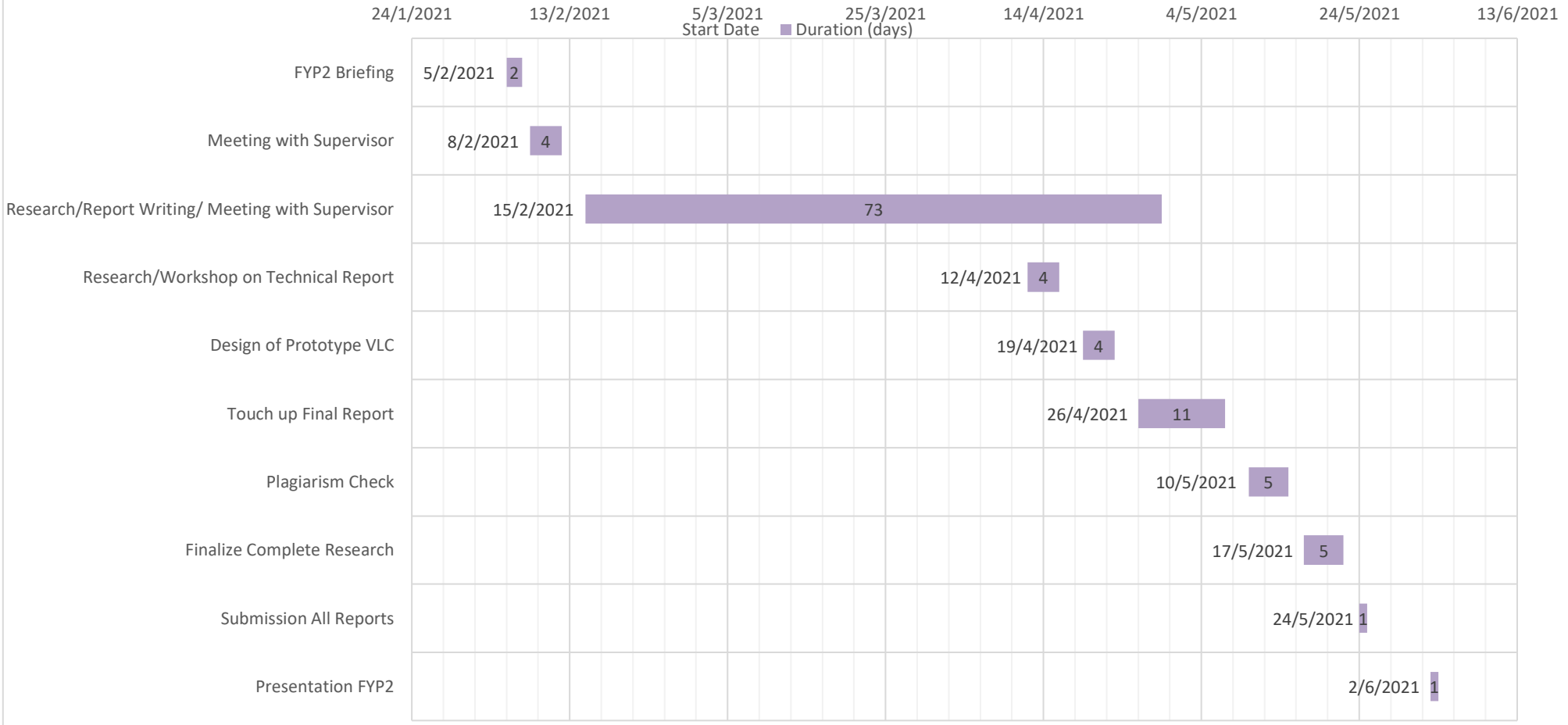
BMI FINAL YEAR PROJECT 2 (FYP2) LOGBOOK

Full Name	Muhamad Arif Bin Mat Azam
ID No	51218218108
Supervisor's Name	Ir. Dr. Mohd Badrulhisham Ismail
FYP Title	A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.
FYP Code	**NCB 49904**

