Ministry of Higher Education and Scientific Research

University of Diyala

College of Science

Department of Computer Science

Home lighting controlling using Arduino

This research was presented to the council of the College of Science - University of Diyala - Department of Computer Science as a part of the requirements to get a Bachelor's in Computer Science

By:

Mustafa Kahlid fadil

Hussam Abdul-Jabbar Khalaf

Zainab Shaalan Ibrahim

Under the Supervision of

Dr. Jumana Waleed

1441A.H 2020A.D

Abstract

Conventional houses have always evolved with time to cater to the changing needs of people in terms of security and comfort. These needs can be easily met by converting ‘normal’ homes into smart ones by implementing a home automation system. It initially involved the control and automation of systems that ensure human comforts such as lighting, heating, ventilation, air conditioning, and security. Recently, it has evolved to encompass most home appliances that use Wi-Fi and Bluetooth for remote monitoring. However, the emergence of cheap microcontrollers, like the Arduino, has enabled the implementation of low-cost smart home systems. In this project, we present a highly scalable, low-cost and multi-faceted lighting home system automation, using Arduino microcontroller that is capable of integrating appliances and equipment automation. In addition to the controlling the system remotely based on a smartphone via the Bluetooth technology.

جمهورية العراق

وزارة التعليم العالي والبحث العلمي

جامعة ديالى / كلية العلوم

قسم علوم الحاسوب

التحكم في الإضاءة المنزلية باستخدام الأوردوينو

بحث مقدم الى جامعة ديالى /كلية العلوم / قسم علوم الحاسوب

كأحدى متطلبات لنيل شهادة البكالوريوس في اختصاص علوم الحاسوب

اعداد :

مصطفى خالد فاضل حسام عبد الجبار خلف

زينب شعلان ابراهيم

باشراف

د. جمانة وليد

1441هـ 2020 م

بسم الله الرحمن الرحيم

(اللَّهُ نُورُ السَّمَاوَاتِ وَالْأَرْضِ مَثَلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ
فِي زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِن
شَجَرَةٍ مُّبَارَكَةٍ زَيْتُونِةٍ لَّا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ
تَمْسَسْهُ نَارٌ نُّورٌ عَلَى نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَن يَشَاءُ
وَيَضْرِبُ اللَّهُ الْأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ)

صدق الله العظيم

سورة النور: [35]

شكر وعرفان

ونحن نخطو اخر خطواتنا في هذه المرحلة الجامعية نبدأ بالشكر للذي لا يُشكر إلا سواه الذي مهد لنا الطريق لإنجاز هذا العمل الله سبحانه وتعالى ومَنَّ علينا بالصحة والعافية.

كلمة شكر وتقدير لكل من ساهم وساعد وقدم لنا العون للوصول الى نهاية هذه المرحلة

الدراسية وإتمام هذا العمل والوصول به الى هذا الشكل المتكامل ونخص بالشكر والتقدير للدكتورة **جمانة وليد** على كل جهودها ونصائحها طوال فترة المشروع فقد كانت تقدم النصائح والمساعدة لنا من غير تذمر او استكثار. وكذلك نخص بالشكر رئيس قسمنا الدكتور الفاضل **طه محمد حسن** على تعاونه المستمر معنا ،،،

وفي الأخير نشكر كل من ساهم وساعد في هذا المشروع حتى وان كان بفكره او بكلمه دعم ورفع من معنويتنا وإعطائنا دفعه الى الامام للمضي قدما ،،،

والله ولي التوفيق،،،

الاهداء

بدأنا بأكثر من فكره وعمل وقاسينا أكثر من هم وعانينا الكثير من الصعوبات وها نحن اليوم والحمد لله نطوي سهر الليالي وتعب الأيام وخلاصة مشوارنا بين دفتي هذا العمل المتواضع و الذي نهديه :

إلى منارة العلم والإمام المصطفى إلى الأمي الذي علم المتعلمين إلى سيد الخلق إلى رسولنا الكريم سيدنا محمد صلى الله عليه وسلم.

إلى الينبوع الذي لا يمل العطاء إلى من حاكت سعادتنا بخيوط منسوجة من قلوبهن إلى امهاتنا العزيزات.

إلى من سعى وشقى ووفر لنا الراحة والهناء الذي لم يبخل بشئ من أجل دفعنا في طريق النجاح الذي علمنا أن نرتقي سلم الحياة بحكمة وصبر إلى ابائنا الأعزاء وإخواننا الأجلاء.

إلى من حبهم يجري في عروقنا ويلهج بذكراهم فؤادنا ،، إلى إخواننا وأخواتنا .

إلى من علمونا حروفا من ذهب وكلمات من درر وعبارات من أسمى وأجلى العبارات في العلم إلى من صاغوا لنا علمهم حروفا ومن فكرهم منارة تنير لنا مسيرة العلم والنجاح إلى أساتذتنا الكرام.

