Smart Security and Home Automation System using IoT

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Abstract. The standards of human's comfort in homes can be categorized into several types. Among these categories, the most significant ones are the thermal comfort, which is related to temperature and humidity, followed by the visual comfort, related to colors and light, and hygienic comfort, associated with air quality. A system can be set to monitor these parameters to help maintain them within an acceptable range. Additionally, making the house smart is to allow for intelligent automatic executing of several commands after analyzing the collected data. Automation can be accomplished by using the Internet of Things (IOT). This gives the inhabitant accesses to certain data in the house and the ability to control some parameters remotely. This paper presents the complete design of an IOT based sensing and monitoring system for smart home automation.

Keywords: Internet of Things, GPS, IDE,AC,LED,Usb.

I. INTRODUCTION

The Solar Decathlon Middle East (SDME) is a newly established competition in the Middle East region that is intended to take place in Dubai in 2018. Qatar University's entry to the SDME 2018 competition has enabled it to form a multidisciplinary of students who will collaborate in the design and construction of a green, smart, portable and affordable solar house. An energy efficient house that is fully monitored and automated using the internet of things (IOT) technologies. The increase in the popularity of IOT has widely spread to simple in-home applications and everyday tasks. Home automation systems using IOT consists of three major parts. The first part is the sensing and data acquisition part. This is done by placing sensors or devices, also called things, at several locations throughout the home to measure and gather desired information such as temperature, humidity, or
Lux. IOT home monitoring system illustrative diagram the second part of the system is the data processing. Sensors provide data in raw form. These data are sent to the processor through a mode of transmission, wired connection or wireless. The processor then translates the data into comprehensible values. These values are transmitted to a device to be controlled automatically and/or to a user interface. The last part of IOT automation is the internet.

II. ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IOT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Figure 1: ARDUINO

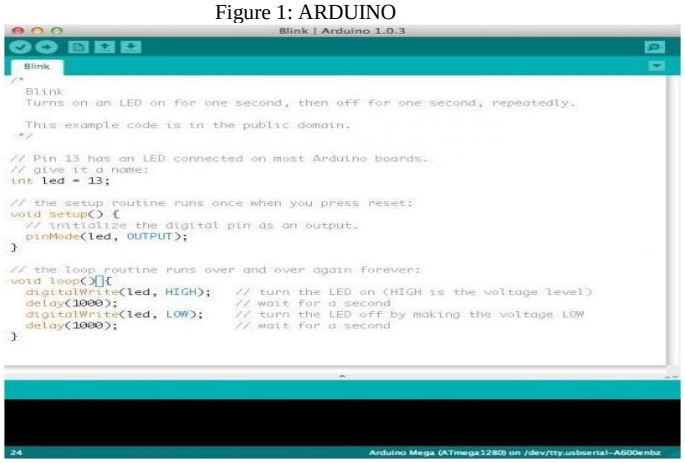

Figure 2: Arduino IDE Environment.

III. ANDROID

Android is now nearly eight years old and despite the green robot android peeking out of phone shops up and down the high street, there are still plenty of people who don't know what Android is. If you fit into this category then have no fear; this article is your complete guide to understanding what Android is, what it can do and where to find it, including the best Android mobile phones, Android apps, which games you can play on Android devices, the very best features you can enjoy and how to update to the latest version.

Android is the name of the mobile operating system owned by American company; Google. It most commonly comes installed on a variety of smartphones and tablets from a host of manufacturers offering users access to Google's own services like Search, YouTube, Maps, Gmail and more.

Android phones are highly customisable and as such can be altered to suit your tastes and needs; with wallpapers, themes and launchers which completely change the look of your device's interface. You can download applications to do all sorts of things like check your Facebook and Twitter feeds, manage your bank account, order pizza and play games.

Figure 3: ANDROID

IV.PROPOSED WORKFLOW METHOD

Main objective of loT is to manage and control physical objects around us in a more intelligent and meaningful manner and also improve quality of life by providing cost effective living including safety, security and entertainment. This system does not require the user to manually trigger an alarm but still it provides the user with the advantage of analyzing the situation and then triggering an alarm but still it provides the user with the advantage of analyzing the situation and then triggering the security alarm remotely phone.

