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SJB INSTITUTE OF TECHNOLOGY

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1.4 A MINI PROJECT REPORT ON

1.4.1 “HOME AUTOMATION”

SUBMITTED IN PARTIAL FULLFILLMENT OF THE REQUIREMENT FOR THE 4th
SEMESTER MINI PROJECT WORK OF BACHELOR OF ENGINEERING



SUBMITTED

BY

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UNDER THE GUIDANCE OF

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ABSTRACT:

This project presents the overall design of Home Automation System (HAS) with low cost and wireless system. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. . The switch mode and voice mode are used to control the home appliances. The video feedback is received in the android application which streams the video of IP Camera. The main control system implements wireless technology to provide remote access from smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation.

1. Introduction

Background

The “Home Automation” concept has existed for many years. The terms “Smart Home”, “Intelligent Home” followed and has been used to introduce the concept of networking appliances and devices in the house. Home automation Systems (HASs) represents a great research opportunity in creating new fields in engineering, and Computing. HASs includes centralized control of lighting, appliances, security locks of gates and doors and other systems, to provide improved comfort, energy efficiency and security system. HASs becoming popular nowadays and enter quickly in this emerging market. However, end users, especially the disabled and elderly due to their complexity and cost, do not always accept these systems.

2 1.1 INTERNET OF THINGS

For the automated lighting system we use the iot concept. IoT internet of things describes a world where just about anything can be connected and communicated in an intelligent fashion. In other words, with the Internet of Things, the physical world is becoming one big information system. The Internet of Things is a difficult concept to define precisely however the first version of the Internet was about data created by people, while the next version is about data created by things. The future of IOT starts from smart homes to connect cars to smart health care, consumers and vendors are gearing up for the next big thing, five companies that dominate the consumer IOT market are Google,Microsoft,Samsung,Amazon,Apple.

The Internet of things (IoT) is the inter-networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), 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."^[3] The IoT allows objects to be sensed or controlled remotely across existing network infrastructure,^[4] creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. 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, virtual power plants, 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. Experts estimate that the IoT will consist of about 30 billion objects by 2020.

Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications.[12] The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid,[13] and expanding to areas such as smart cities.[14][15].the vision of the Internet of Things has evolved due to a convergence of multiple technologies, including ubiquitous wireless communication, real-time analytics, machine learning, commodity sensors, and embedded systems.[19] This means that the traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things[25] (IoT)."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,[16] automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring[17] or field operation devices that assist fire fighters in search and rescue operations.[18] Legal scholars suggest to look at "Things" as an "inextricable mixture of hardware, software, data and service".[19] These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices.[20] Current market examples include home automation (also known as smart home devices) such as the control and automation of lighting, heating (like smart thermostat), ventilation, air conditioning (HVAC) systems, and appliances such as washer/dryers, robotic vacuums, air purifiers, ovens or refrigerators/freezers that use Wi-Fi for remote monitoring.

3 2.1COMPONENTS REQUIRED

NTS: HARDWARE COMPONE

- **Bread board**
- **Male to female jumpers**
- **Wemos Esp8266 Node MCU**
- **Common cathode RGB LED**

SOFTWARE USED:

- **Arduino IDE**

4 2.1.1 BREAD BOARD:

A **breadboard** is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the **solderless breadboard** (AKA **plugboard**, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.

Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also extremely popular with students and in technological education.



Fig:1 NODE MCU

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.[1]

The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.[3]

The **ESP8285** is an **ESP8266** with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.[4]

The successor to these microcontroller chips is the ESP32.

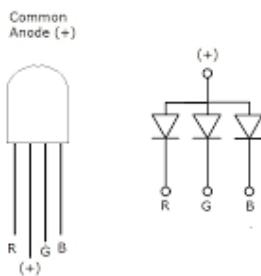
NodeMCU is an open source IoT platform.[4][5] It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware[6] which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on



the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson,[7] and spiffs.

5 2.1.2 RGB LED:

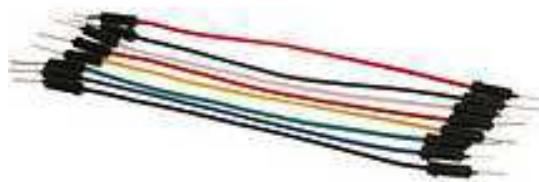
A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p-n junction diode that emits light when activated.[5] When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm²) and integrated optical components may be used to shape the radiation pattern.