FINAL YEAR PROJECT 2 TIMELINE



	Presentation FYP2	Submission All Reports	Finalize Complete Research	Plagiarism Check	Touch up Final Report	Design of Prototype VLC	Research/Workshop on Technical Report	Research/Report Writing/ Meeting with Supervisor	Meeting with Supervisor	FYP2 Briefing
Start Date	2/6/2021	24/5/2021	17/5/2021	10/5/2021	26/4/2021	19/4/2021	12/4/2021	15/2/2021	8/2/2021	5/2/2021
Duration (days)	1	1	5	5	11	4	4	73	4	2

BUDGET PLANNING

List of components

No	Component	Quantity	Price per unit (RM)	Price (RM)
1	16 GB Micro SD Card with NOOBS for RPI	1	48.00	48.00
2	Breadboard 16.5x5.5cm (830 holes)	2	4.20	8.40
3	Wire jumper (male and female)	10	2.00	20.00
4	Solder	2	23.50	47.00
5	Solder lead 1.0mm (250gm)	1	34.00	34.00
6	Arduino	1	35 - 45	
7	Resistor	20	-	-
8	Capacitor	10	-	-
9	Wire	2	-	-
10	LDR sensor	5	0.40	2.00
11	Battery	3	-	-
12	Power bank	1	-	-
13	Solar panels	4	-	-
14	Relay	3	-	-

List of materials

No	Materials	Quantity	Price per unit (RM)	Price (RM)
1	Cardboard	5	5.00	25.00
2	Box	5	5.00	25.00
3	Perspex	3	3.00	9.00

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 1**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
5/2/2021	**PROJECT STARTED** Search about which software that want to use to run simulation about Visible Light Communication which are Distance & Reliability Test and some IoT integration. Some software that are widely used for simulation of this study such as: • Blynk • Proteus • Matlab • Tinkercad Weekly Summary: Installed and prepared for the initial build regarding coding and prototype design. Few research on topics VLC system. ArifAzam Student's Signature: Date: 5 February 2021	Supervisor's Signature: Date:

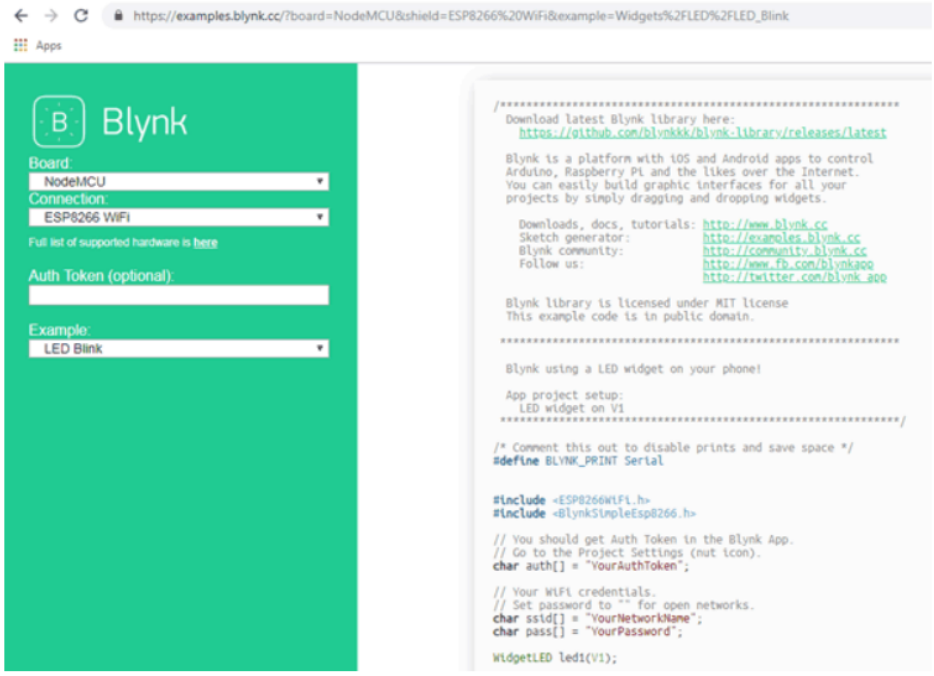
Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