Chapter One

Introduction

1.1 Introduction

The Internet of Things (IoT) is an emerging concept of everyday objects that are interconnected with each other. With this comes the concept of smart homes where consumer electronic products and systems are automated and can be controlled easily by the users improving convenience, comfort, efficiency and security [1].

Within the many subsystems of a smart home, lighting plays a profoundly big role in our daily lives not just at night, but even during the day, where artificial lighting is used to light up the indoors. The uptake of light emitting diodes (LED) as the main light source in the residential segment is forecasted to be at almost 50% in 2016 and over 70% in 2020 by McKinsey [2], showing a high adoption rate of solid state LED lighting by consumers due to its high energy efficiency and long lifespan. With the advancement of LED technologies much more technologically complicated and challenging controls can be performed on them compared to halogen bulbs or fluorescent lamps. As a result, improvements in the standards of living in terms of convenience, ambience, customizability and power savings by using artificial lighting can be achieved through an LED-based intelligent lighting system. For example, the brightness and color of the LED luminaires can be controlled, functionalities such as dimming can be enabled to save power or lighting color can be changed to suit the occasion mood or situation.

In a report released by the International Energy Agency in 2015, artificial lighting accounted for 15% of energy consumption in residential buildings [3]. Daylight harvesting which is a method in which daylight is used to offset the amount of electric energy needed to light up a space can

save up to 27% [4] or even 40% [5] of lighting power in areas that receive a significant amount of daylight.

Seeing great potential in smart lighting, many industrial companies have taken up the challenge to create commercial products, such as Philips Hue, OSRAM Lightify, and LIFX. Though these are the leading smart lighting systems in the market, they are still lacking in many areas. For example, there is no closed loop feedback control for the illuminance level of the room and hence daylight harvesting cannot be employed without the use of external sensors. Some other concerns associated with smart lights such as Philips Hue and smart homes in general which integrate with the IoT are the issues of security and privacy [6, 7].

The Philips Hue system along with some other smart home appliances were studied to show some security loopholes [6] and were even successfully hacked into [7]. This raises a huge concern as hackers are then able to monitor the status of these smart homes removing all privacy and would even be able to control the lights causing a blackout to the entire house, leaving the owner of the house worse than using the traditional lighting systems with wall switches.

1.2 Arduino System

Arduino is an open-source platform [8] used for constructing and programing of electronics. It can receive and send information to most devices, and even through the internet to command the specific electronic device. It uses a hardware called Arduino Uno [9] circuit board and software program (Simplified C++ [10]) for programming the board.

In these modern day, Arduino are used a lot in microcontroller programing among other things due to its user friendly or easy to use setting [11]. Like any microcontroller an Arduino is a circuit board with chip that can be programmed to do numerous number of tasks, it sends information from the computer program to the Arduino microcontroller and finally to the specific circuit or machine with multiple circuits in order to execute the specific command.

An Arduino can help you read information from input devices such as Sensors, Antenna, Trimmer (potentiometer) etc., and can also send information to output devices such as LED, Speakers, LCD Screen, DC motor etc. [12].

1.3 Why Arduino

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community. There are many other microcontrollers and microcontroller platforms

available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems :

- Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino modules cost less than $50.
- Cross-platform - The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.
- Simple, clear programming environment - The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.
- Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want to.

- Open source and extensible hardware - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

1.4 The System Problem

The problem of the current system is the human factor where it needs someone who is good at dealing with the phone and connecting via Bluetooth only. But when developing the system in the future and dealing via the Internet here needs more experience and entered here the problem of security and prevent strangers from controlling the smart home.

