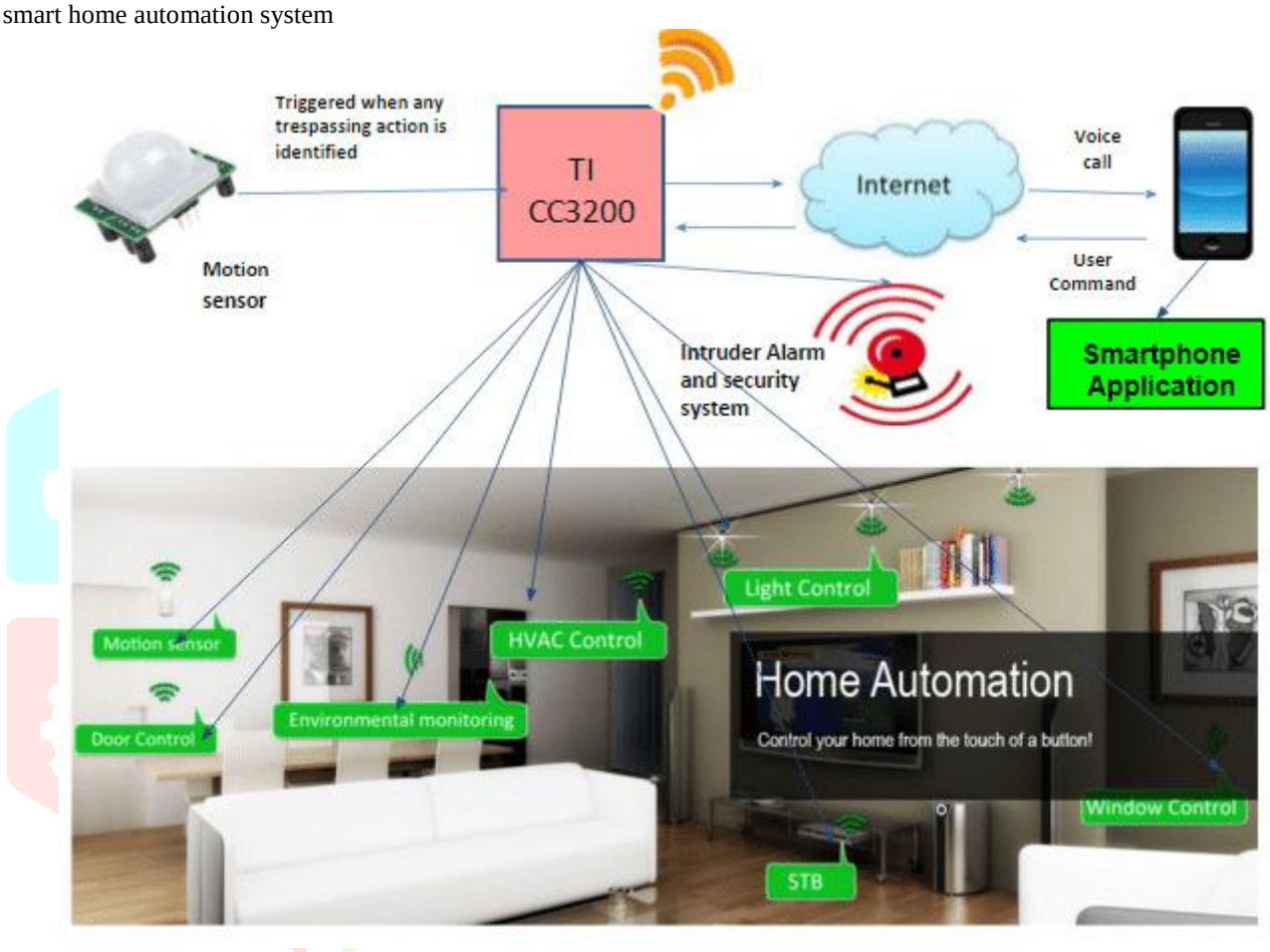

***Fig*- Security and home Automation**

1) As a smart security system-

PIR motion sensors should be installed at the entrances of abuilding. These sensors detect the motion of human beings. This signal which detects their presencebecomes the input trigger for the micro-controller.The owner,who may or may not be present in that building, will bereceiving a voice call on his mobile phone (whose numberis pre-defined in the program) stating that thereis an Intruderin the House'. To warn the intruder, to turn ON the lights andalarmat housethe owner can press '1' from hismobile keypad. Moreover the owner can send an SMS [8]to the concerned authority in police department,if he finds that his building isunsafe; explainingthe situation. The alarm and the light will be turn OFF after a fixed time delay, using Module.As soon as the module detects anyunexpected motion, the call will be triggered again and the owner will receive the call again and the process continues so on.

