

Least Power consumption of Street light using Internet of Things

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Abstract— The main aim of the work is to develop a system that will provide remote control of public street light and also provide security against the mishaps when no one is there to switch off the light. This paper is mainly concerned with the automatic control of street light or any other electric equipment of Municipality using Internet. It is meant to save the electric power and human energy. This work is made with the help of Microcontroller Adriano [5], Relay and various sensors [4]. The various appliances connected to the microcontroller and sensors are connected using wireless network (Local Wi-Fi). “Street light automation using IOT” is basically communication of physical devices over internet so it’s clearly visible that by using this technology real world equipment’s like lights, fans, tubes and other devices can be operated from Internet.

Keywords— Microcontroller, Relay, Adriano, Sensors, Wireless network, Wi-Fi, IOT

I INTRODUCTION

The IOT concept was coined by a member of the Radio Frequency Identification (RFID) development community in 1999, and it has recently become more relevant to the practical world largely because of the growth of mobile devices, embedded and ubiquitous communication, cloud computing and data analytics.[11]

Internet of things common definition is defining as: Internet of things (IOT) is a network of physical objects. The internet is not only a network of computers, but it has evolved into a network of device of all type and sizes , vehicles, smart phones, home appliances, toys, cameras, medical instruments and industrial systems, animals, people, buildings, all connected ,all communicating & sharing information based on stipulated protocols in order to achieve smart reorganizations, positioning, tracing, safe & control & even personal real time online monitoring , online upgrade, process control & administration[12,13].

Internet of Things Vision: Internet of Things (IoT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals. In this context the research and development challenges to create a smart world are enormous. A world where the real, digital and the virtual are converging to create smart environments that make energy, transport, cities and many other areas more intelligent. [12,13]

In the IOT, things are expected to become active participants where they are able to interact and communicate among themselves by exchanging data and information sensed about the environment. In this paper we use IOT for controlling in public area electric equipment [1]. It is the name of latest technology which is giving to be new future of whole world. IOT is the combination of three different leading technologies of World internet (web programming), embedded system [2] programming and electronics. IOT [6]is the communication of physical devices over internet, through which you can give instruction to public electric equipment like to switch ON / OFF fans, lights when no one is there to utilize them through internet. Through IOT[10], such which robots[3] which are under your control rights through from your internet which can be operated from your smart phone, your laptop or your computer or tablet that too from anywhere in the world.

II CHARACTERISTICS OF IOT

The fundamental characteristics of the IoT are as follows [12, 14]: Interconnectivity: With regard to the IoT, anything can be interconnected with the global information and communication infrastructure. Things-related services: The IoT is capable of providing thing-related services within the constraints of things, such as privacy protection and semantic consistency between physical things and their associated virtual things. In order to provide thing-related services within the constraints of things, both the technologies in physical world and information world will change. Heterogeneity: The devices in the IoT are heterogeneous as based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks. Dynamic changes: The state of devices change dynamically, e.g., sleeping and waking up, connected and/or disconnected as well as the context of devices including location and speed. Moreover, the number of devices can change dynamically. Enormous scale: The number of devices that need to be managed and that communicate with each other will be at least an order of magnitude larger than the devices connected to the current Internet. Even more critical will be the management of the data generated and their interpretation for application purposes. This relates to semantics of data, as well as efficient data handling. Safety: As we gain benefits from the IoT, we must not forget about safety. As both the creators and recipients of the IoT, we must design for safety. This includes the safety of our personal data and the safety of our physical well-being. Securing the endpoints, the networks, and the data moving across all of it means creating a security paradigm that will scale. Connectivity: Connectivity enables network accessibility and compatibility. Accessibility is getting on a network while compatibility provides the common ability to consume and produce data

III METHODOLOGY

The main part of the system consists of a Microcontroller with an Ethernet module for controlling. This Ethernet module is Connected to a Wi-Fi router which gives a static IP address (URL to website) I.e. a web page to it so that it can use TCP/IP based communication with other accessing devices connected to the same router. This module is connected to many appliances through relay devices to turn on and off those devices according to the passed instructions through internet. Based on the encountered Uniform Resource Locator (URL) from the internet browser which contains embedded strings that has a control byte, once picked by the server, will be executed as a specific command attached to the string[9]. A manually assigned IP address is assigned to the server which is in this case 192.168.0.155. Initializing the server will make a request to the server to open a listening connection and after receiving a URL such as 192.168.0.155/? (Control Byte) it will display the current state of sensors and I/O devices and provides manual control, i.e., Human Interface [7]. As the relay devices are current controlled device, current amplification is needed to support low current output of the microcontroller and hence the connected appliances like fans / tubes / air conditioner are either turn ON / OFF according to requirement. To make this design more efficient an automatic system has been designed as well[8].