1.5 The Research Objective

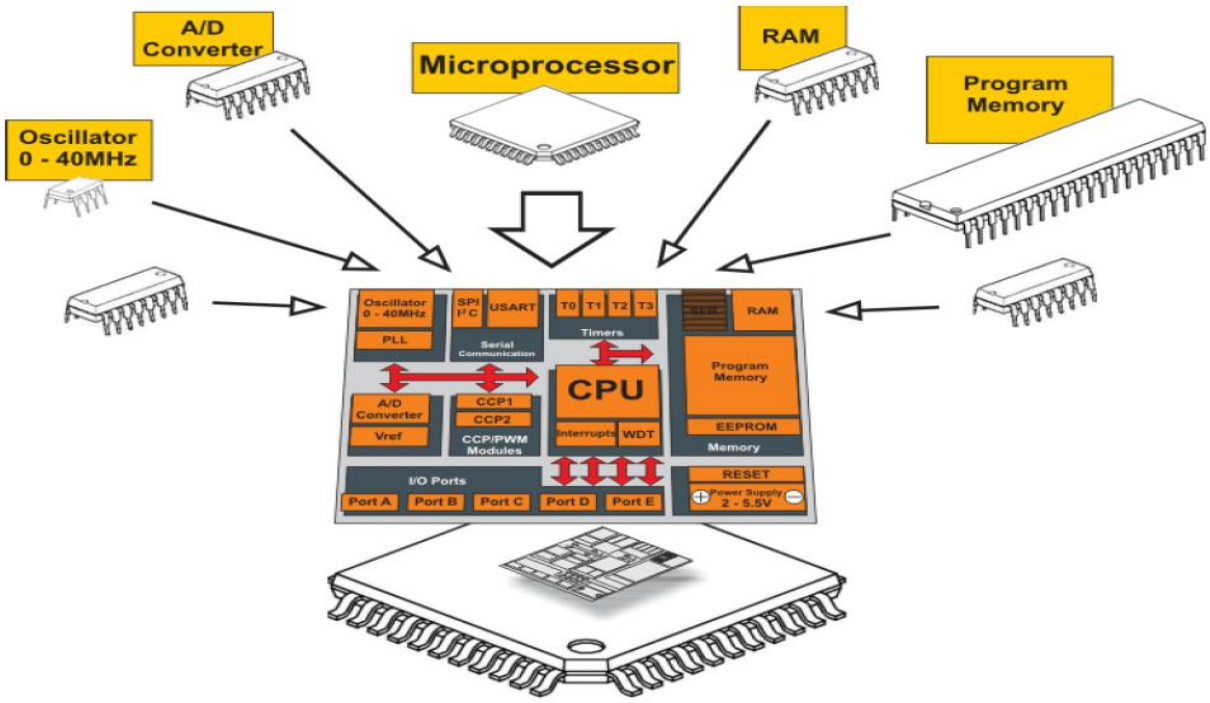
The aim of this study is to activate the role of technology in society, as well as to provide energy at a high rate using light sensor and motion sensor, as well as through the application of Android, in addition to the provision of human effort.

Chapter Two

Background and Literature Review

2.1 Microcontroller

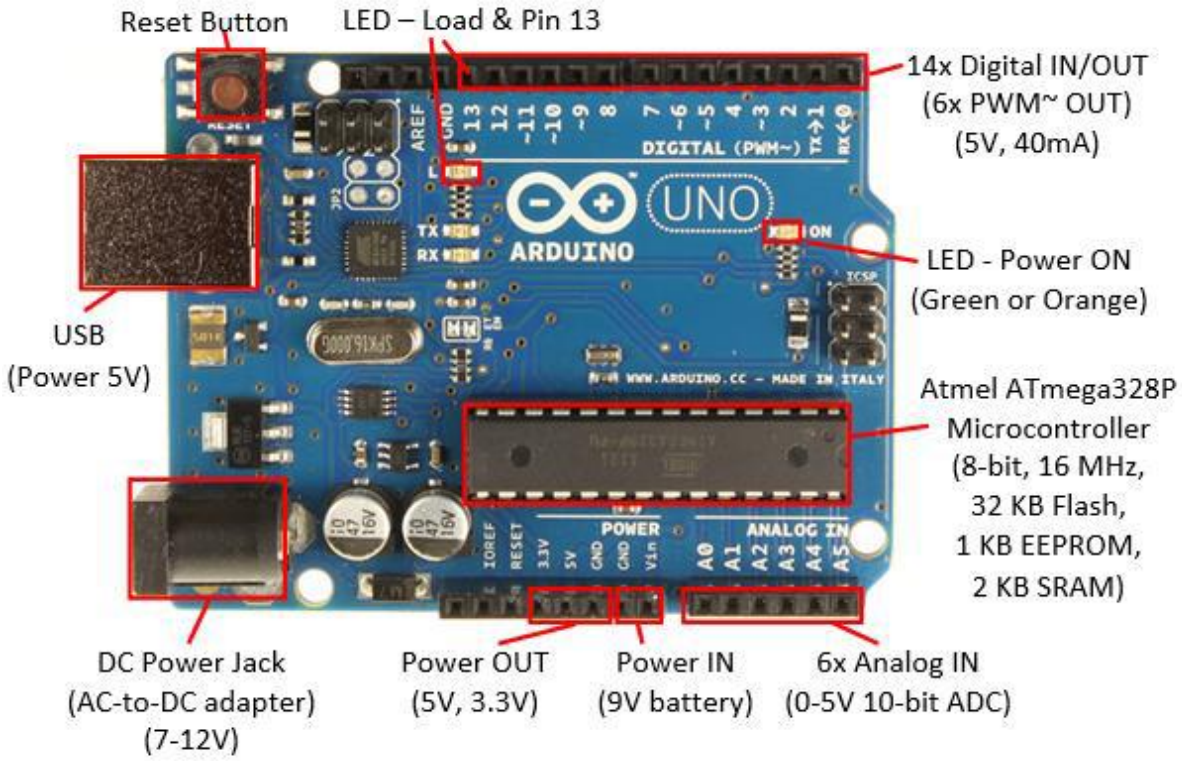
A micro-controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. And the difference Between Microprocessor and Microcontroller is that a microprocessor does not have Ram, ROM and IO pins. It usually uses its pins as a bus to interface to peripherals such as RAM, ROM, Serial ports, Digital and Analog IO. While, a microcontroller is 'all in one', the processor, ram, IO all on the one chip, as such you cannot (say) increase the amount of RAM available or the number of IO ports. Figure 2.1 illustrated the main components of a Microcontroller.



