

Smart House: Remote Light Control

Group 7

Xian Jiaotong-Liverpool University

May 15, 2019

Outline

- 1 Introduction
- 2 Methodology
- 3 Result
- 4 Discussion
- 5 Future Work
- 6 Conclusion

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- 1 Introduction
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- The need for connectivity and remote control
- Internet of Things (IoT)
- Smart house - time-efficient and convenient

Introduction

Software

- WeChat mini program
- Web server development

Hardware

- Arduino and ESP8266 Wi-Fi module
- Digital magnetic sensor
- Three LED lights

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Figure 1: Hardware equipment

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- House model design
- Arduino design
- Mini-program design
- Server design

House model design

- Living room - Red LED
- Bedroom - Yellow LED
- Dining room - Green LED
- Single door - A digital magnetic sensor
- A magnet




Figure 2: House model

Hosting Plan

United States (English)

Login



000webhost
POWERED BY HOSTINGER

SALE

Cheap Web Hosting

Forum

Website Builder

Free Sign Up

Free Web Hosting


Zero cost website hosting with
PHP, MySQL, cPanel & no ads!

Free Sign Up

Go Premium

\$0⁰⁰/mo

000webhost



public_html

tmp

Name	Size	Date	Permissions
htaccess	0.2 kB	2019-04-23 03:44:00	-rwxr-xr-x
lightGetter.php	0.6 kB	2019-04-25 05:57:00	-rwxr-xr-x
lightSetter.php	0.5 kB	2019-04-23 06:25:00	-rwxr-xr-x

phpMyAdmin

Recent Favorites

New

k93b4097_anduno

New

lightStatus

information_schema

mysql

Server: localhost:3300 - Database: k93b4097_anduno - Table: lightStatus

Browse Structure SQL Search Insert Export Import Operations Triggers

Showing rows 0 - 0 (1 total, Query took 0.0024 seconds.)

SELECT * FROM "lightStatus"

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table

Options

appID	light1	light2	light3	doorlock
off	off	off	closed	

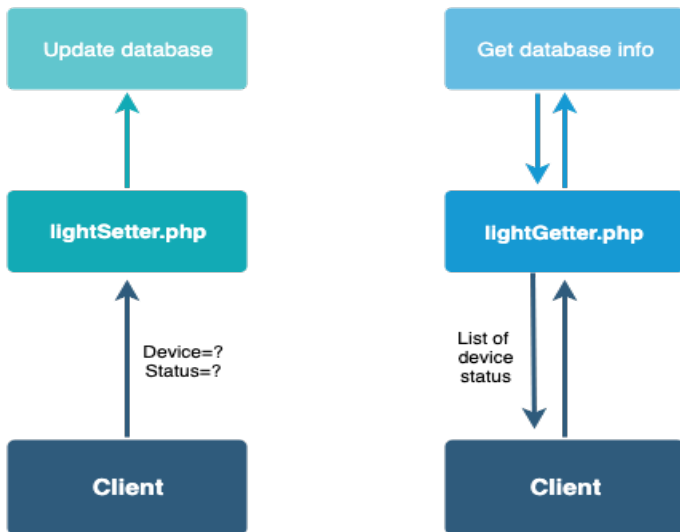
Check all | With selected: Edit Copy Delete Export

Show all | Number of rows: 25 | Filter rows: Search this table

Query results operations

Print Copy to clipboard Export Display chart Create view

Processing Request



Equipment

- ESP8266 → WiFi network
- Connected with UNO board → complicated
- NodeMCU = ESP8266 module + UNO board

Circuit

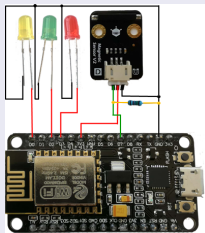
Resistor - Avoid Floating pin

Arduino Hardware

Equipment

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- Connected with UNO board → complicated
- NodeMCU = ESP8266 module + UNO board