6 2.1.3 JUMPER WIRE:

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.[1]

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.



7 2.1.3 SOFTWARE:

The open-source **Arduino** Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

CODE:

```
#include <ESP8266WiFi.h>
#include <FirebaseArduino.h>

// Set these to run example.

#define FIREBASE_HOST "aurora-8bc38.firebaseio.com"
#define FIREBASE_AUTH "ZMgdBVCnm2kRSjGxWCKxvaZpuFvSaKFuUqOHGBCo"
#define WIFI_SSID "MBLAZE-AC3633R2"
#define WIFI_PASSWORD " *****"

void setup() {
    Serial.begin(115200);
    pinMode(D6,OUTPUT);
    pinMode(D7,OUTPUT);
    pinMode(D8,OUTPUT);
    // connect to wifi.
    WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
    Serial.print("connecting");
    while (WiFi.status() != WL_CONNECTED) {
        Serial.print(".");
        delay(500);
    }
    Serial.println();
    Serial.print("connected: ");
    Serial.println(WiFi.localIP());

    Firebase.begin (FIREBASE_HOST, FIREBASE_AUTH);
    Firebase.set ("R", 0);
    Firebase.set ("G", 0);
    Firebase.set ("B", 0);
```

```
}

Void firebasereconnect () {
    Serial.println ("Trying to reconnect");
    Firebase.begin (FIREBASE_HOST, FIREBASE_AUTH);

}

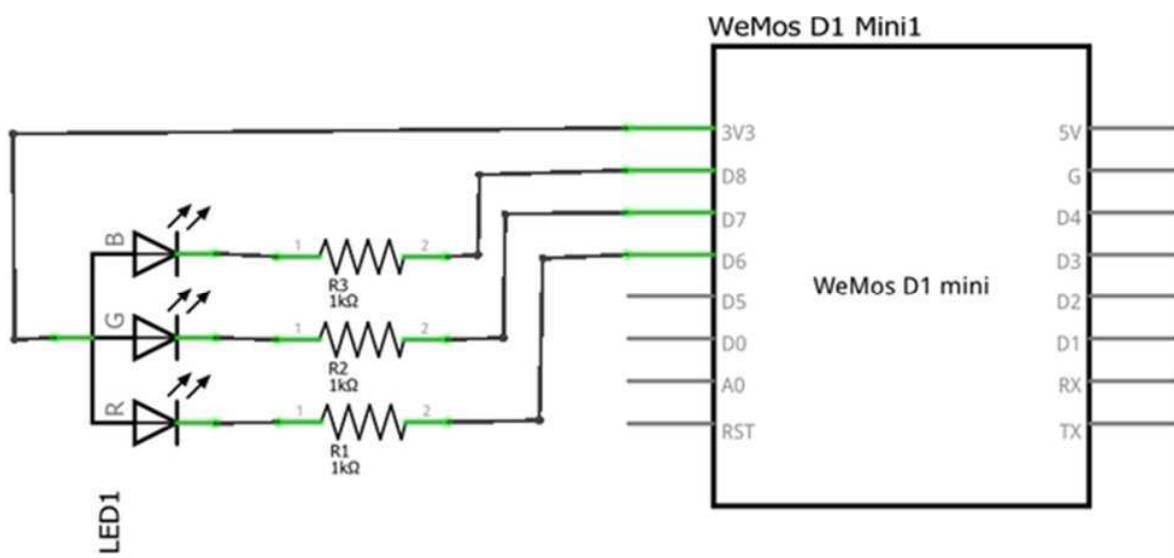
int n = 0;
char r[5];
char g [5];
char b [5];
void loop() {
    // set value
    // handle error
    if (Firebase.failed()) {
        Serial.print("setting number failed:");
        Serial.println(Firebase.error());
        firebasereconnect();
        return;
    }
    Firebase.getString ("R").toCharArray(r,sizeof(r));
    Firebase.getString ("G").toCharArray (g,sizeof(g));
    Firebase.getString ("B").toCharArray (b, sizeof (b));

    delay (100);
    int red = atoi(r);
    int green = atoi(g);
    int blue = atoi(b);

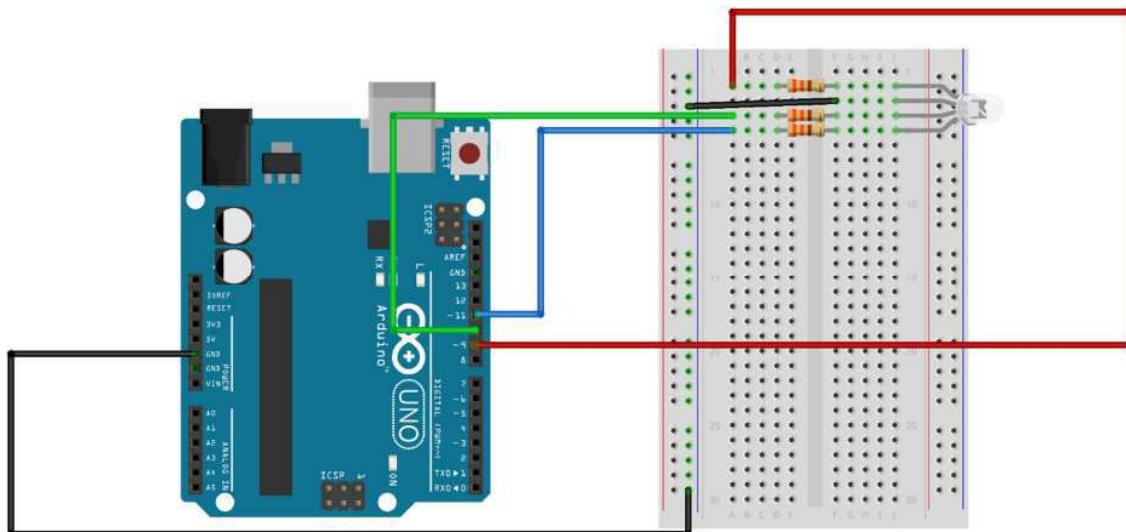
    Serial.print (red);
    Serial.print ("\t");
```

```
Serial.print (green);
Serial.print ("\t");
Serial.print (blue);
Serial.println ("");
analogWrite (D6, red);
analogWrite(D7,green);
analogWrite(D8,blue);
}
```