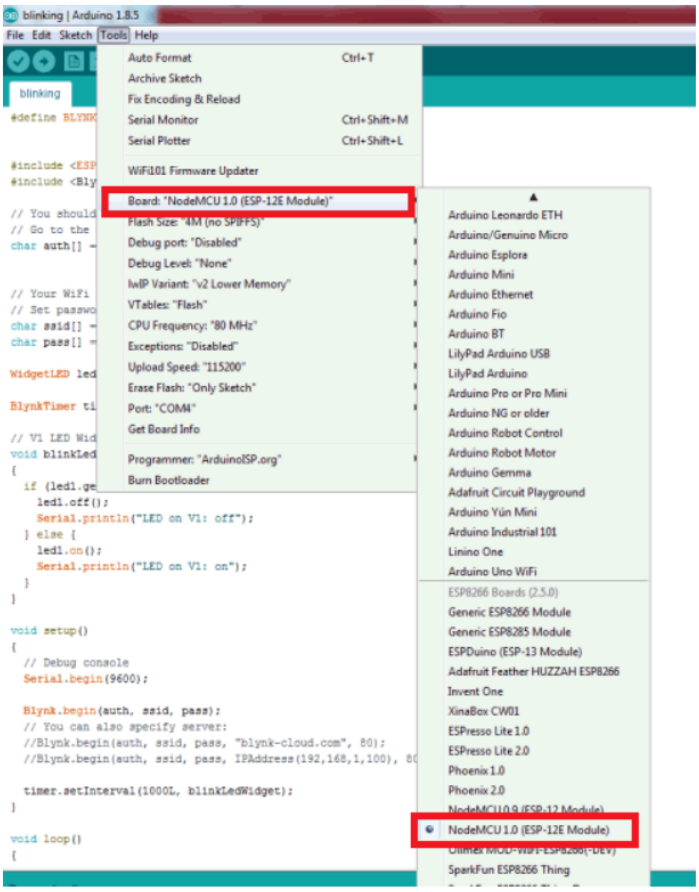
NODE MCU Setup for Blynk App

In your browser search Blynk code generator then open Blynk example browser,

Select your board and example code, as shown below:



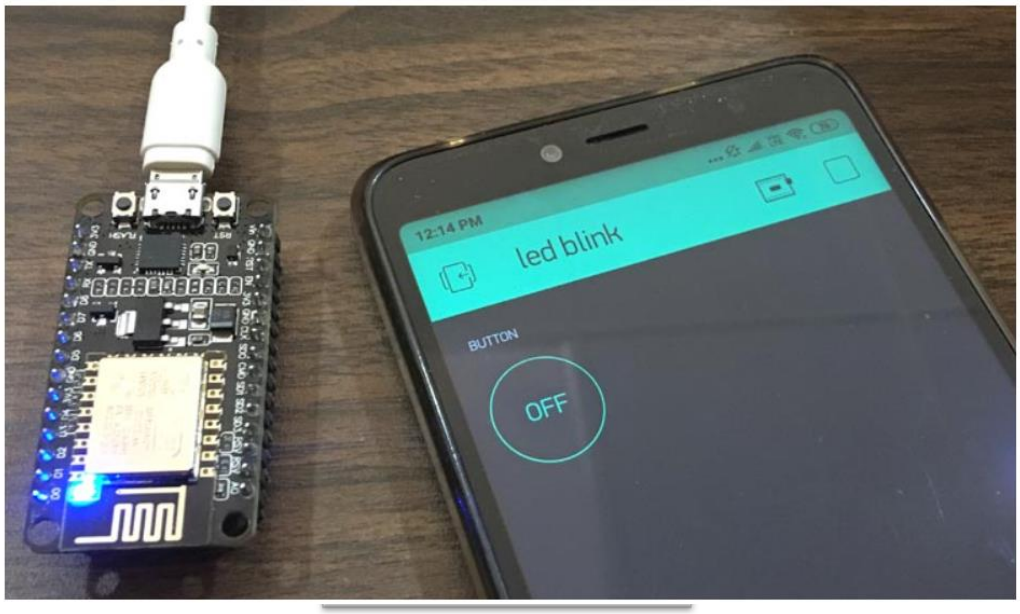
Open Arduino IDE and select Tools option as shown below:



Testing LED Control using Blynk App and ESP32

Now, copy and paste the complete code into Arduino IDE. Then upload the code into the ESP8266.