Circuit



Resistor - Avoid Floating pin

Figure 3: The whole circuit

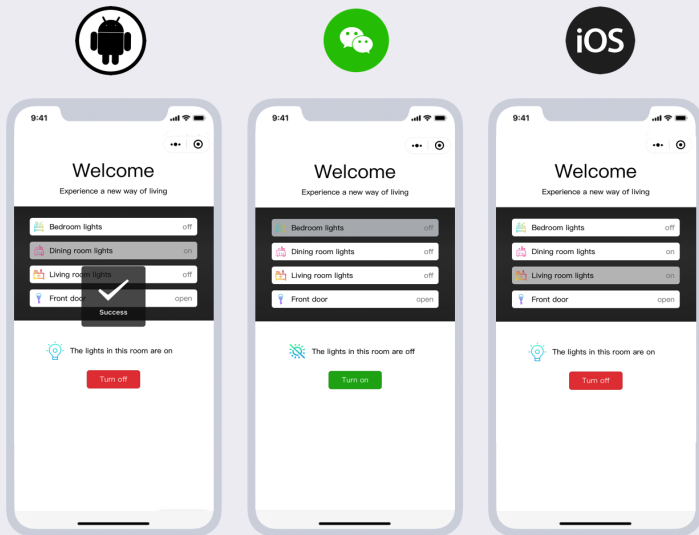
Two libraries

- ① **ESP8266WiFi.h** - connect to a given Wi-Fi network: router, hotspot
- ② **ESP8266HTTPClient.h** - send HTTP requests
 - GET request - obtain each LED's status every 2s
 - SET request - update the door's status

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WeChat Mini-Program UI



WeChat Mini-Program UI (cont.)

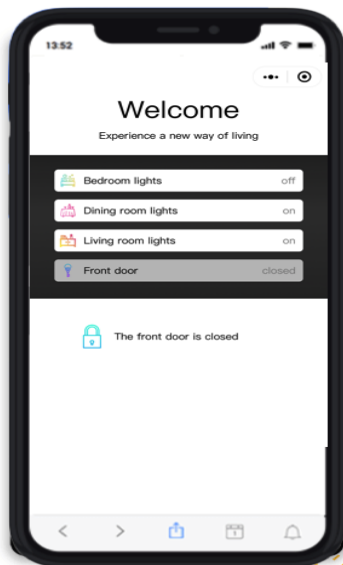
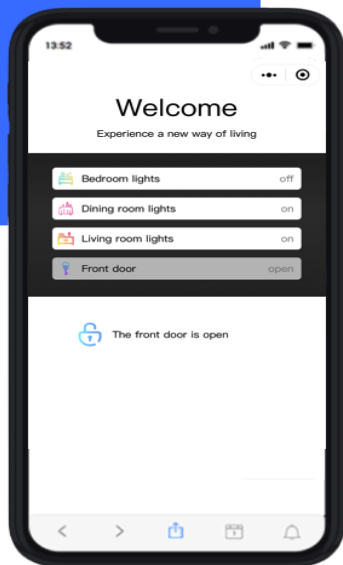


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- Power supply - 5.1V / 2.1A
Network - personal hotspot
- Magnetic induction distance
1 magnet: 2mm \sim 8mm $\xleftarrow[\text{accurate}]{\text{more}}$ Smart house model size
2 magnets: 10mm \sim 22mm
- Testing by WeChat mini program

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Switch On / Off 3 LEDs

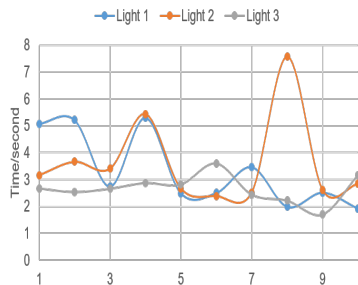
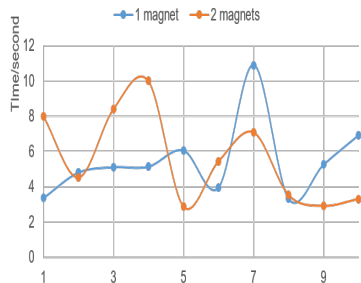