.

2.2 Arduino Board (Uno)

Arduino is a flexible programmable hardware platform designed for artists, designers, tinkerers, and the makers of things. This microcontroller of Arduino comes from a company called Atmel with properties of 16Mhz with an 8-bit core, 32 kilobytes of storage, 2 kilobytes of RAM, and 1kilobyte EEPROM (see figure 2.2).



2.2.1 Open-Source Hardware

The Arduino platform is itself pretty useful for microcontroller projects, but that alone is not enough to propel the popularity and widespread adoption of the platform. Instead of closing the design of the interface board and development environment, the entire Arduino project is deeply entrenched in the emerging practice of open-source hardware. It can be seen as all of the design files, schematics, and software are freely available to download, use, modify, remake, and even resell.

2.2.2 The Software (Integrated development environment (IDE))

IDE is an easy to-use development environment which enable us to write and edit code and convert this code into instructions that Arduino hardware understands. The practice of contributors having the liberty to use these designs freely (free as in speech) and with no obligation to buy anything. Many Libraries support a lot of hardware.

The core language used in the Arduino development environment is the C / C++ computer programming language. Arduino team has developed the standard Arduino library that provides a simple and targeted set of functions like (pinMode(), digitalWrite(), and delay(), …. ,Etc) that make programming the Arduino interface board about as easy as it can get.

2.2 Literature Review

Smart home systems were introduced to autonomously control appliances, lights and other services based on the current state inside homes. There are a lot of researches in Smart home systems which are dealing with the problem of lighting system in addition to the problems that must be solved in traditional homes.

A. T. Gâmbutan and M. Popa [17] describe an intelligent lighting system that tracks users' locations, turns on the light in a room just before the user enters the room and turns off the light when the user has left the room. The two used standards in regards to smart homes, are the X10 standard and the TCP/IP standard, with each having its own strong and weak points.

J. García-Guzmán et al. [18] reports on the design and FPGA implementation of a smart lighting system for application in small smart homes. Unlike those systems using pervasive remote controls. The system proved to be functional when adapted to the needs of a family in a small home. Programming required by the end users is minimal and the operation of the system is adjusted automatically depending on the conditions of use. Practical implementation for actual smart home operation would require a small PCB with the FPGA, a few programming buttons, 7-segment displays and additional interfaces for inputs (sensor signals) and outputs (light switching signals).

To enable automated lighting control, under varying conditions of occupancy, weather, seasons and other lighting influences it is essential to have a complete system that is effective and adaptive. Such system must be deployable in a simple, cost effective system without the need for customizations and reprogramming as conditions change. It also needs to

create a comfortable environment with energy savings as a goal. Y. Wang and P. Dasgupta [19] present such a complete core system that contains both daylight harvesting module and artificial lighting control module. It also tests the feasibility and effectiveness in both experimental and simulated scenarios. The underlying system can be deployed in buildings and homes without excessive costs. The lighting control problem is built using non-linear integer programming model, which is NP-hard. A heuristic algorithm is proposed to solve the problem to compute approximate optimal solutions.

S. Gunputh et al. [20] present the design and implementation of a simple low-cost smart home system that will control various actuators based on the data gathered by multiple passive and active sensors installed in strategic locations. Its main objective is to enable home owners to experience a more convenient and comfortable lifestyle, a safer environment and a better energy efficiency. The design criteria have focused on ensuring that the system is affordable, reliable, user-friendly and adaptable to the needs of home owners. Moreover, its major features, which facilitate the operation of common home activities, make it attractive to households, especially those with elderly and handicapped people. The system consists of a voice recognition system which controls the switching of lights. The Elechouse V3 voice recognition system was used to recognize the commands of the occupants to switch on or off lights. It supports up to 80 voice commands, with a maximum of 7 voice command working simultaneously. The V3 module was chosen as it is Arduino-compatible and the connection is simple. Digital I/O pins 2 and 3 of the Arduino Mega are connected to the TX and RX pins of the V3 module. 5V and GND are also provided to the voice module from the Arduino. The V3 module was initially trained with the appropriate voice