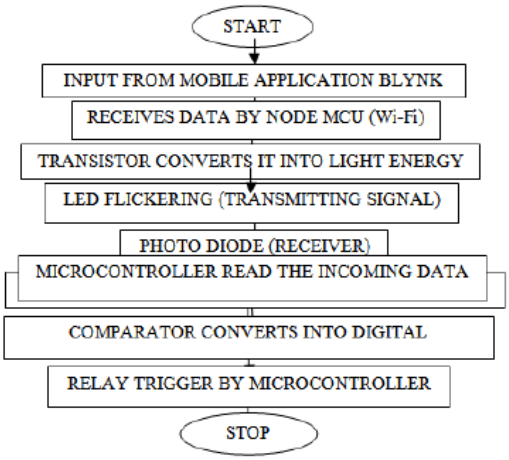
Then, open the Blynk App for controlling the LED from the button widget.



4. CONNECTIVITY WITH IOT

Here we have used ESP8266 as a Wi-Fi module termed as Node MCU. In this Wi-Fi module, you can directly write code and program the ESP8266 module using Arduino language; this is connected to Cloud known as BLYNK. We have downloaded the BLYNK application in mobile so we can handle the Li-Fi module from anywhere. At transmitting side, we have mobile application from which we handle our base module. In our base module we used node MCU connected with Li-Fi dongle and LED, and at receiving side, pin diode used for getting the data which is then connected to 2 relays of 5v DC.Relay may loaded with some load like switch on or off the lights, fans etc. from office.

Flowchart-



OUTPUT IMAGES-

Fig. Result of Li-Fi with IOT

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

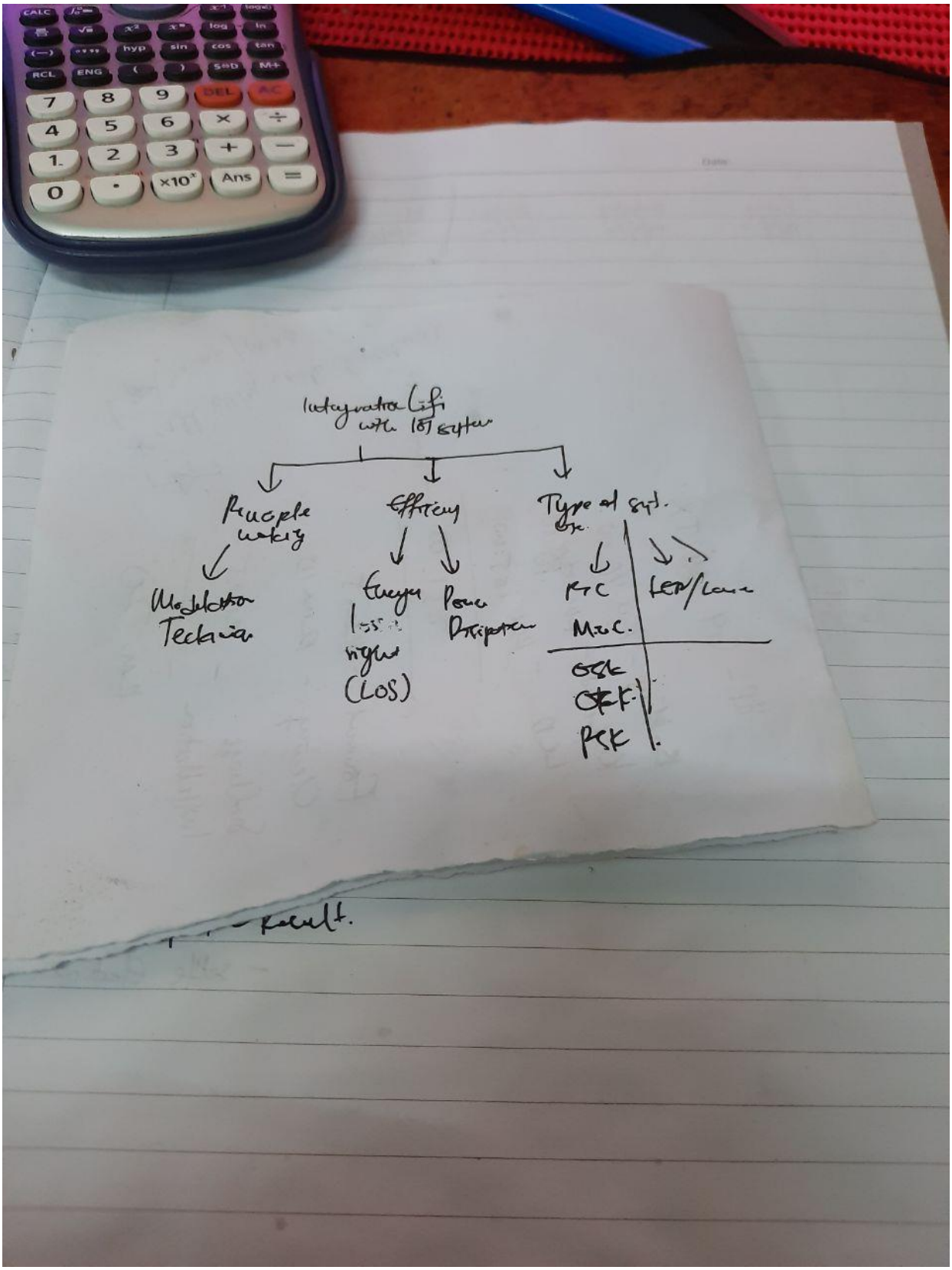
Project Title **Week 2**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
8/2/2021	**INITIATE IDEAS AND PLANNINGS** Discussion with supervisor Discussion have been made with other students with I.r Badrulhisham as his supervisor. I.r Badrulhisham explain the details of the FYP2 flow and discussion on project title. The suggestion and opinions for the proposed project New Idea and suggestion have been added to the proposed project. Weekly Summary: Few research on topics Li-Fi system. Schedule planning research for overall task ArifAzam Student's Signature: Date: 8 Feb 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)