3. SCHEMATIC:



3.1 CIRCUIT DIAGRAM:



4 WORKING:

This simple, yet effective project can solve a problem by controlling the led via your smartphone over WiFi. Controlling over a web server means that it can be controlled from anywhere in the world! Having an internet connection isn't a problem as most of the people already have it for their daily use.

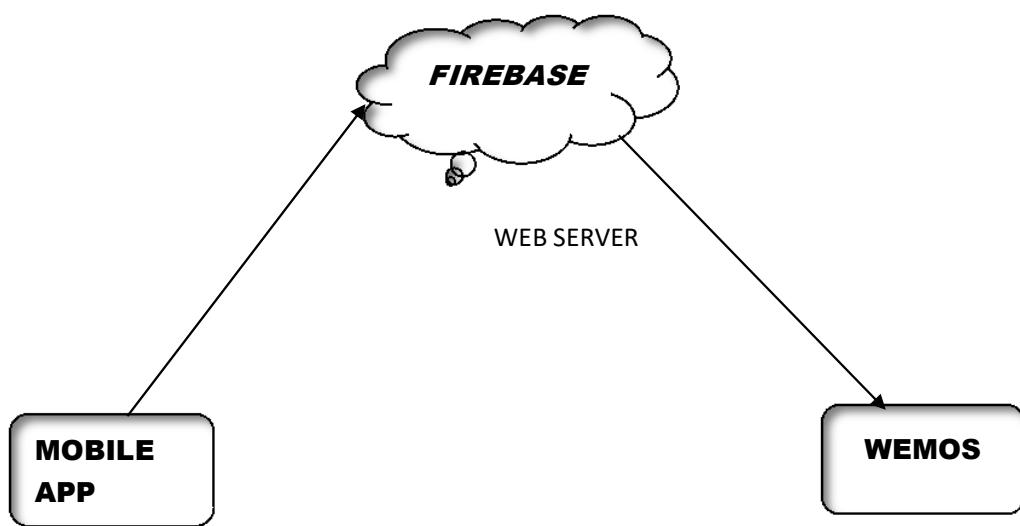
we will connect an RGB led to our Wemos MIni, lets look at RGB leds first RGB LEDs consist of one red, one green, and one blue LED. By independently adjusting each of the three, RGB LEDs are capable of producing a wide color gamut. Unlike dedicated-color LEDs, however, these obviously do not produce pure wavelengths. Moreover, such modules as commercially available are often not optimized for smooth color mixing.