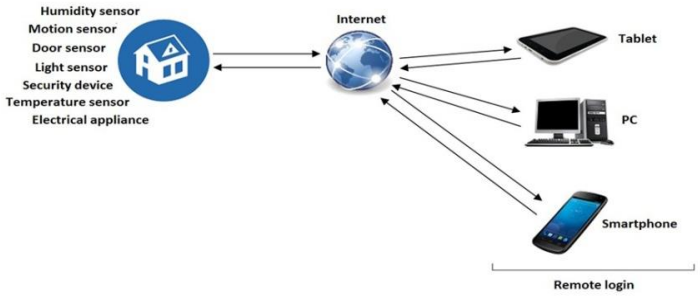

Figure 4: System Architecture

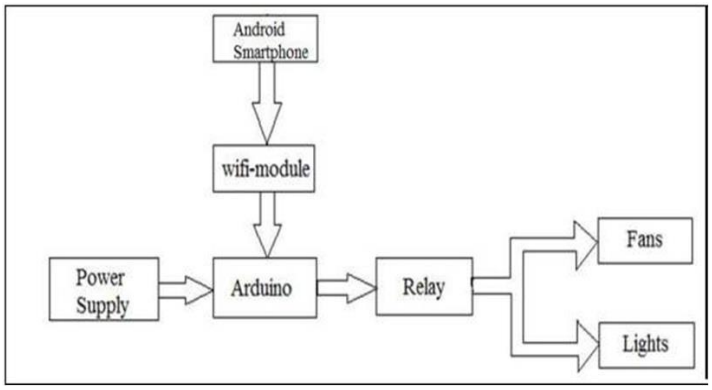

Figure 5: Workflow Sequence

V.INTERNET OF THINGS (IOT)

The **internet of things** (**IOT**) is the network of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IOT-GSI) defined the IOT as "the infrastructure of the information society." The IOT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. When IOT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.

"Things," in the IOT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist firefighters in search and rescue operations Legal scholars suggest to look at "Things" as an "inextricable mixture of hardware, software, data and service" These devices collect useful data with the help of various

existing technologies and then autonomously flow the data between other devices Current market examples include smart thermostat systems and washer/dryers that use Wi-Fi for remote monitoring.

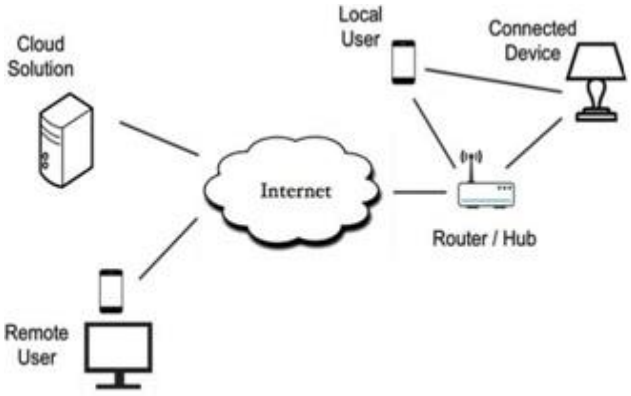

Figure 6: Workflow Sequence

VI.POWER SUPPLY

The power supply circuits built using filters, rectifiers, and then voltage regulators. Starting with an ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit, which takes a dc voltage and provides a somewhat lower dc voltage, which remains the same even if the input dc voltage varies, or the output load connected to the dc voltage changes.

1) Transformer

A transformer is a device which transforms high voltage AC into low voltage AC or vice versa. Our goal is to convert high voltage AC into low voltage DC. So there is absolutely no reason to use step-up transformer. The transformer that is used in power supply is step-down transformer, which steps down the input AC voltage. The magnitude by which transformer steps down the voltage depends on the turns ratio of primary and secondary winding. Observe the magnitude of sinusoidal signal before the transformer block.

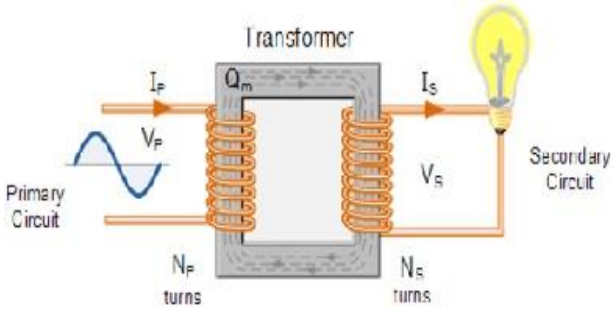

Figure 7: Transformer

2) RECTIFIER

A **rectifier** is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as **rectification.**

3) Filter

The output after being processed by full wave rectifier is not a pure DC. The output is a pulsating DC. The output contains large fluctuations in voltages. This is quite apparent from the block of full wave rectifier shown above. The power supply that we intend to design must not have any variation in output voltage. The voltage that we get from full wave rectifier fluctuates between 0 V and V_{peak}, and hence it contains AC components. These AC components needs to be filtered out so as to obtain DC voltage. This is where filters come into picture. Filters, as the name suggests, filters out any AC component present and provides DC as the output. However, the output from the filter is still not a pure DC but filters removes the AC component in the voltage to a considerable extent.

VII.CONCLUSION AND FUTURE ENHANCEMENTS

It is simple and flexible design for solar house monitoring and automation. The selected platform is the EmonCMS that uses a cloud server to collect data from sensor nodes using the IOT principle. Collected data can be displayed, archived or processed and used to control devices in the house. The NodeMCU combined with the ESP2866 was used as the main processing unit that collects the data from the sensors, processes it and then uploads it to the EmonCMS cloud server. The NodeMCU can also read data and commands from the same server and control switching devices. This constitutes a complete smart-home monitoring and automation system that is based on the IOT technology. The proposed design of the smart solar home is very flexible and can be easily expanded and applied to larger buildings by increasing the number of sensors, measured parameters, and control devices. More functionality and smartness could be also added to the existing system for making the house automation system grow, adapt, and evolve by itself using advanced artificial intelligence.

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