Some of Project Planning research needs to be done by me.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

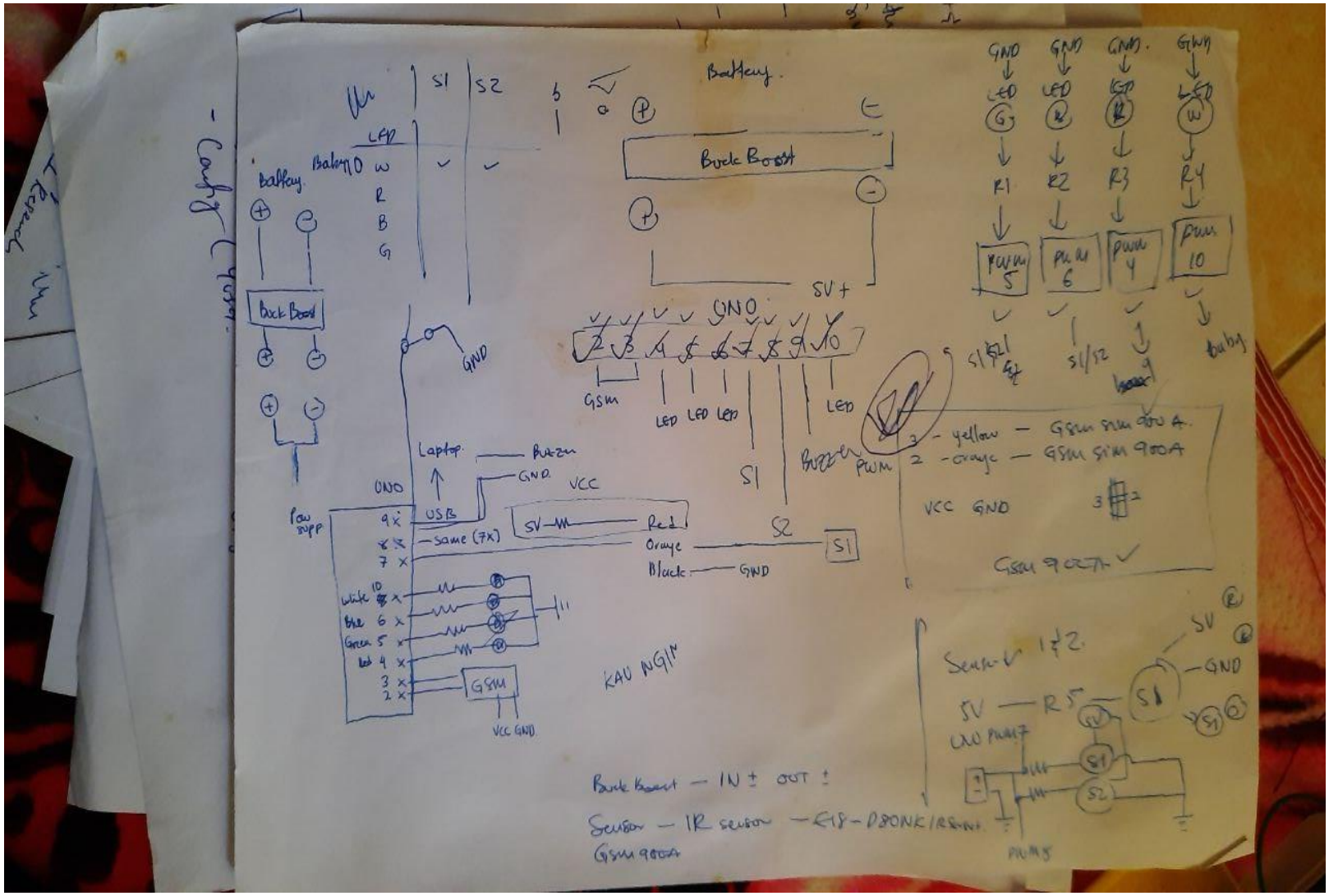
Project Title **Week 3**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
16/2/2021	**Testing circuit part basic VLC** To make sure project really working on simple test To identify component to be used in the project To manage proper code for the experiments Weekly Summary: Schematics have been done & code still in progress Still research the previous project that related to the proposed project. ArifAzam Student's Signature: Date: 17 Feb 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)