There are two primary ways of producing white light-emitting diodes (WLEDs), LEDs that generate high-intensity white light. One is to use individual LEDs that emit three primary colors[95]—red, green, and blue—and then mix all the colors to form white light. The other is to use a phosphor material to convert monochromatic light from a blue or UV LED to broad-spectrum white light, much in the same way a fluorescent light bulb works. It is important to note that the ‘whiteness’ of the light produced is essentially engineered to suit the human eye, and depending on the situation it may not always be appropriate to think of it as white light.

There are three main methods of mixing colors to produce white light from an LED: blue LED + green LED + red LED (color mixing; can be used as backlighting for displays) near-UV or UV LED + RGB phosphor (an LED producing light with a wavelength shorter than blue's is used to excite an RGB phosphor) blue LED + yellow phosphor (two complementary colors combine to form white light; more efficient than first two methods and more commonly used)[96] Because of metamerism, it is possible to have quite different spectra that appear white. However, the appearance of objects illuminated by that light may vary as the spectrum varies.

The input is given through the app. The firebase receives this information and acts as a web server.

This information is then transferred to Wemos.



5 FIREBASE AS SERVER:

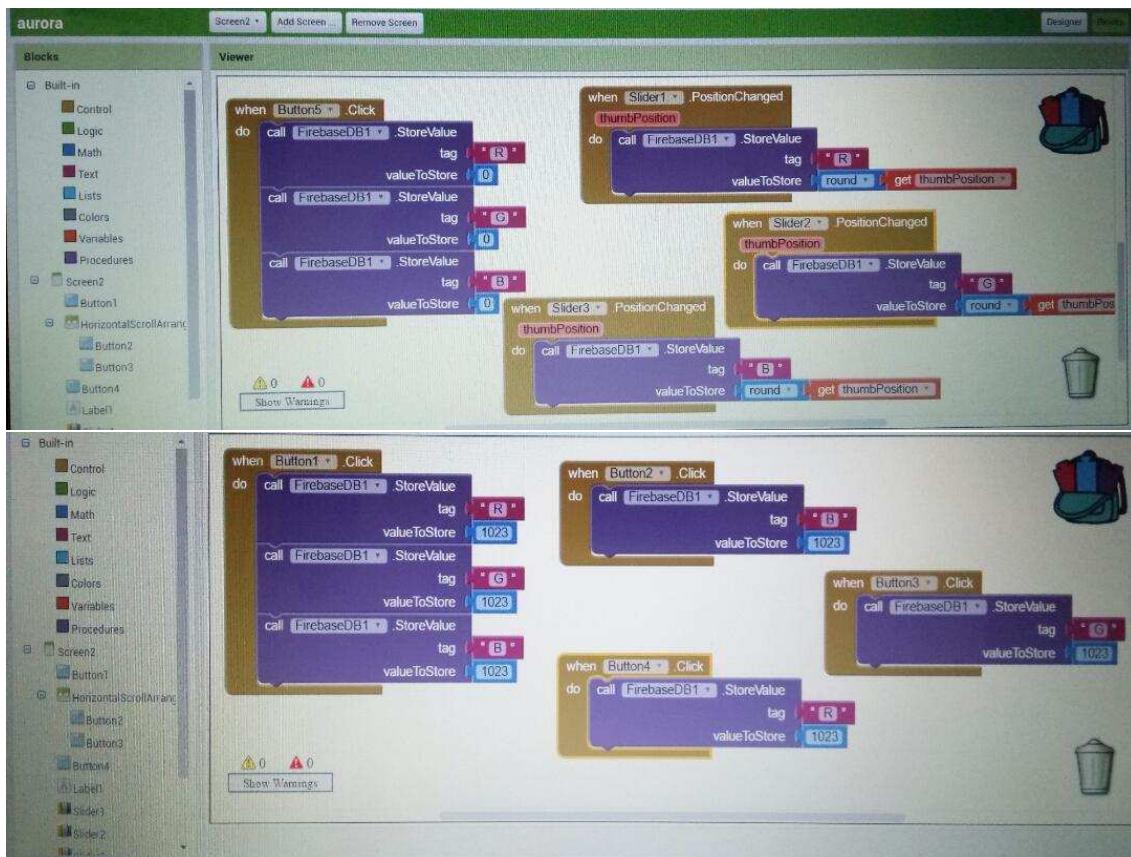
Firebase is a mobile and web application development platform. Firebase is made up of complementary features that developers can mix-and-match to fit their needs.