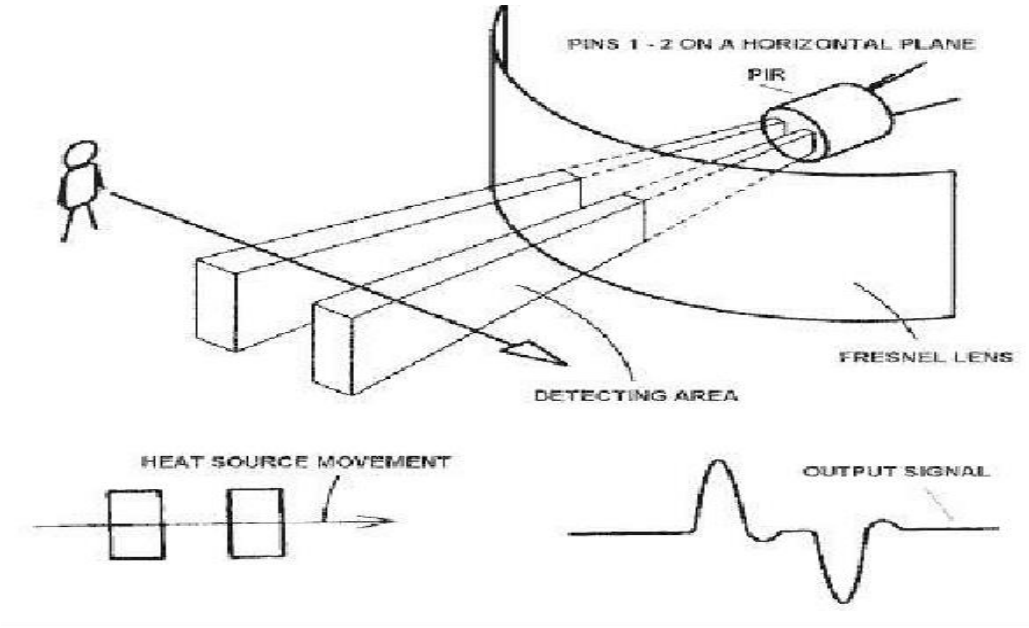

***Fig*- PIR Motion Sensor working principle.**

2) As a smart home automation system

By an example, this application of the module can be explained. Suppose, the situation is that the owner is expectinga guest at his housebut he is not available there. Now, when the guests reach at hishouse, the owners will receivea video call. But now the ownercan even can disable the security system or can press digits other than 1 (such as 3 for lights, 4 for fan, 5 for A.C., and so on). Similarly the userwill still receive a video call, if the user or somebody leaves the house and this time can enable the security system again by pressing proper digits known to him he can switch Off the appliances.,The appliances can be easily controlledusing micro-controller, since they are connected to mains supply through a relay.