Figure 4: Transmission time for change of light status

	Bedroom	Dining room	Living room
$\bar{t}(s)$	3.322	3.631	2.670
Accuracy	100 %		

Table 1: Light transmission time

Check door statement



	1 magnet	2 magnets
$\bar{t}(s)$	5.481	5.687
Accuracy	100 %	

Table 2: Door statement transmission time

Figure 5: Transmission time for change of door status

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- Circuit design challenge
- Achievement
- Problem

Circuit design challenge

Floating pin / Floating input: affect the I/O pins of digital integrated circuits.

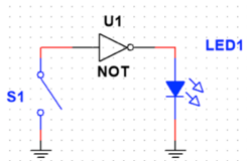


Figure 6: Design causing Floating pin

Without the connection to the source V_{cc} , or GND

the I/O pin is sensitive to electrical noise

that causes the random fluctuation in I/O between LOW and HIGH

Circuit design challenge

Solution

The problem of floating pin can be solved by inserting a pull-up 15k Iji resistor between I/O and GND.

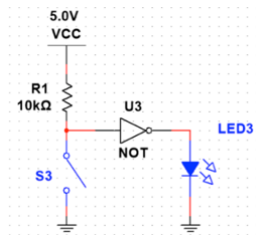


Figure 7: The design for avoid Floating pin

Achievement

- Average time: within 5 seconds \Rightarrow Response time is acceptable
- Rate of failure \Rightarrow High rate of success

Problems

- Sometimes the response time have some delay
- Unstable fluctuation in response time

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Future Work

5G: enhance the transmission time and the possibility of failing will be decreased.

Comparing 4G and 5G

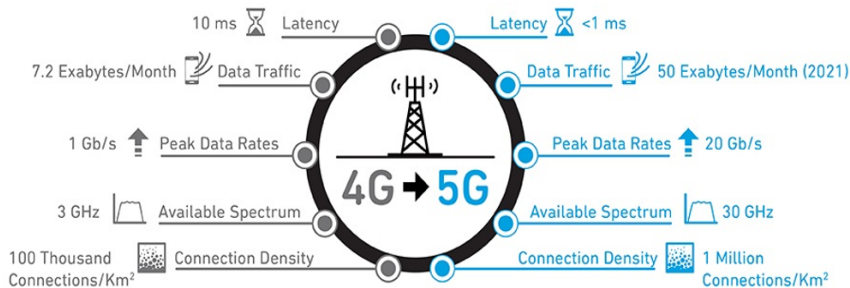


Figure 8: Comparison of 4G and 5G

Future Work

- Use the server in local city
- Add more functions
- Security: verification and encryption protection - Hash codes



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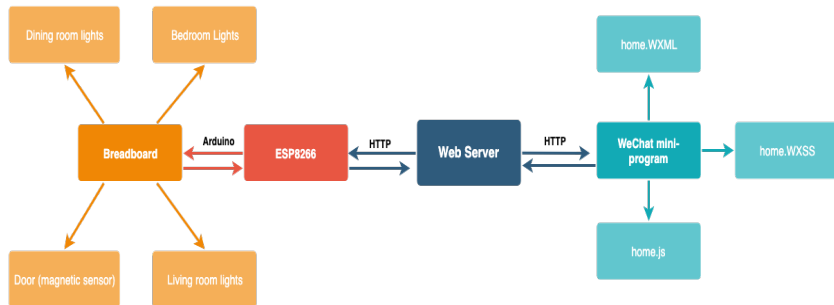


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Conclusion

- Make a successful prototype
- Investigate IoT and hardware programming
- Improve teamworking and communication skills



Question & Answer

Thank you