commands which were subsequently loaded into the recognizer of the module. Once commands are successfully identified, the module sends control instructions to the microcontroller. Accordingly, the latter will actuate a relay to switch the lights on or off. The system is also equipped with a Passive Infra-Red (PIR) that detects the presence of people in the room. In this way, the lights switch off automatically when there is nobody in the room, thereby improving the energy efficiency of the design. The working principle of the PIR motion sensor is based on changes in the infrared level emitted by surrounding objects when a person moves around a room. Such changes can be identified by verifying for a high signal on a signal I/O pin. The microcontroller is programmed so that it checks for occupancy every 8 seconds. It will only switch off the lights if it does not detect any movement in the room during two minutes in order to prevent switching off the lights when an occupant is motionless in the room. Alternately, commands can be given to the lighting system via a smart phone or tablet through a web-server. Tests performed on the system have demonstrated that it is reliable.

Chapter three

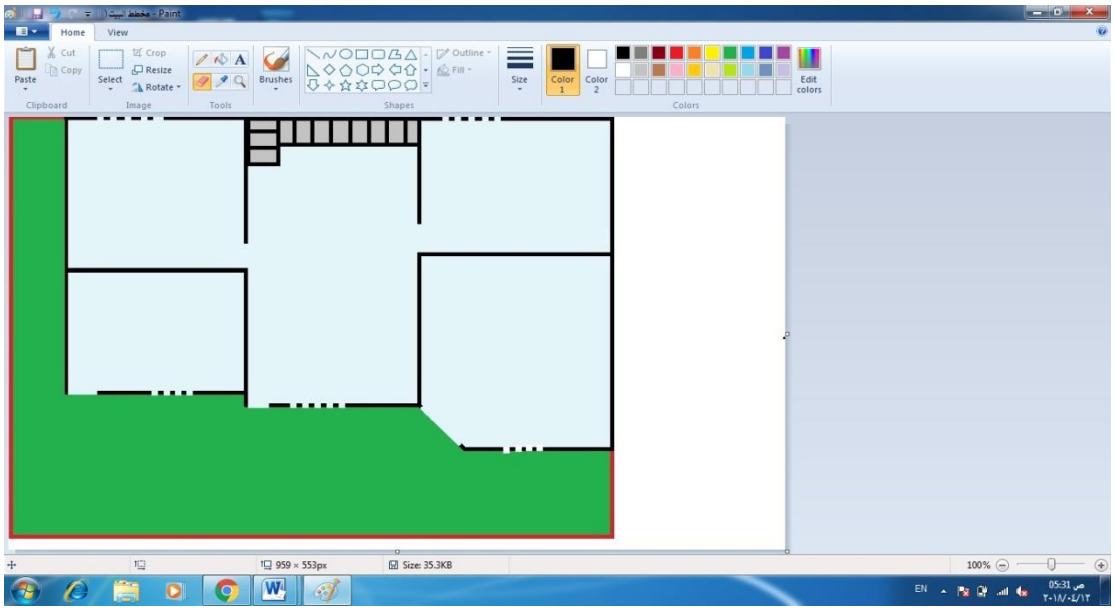
Practical Part

3.1 Chapter Summary:

In this chapter we will explain the external part and tools used to complete this project,

We used Paint program; It is a program used for simple drawing. To draw the external outline of the house as shown in figure 3.1.

And then used wood and ornamental herbs to carry this drawing and convert it into a stereoscopic shape as in the following figure 3.2.



3.2 The tools of the Project are:

1- Arduino Uno.

2- breadboard.

3- IR Sensor.

4- Light Sensor (LDR).

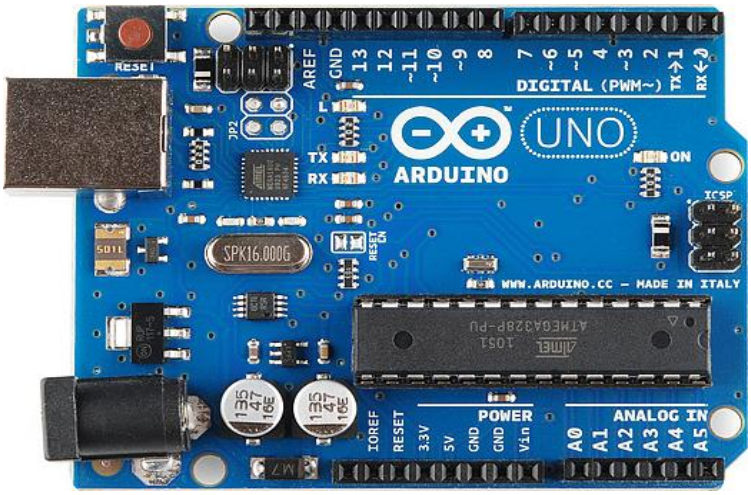
5- Bluetooth HC-06.