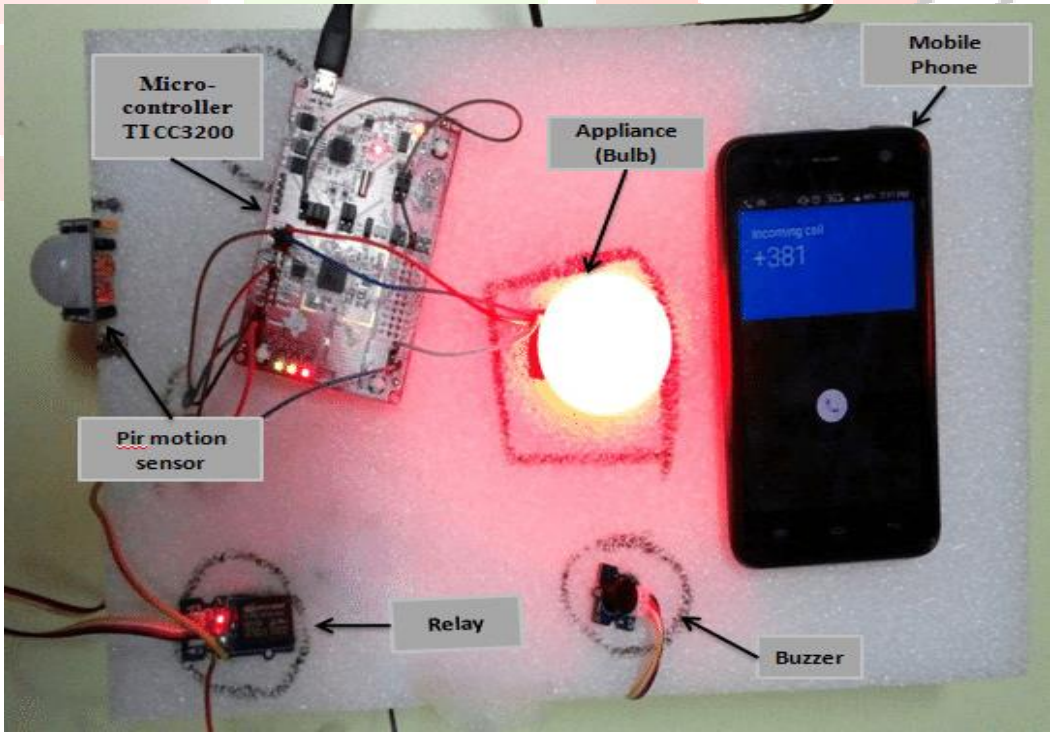

***Fig*-Implementation Setup**

The use of a camera connected to the micro-controller might help the user in taking decisions whether toactivate the security system or welcome the guest, as the system is dependent on the user's discretion and judge ability of the situation (whether it is a guest or an intruder entering his house).After face detection, the captured picture of the guestor intrudercan be mailed to the user. The user can also forward thesame photograph to the police station.The user can controlhis home appliances, by integrating the voice call feature within the same smart phone application

V. ISSUES AND CHALLENGES –

IOT is not free from challenges. Issues of Governance security, privacy, regulations, Interoperability, providing power to billions of sensors and standardization issues can slow down the progress of Internet of Things. There is much confusion and inconsistencies, due to absence of generic governance.For providing a true IOT environment, an universal numbering system is must. Systems like EPC Global and ubiquitous ID systems are used to address the issue of global ID systems; in the current context.There is a challenge of implementing common security protocols. So while interacting among IOT objects developed by different manufacturers, interoperability is an issue. Lack of ubiquitous connectivity, support of the regulatory bodies and Government agencies are barriers to device integration. Even cost and quality of receiving data from multiple sources are still with issues. Companies like IBM, Cisco, GE and Amazon have decided to add Swarm and fog layers. This effort reduces the difficulty of the cost of integrating these devices and also connecting IOT devices. Applications like wearable devices along with consumer oriented products, home monitoring systems are the centre of attention of Internet of Things domain.To apply these concepts from the context of generating business values, Enterprise IT professionals are still with issues.A real change can happen when we can develop a system to evaluate the massive data generated in IOT Environment and acts on these data in real time.IOT is now in early stage of acceptance. Primary obstacles to acceptance of IOT are awareness of IOTs among benefits, consumers and features of these products.

VI. ADVANTAGES

• This minimum requirements with low cost system takes care of both home automation
as well as home security
• This home security system does not use any type of user interface or any smart- phone application; instead it uses digits from the keypad on the phone.As the systemis platform independent, it can be accessedfrom a wide range of phones with different operatingsystems.
• To operate home security system, data connection is not needed in the user's phone. With the launch pad connected to wi-fi at home/work place, the systemruns properly.
• To control his home appliances without sensors being triggered, the optional smart phone application takes care of this fact.
• The user need not have data connection enabled in his phone, to operate home security system. The systemruns ne with the launch-pad connected towi-fi athome
• The user may also wish to control his homeappliances without sensors being triggered; the optional smart phone application takes care of this fact.
• As the system cannot be accessed by any other unauthenticated user, no need to worry about security leakage, since the launch pad sends a voice call to a particular number which is present in the web API. This increases the chances of thesecurity system.
• The use of wi-fi enabled launch pad in the system enables the system to be controlled from many partof the globe.
• Since the same set of motion sensors can be used for home automation aswellassecuritysystem, the system is very simple and inexpensive
• This system does not require the user to manually trigger an alarm but still it provides the user withthe advantage to analyze the situation and thentrigger the security alarm remotely from his phone.

VII. CONCLUSION AND FUTURE RESEARCH DIRECTION

The research in the field of IOT and its implementation will definitely improve the quality of life of human.Today IOT is being implemented everywhere which is of human concern like security, smart environment, Smart city, and emergencies, smart agriculture, smart business process, domestic and home automation and healthcare. Initiatives to mark its presence in the field of IOT, search engine Google has already taken. It is trying to transform the IOT by putting their enthrall concept of making the physical URL as future of IOT instead of apps which we commonly use.

In this process, the browser will display a beacon style broadcast in which the nearby object will appear which will be present in the near proximity and can be communicated directly with the help of URL's according to the preference of users and signal strength of the smart object. On the other hand companies like IBM and Libelium has launched 6LoWPAN development platform for IOT which will enable every single sensor and devices to connect directly to the Internet using the new IPv6 protocols. Many countries like China and Europe are investing high amount of their GDP in making smart architectural infrastructure which includessmart Roads and Bridges for the safety of people. In this smart bridges if corrosion or if any malfunction occurs, so to do repair work at the proper time, it will communicate directly. Smart agriculture is also in research, has taken this initiative for optimum productivity using the sensor networks to maintain monitoring capacity of crop cultivation throughout the production cycle

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