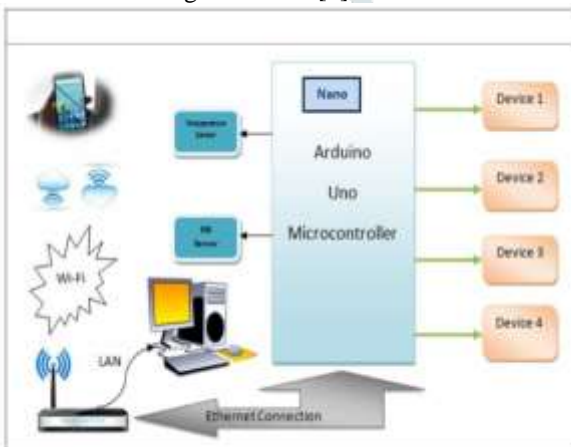


Fig. 1 System overview and design

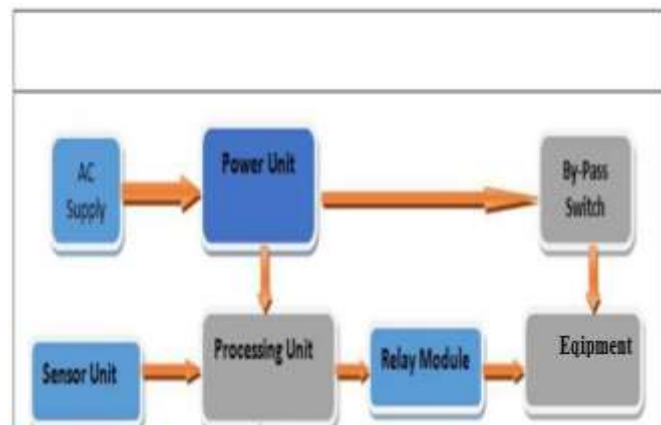


Fig. 2 Block Diagram of Proposed Design

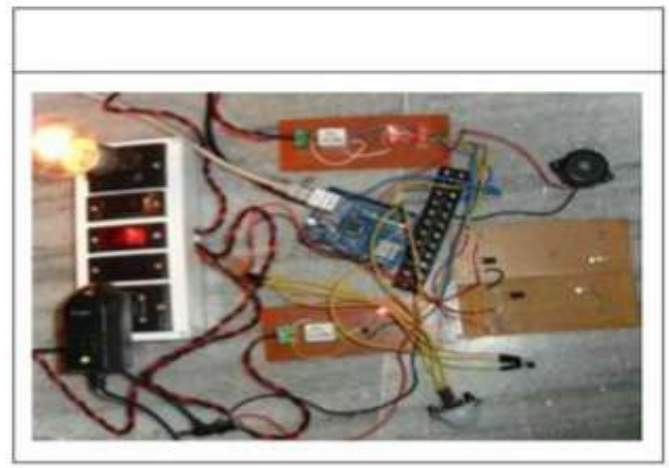


Fig. 4 Working View of Project

IV APPLICATIONS OF IOT

As it is a growing technology we are lots of its applications which are playing important role in the automation industries some of the applications are as follows.

- a) Smart Cars
- b) Smart cities
- c) Buddy Home (Home Automation)
- d) Automatic Lamp Post
- e) GPRS System and Path Tracking
- f) Highly secured digital locking and information system
- g) Digital road maps

V CHALLENGES OF IOT

a) Since we may be at a far distance from original place where things are situated so data being sent will take time to reach to source which may be a significant gap between instruction firing and instruction execution.

b) Not only that but because we are working on internet therefore network bandwidth is also a big issue to deal with.

VI ADVANTAGES OF IOT

a) Most prominent advantage of this project will be for physically handicapped people, with the help of this project without moving anywhere they can operate their electricity at home.

b) It is a wonderful initiative for old age people who are not able to move much from their place so they don't need any care taker sort of person for arranging their day to day life.

c) Commercially it is a wonderful approach for huge premises where we have huge wastage of power, electricity and man power.

d) As lot of people are required for switching lights ON / OFF regularly so lot of time and money is wasted but after this they can be utilized in doing other useful jobs. e) Speed and Accuracy of systems will be increased 100 times better and faster than current scenario because physical and human movements will be dramatically minimized whole systems will be automated therefore jobs of hours will take seconds so huge saving of time and effort.

VII Technical Description

Software's Description:

□ Arduino: It is basically an IDE to make embedded programs. It is chosen for this project because of its easy, fast and efficient working so that without facing difficulties of programming we can fully focus on application.

□ Ethernet Module: Since working on IOT (Internet of Things) therefore networking is required so we will have to attach some routers to avail network and for programming of routers we need Ethernet Module as software.

Hardware Description:

□ Microcontroller: Atmega8 microcontroller will be used to program several input and output devices. □ Relay: It will play major role in controlling project because Relay is the device which changes a digital input into an analogue input and provide several useful features for home automation project

Major Device's Description:

□ LAN Cables: For making a network, so that internet can be available to routers.

□ Development Board: It is required to place ATmega8 and other hardware devices to place together in a feasible set up which can be delivered to client.

□ Routers: Will be required to create a Wi-Fi network for accessibility of internet.

□ USB Cable: Will be used to write program in microcontroller's flash memory.

□ DC Geared Motors: Will be representing fans of buddy home, so motor will be required to move fans.

□ LED: To test output of programs LEDs will be required.

□ IR Sensors: Sensors will be required to provide additional features to buddy home like by touching an appliance you can switch ON / OFF.

□ LDR: Will be required to judge amount of light available so that day and night can be detected in order to provide automatic lights ON/OFF in "Buddy Home".

□ Wires and Cables: As per requirement. And other things depend on need during development



Fig. 6 Adriano with Ethernet shield

VII. CONCLUSION AND WORK

With the advancement in technology, it is expected that the availability of internet is everywhere and online at all the time. In this paper we proposed a design of a Street light IOT that integrates electrical devices of public area with each other. The techniques which are going to use in home automation includes the control of public domain devices such as fans, lights etc. In this paper we are planning to eliminate the most of human interaction to the device just to switch ON / OFF them and hence to reduce the additional expenditure. Development of such Street light IOT achieve by using "Internet of Things" by using these systems we can actually manage to make low cost, flexible and smart home. Using this system in near future as frame work, the system can be expanded to include various other options which could include home security features like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and store it. This kind of a system with respective changes can be implemented in the hospitals for disable people or in industries where human invasion is impossible or dangerous.

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Fig. 5 Relay Board

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