6- LEDs.

7- Android application.

3.2.1 Arduino Uno:

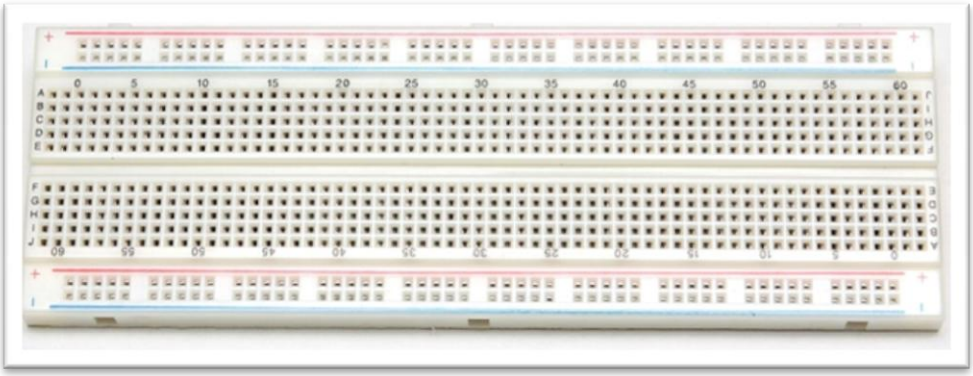
The Uno is a great choice for your first Arduino. It's got everything you need to get started, and nothing you don't. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a power jack, a reset button and more. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



3.2.2 breadboard:

A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a bread board. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consist of an array of conductive metal clips encased in a box made of white ABS plastic, where each clip is insulated with another clips. There are a number of holes on the plastic box, arranged in a particular fashion. A typical bread board layout consists of two types of region also called strips. Bus strips and socket strips. Bus strips are usually used to provide power supply to the circuit. It consists of two columns, one for power voltage and other for ground.

Socket strips are used to hold most of the components in a circuit. Generally it consists of two sections each with 5 rows and 64 columns. Every column is electrically connected from inside.



3.2.3 IR Sensor:

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

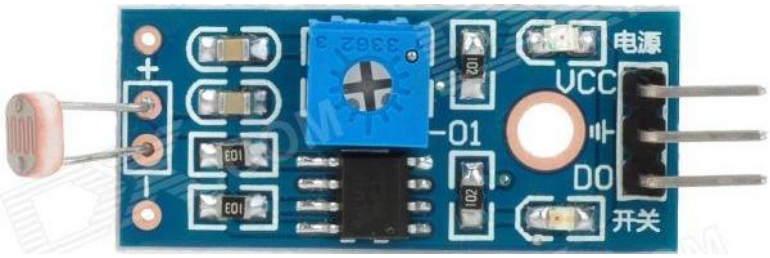
These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared

spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor.

3.2.4 Light Sensor (LDR):

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells.

They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it.



3.2.5 Bluetooth HC-06 :

A widely available bluetooth module that has capability to enable your project with bluetooth. It has got 6 pins interface. But we are interfacing it by using its four pins only. We are using-