The web server is the program or machine that responds to that request, and delivers the content of the page back to the user. This can be done because every computer or device that connects to the internet has a uniquely identifying number, called an Internet Protocol address, or IP address for short. Servers are often dedicated (meaning it performs no other task besides server tasks). Because a server is engineered to manage, store, send and process data 24-hours a day it has to be more reliable than a desktop computer and offers a variety of features and hardware not typically used in the average desktop computer.

6 MOBILE APP:

The app is created using mit app inventor.

CODE BLOCK:



7 APPLICATIONS-

- 1) It is used in house as lighting system.
- 2) It is used in hotels as smart lights.
- 3) It is used for decorations.
- 4) It is used in industries to prevent internal damages to mechanics
- 5) It is used leak detection smoke and co detector
- 6) It provides additional services such as remote surveillance of security cameras over the internet, or central locking of all perimeter doors and windows

8 MERITS -

- Reduces or eliminates reliance on occupants or employees to turn lights off; lighting controls do that automatically with timers, sensors or programming logic
- Life of lamps and ballasts are extended due to reduced run-time which reduces time spent on maintenance and lowers overall maintenance expense
- Reduces the number of hours per year that the lights are on
- Improves employee satisfaction and productivity by providing appropriate lighting levels, minimizing glare and balancing surface brightness
- Wireless lighting controls reduce installation costs and increase flexibility in areas where switches and sensors can be placed
- Lighting controls offer flexibility in lighting a specific office, a group of lights, a section of a floor or a whole floor
- Dimmers can provide lighting flexibility in multi-use rooms or rooms in which projectors are used
- Exterior motion detectors and interior occupancy sensors can turn lights on when people are present
- To learn more about the advantages of lighting controls offered through Graybar, contact a Graybar Lighting Consultant or search for your nearest Graybar branch.

9 DEMERITS-

Wireless systems can be unreliable – with our systems we require 100% reliability and low maintenance. By definition wireless technologies are subject to interference and a higher level of maintenance, even if this is just periodic battery changing. For this reason we always try to install wired lighting systems although we have evaluated and installed wireless lighting when there is no option.

– Badly Setup Systems can be difficult to use – A badly designed and installed system can be difficult to use even if this is just because it differs from the normal switches people expect. For this reason we like to install fully customisable systems with bespoke engraving. Off the shelf systems tend to have pre-engraved buttons which may not always fit the clients requirements.

– They can require ongoing maintenance – A well installed system should just keep running and not require maintenance. We have systems which are 10+ years old which work reliably and have zero maintenance.

We install high end fully integrated lighting control systems in to large residential properties

10 CONCLUSION

Lighting Automation is the discipline of creating automated changes in lighting levels to affect mood, emphasize architecture, illuminate art, and influence action. Automated lighting from Vantage can be described like the rising or setting of the sun. As light gradually, imperceptibly moves across the landscape our senses are heightened and we see earth with new perspective.

Architects and lighting designers have long understood the power of light and its ability to define, highlight, and transform architecture. To manipulate light in such a way as to simultaneously evoke subtlety and complexity requires a serious understanding of light.

Lighting automation from Vantage provides professional designers with the tools to fully implement their designs and users with the full enjoyment of their luxury spaces.

"The power of utilizing automated lighting control in all of my artistic lighting designs is paramount to the success of any project. Vantage has consistently exceeded my expectations."

- Glenn Merlin Johnson, Adaptive Design Group, Inc.

11 FUTURE WORKS-

- Comelite-Video Intercom Solution
- Interasonic Technology-Your prime source for security;Music Intercom Systems
- Light scokets;
- Luxul Xen-Enlightened System
- Video mount product-Mounting systems for audio,video,and security system
- MIDLITE-A leader in low voltage wall plate and cable management system

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