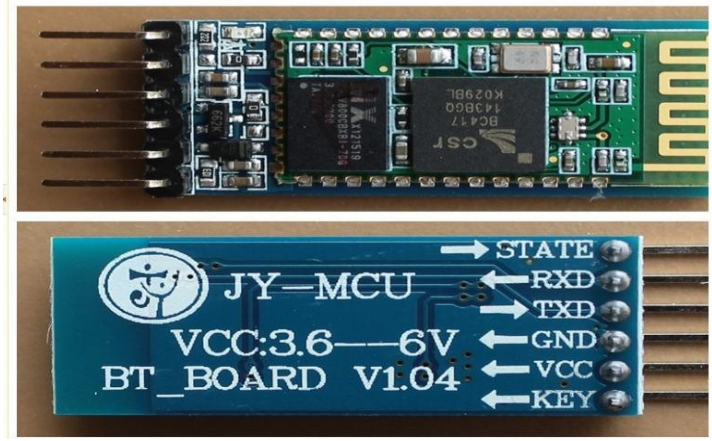
• VCC - To supply +5V

• GND - To make it Ground

• TXD - Data TX pin

• RXD - Data Rx Pin

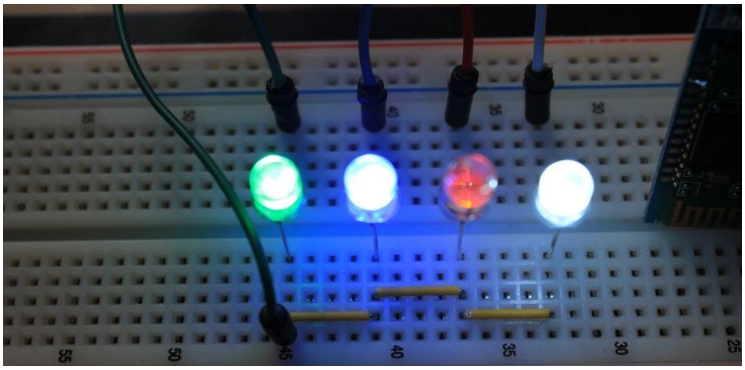
It has got one LED, Which shows its state. If it is blinking that means it is not connected. If it is staying in glowing condition that means it is connected. There is a pin STATE that is connected to this state LED. You may use this pin in your project to determine the state of BT module.



3.2.6 LEDs :

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

Since light is generated within the solid semiconductor material, LEDs are described as solid-state devices. The term solid-state lighting, which also encompasses organic LEDs (OLEDs), distinguishes this lighting technology from other sources that use heated filaments (incandescent and tungsten halogen lamps) or gas discharge (fluorescent lamps).



3.2.7 Android application:

3.3 Code of project :

```
#include <SoftwareSerial.h>
int led  = 3 ;
int ir = 13 ;
byte motion =0; // define variable of PIR sensore
int LDR = A0;     //analog pin to which LDR is connected, here we set it to 0 so it means A0
int LDRValue = 0;      //that's a variable to store LDR values
int light_sensitivity = 500;       //This is the approx value of light surrounding your LDR    // define variable of Light_sensor
SoftwareSerial BT(9, 8); //TX, RX respetively
String device;          // define variable of blutooth_control
void setup() {
 BT.begin(9600);
 Serial.begin(9600);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(10, OUTPUT); // Blutooth_Control
    pinMode(led, OUTPUT) ;
  pinMode(ir , INPUT);  // PIR Sensor
   pinMode(2, OUTPUT);  // Light Sensor
}
//-----------------------------------------------------------------//
void loop() {
  while (BT.available()){  //Check if there is an available byte to read
// *Start Blutoth_Control
  delay(10); //Delay added to make thing stable
```

```
char c = BT.read(); //Conduct a serial read
device += c; //build the string.
}
if (device.length() > 0) {
  Serial.println(device);

if(device == "1")
{
  digitalWrite(5, HIGH);
}
else if(device == "2")
{
  digitalWrite(5, LOW);
 }
else if (device == "3")
{
  digitalWrite (6,HIGH);
  }
 else if ( device == "4")
{
 digitalWrite (6, LOW);
}
else if (device == "5")
{
 digitalWrite (7, HIGH);
}
else if (device == "6")
{
 digitalWrite (7, LOW);
```

```
 }
 else if (device == "7")
 {
   digitalWrite (4, HIGH);
 }
 else if (device == "8")
 {
   digitalWrite (4, LOW);
}
 else if (device == "9")
 {
   digitalWrite (10, HIGH);
 }
 else if (device == "10")
 {
   digitalWrite (10, LOW);
 }
device="";} // END Control_blutooth.....

 motion = digitalRead(ir);  // *Start PIR_Sensor
  if ( motion == HIGH ){
   digitalWrite(led ,LOW);
  }
else {
 digitalWrite(led , HIGH);
 }           // END PIR_Sensor control

LDRValue = analogRead(LDR);       //reads the ldr's value through
LDR // *Start Light_Sensor
```

```
    if (LDRValue < light_sensitivity)
   {
     digitalWrite(2, LOW);
   }
  else
   {
     digitalWrite(2, HIGH);
    delay(3000);
   }  // End Light_Sensor
}
```

Chapter Four

Conclusion and Suggestions

4.1 Conclusions:

In this research we have built a smart home lighting system using Arduino. Through this system we can control all the lights from inside and outside, through the system we can provide the greatest amount of electric power and prevent damage to lamps and also easy to use.

4.2 suggestions:

Our suggestion for future work are:

1- We aspire to add new tools to control the lighting through the Internet.
2- I hope that such systems will be used in any house or institution in Iraq.

References

[1] X. Li, R. Lu, X. Liang, X. Shen, J. Chen, X. Lin, Smart community: an internet of things application., IEEE Communications Magazine 49 (11) (2011) 68–75.

[2] T. Baumgartner, F. Wunderlich, A. Jaunich, T. Sato, G. Bundy, N. Grießmann,J. Kowalski, S. Burghardt, J. Hanebrink, Lighting the way: Perspectives on the global lighting market.

[3] I. E. Agency, Energy e_ciency market report 2015.

[4] J. D. Jennings, F. M. Rubinstein, D. DiBartolomeo, S. L. Blanc, Comparison of control options in private o_ces in an advanced lighting controls testbed, Journal of the Illuminating Engineering Society 29 (2) (2000) 39–60.

[5] Y.-J. Wen, J. Granderson, A. M. Agogino, Towards embedded wirelessnetworked intelligent daylighting systems for commercial buildings, in: Sensor Networks, Ubiquitous, and Trustworthy Computing, 2006. IEEE International Conference on, Vol. 1, IEEE, 2006, pp. 6–pp.

[6] B. Ur, J. Jung, S. Schechter, The current state of access control for smart devices in homes, in: Workshop on Home Usable Privacy and Security (HUPS), 2013.

[7] S. Notra, M. Siddiqi, H. H. Gharakheili, V. Sivaraman, R. Boreli, An experimental study of security and privacy risks with emerging household appliances, in: Communications and Network Security (CNS), 2014 IEEE Conference on, IEEE, 2014, pp. 79–84.

[8] M. Banzi, Getting Started with arduino. " O'Reilly Media, Inc.", 2009.

[9] Arduino, "Arduino uno." Last visited on 06/09/2014.

[10] P. D. Minns, C Programming For the PC the MAC and the Arduino Microcontroller System. Author House, 2013.

[11] A. M. Gibb, New media art, design, and the Arduino microcontroller: A malleable tool. PhD thesis, Pratt Institute, 2010.

[12] M. Margolis, Arduino cookbook. " O'Reilly Media, Inc.", 2011.

[13] "What can Wemo Do?," [Online]. Available: http://www.belkin.com/us/wemo.

[14] "MisterHouse -- It Knows Kung-Fu," 3 12 2008. [Online]. Available: http://misterhouse.sourceforge.net/.

[15] R. J. C. Nunes, "Home Automation - A Step Towards Better Energy Management," [Online]. Available: http://www.icrepq.com/pdfs/CALEIRA416.PDF

[16] N. Banerjee, "Automating Energy Management in Green Homes," [Online]. Available: http://conferences.sigcomm.org/sigcomm/2011/papers/homenets/p19.pdf.

[17] A. T. Gambutan and M. Popa, "Smart homes. A solution for a smart lighting system," 2009 5th International Symposium on Applied Computational Intelligence and Informatics, Timisoara, 2009, pp. 205-210.

[18] J. García-Guzmán, E. O. Moctezuma-Monge and F. H. Villa-López, "FPGA implementation of a smart home lighting control system," 2014 IEEE Fourth International Conference on Consumer Electronics Berlin (ICCE-Berlin), Berlin, 2014, pp. 419-420.

[19] Y. Wang and P. Dasgupta, "Designing an adaptive lighting control system for smart buildings and homes," 2015 IEEE 12th International Conference on Networking, Sensing and Control, Taipei, 2015, pp. 450-455.

[20] S. Gunputh, A. P. Murdan and V. Oree, "Design and implementation of a low-cost Arduino-based smart home system," 2017 IEEE 9th International Conference on Communication Software and Networks (ICCSN), Guangzhou, 2017, pp. 1491-1495.

الخلاصة

تطورت المنازل التقليدية مع الوقت لتلبية الاحتياجات المتغيرة للأشخاص من حيث الأمن والراحة. يمكن تلبية هذه الاحتياجات بسهولة عن طريق تحويل المنازل "العادية" إلى منازل ذكية عن طريق تطبيق نظام أتمتة منزلي. وقد اشتملت في البداية على التحكم والتشغيل الآلي للأنظمة التي تضمن راحة الإنسان مثل الإضاءة والتدفئة والتهوية وتكييف الهواء والأمن. في الآونة الأخيرة ، تطورت لتشمل معظم الأجهزة المنزلية التي تستخدم الواي فاي والبلوتوث للتحكم عن بعد. ومع ذلك ، فإن ظهور ميكروكنترولر رخيص، مثل الاردوينو ، مكن من تنفيذ أنظمة المنزل الذكي منخفضة التكلفة. في هذا المشروع ، نقدم أتمتة نظام إضاءة منزلية قابلة للتوسعة ، منخفضة التكلفة ومتعددة الأوجه ، باستخدام متحكم اردوينو قادر على دمج الأجهزة والتشغيل الآلي للمعدات، بالإضافة إلى التحكم عن بعد على أساس الهاتف الذكي عبر تقنية البلوتوث.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة ديالى
كلية العلوم قسم علوم الحاسوب

التحكم في الإضاءة المنزلية باستخدام الأوردوينو

بحث مقدم الى مجلس عمادة كلية العلوم جامعة ديالى وهو جزء من متطلبات نيل شهادة البكالوريوس في علوم الحاسوب

إعداد :

مصطفى خالد فاضل حسام عبد الجبار خلف

زينب شعلان ابراهيم

باشراف

د. جمانة وليد

1441هـ 2020 م