Preparation circuit.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

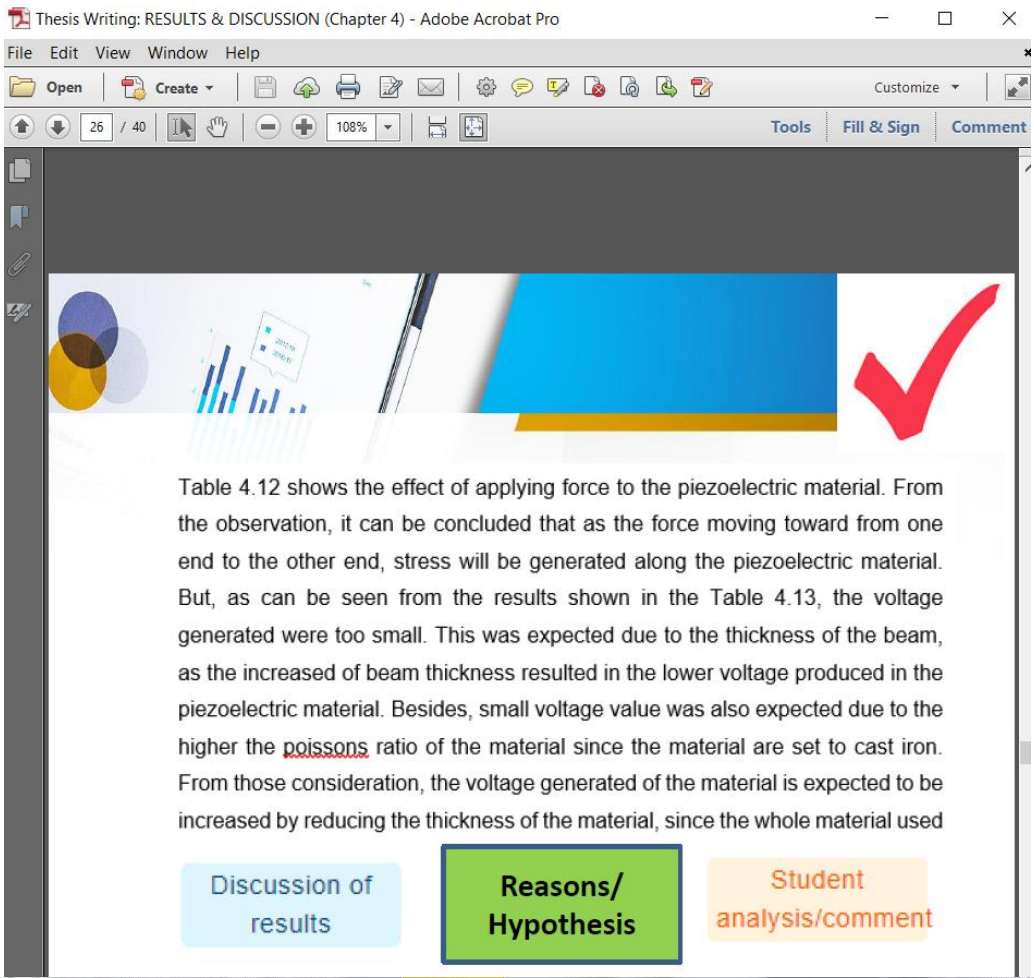
Project Title **Week 4**

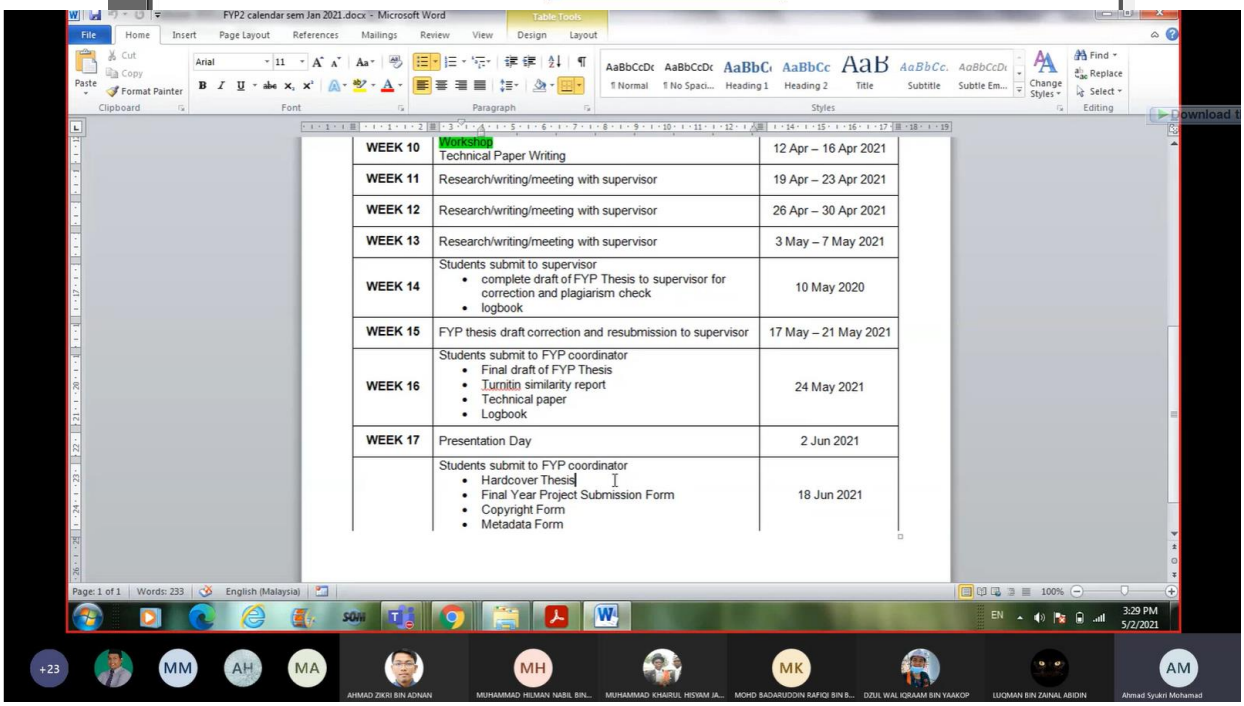
A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
22/2/2021	**FYP2 Workshop Chapter 4 & 5 -Combined UniKL BMI** To give the overview of the flow on Final Year Project 2 To explain the marking scheme on the Final Year Project 2 To explain the activity that will be done during the Final Year Project 2 To discuss what to be done on Chapter 4 and 5 Weekly Summary: Initial discussion regarding writing Chapter 4 with supervisor Still research the previous project that related to the proposed project. ArifAzam Student's Signature: Date: 22 February 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)


Thesis Writing: RESULTS & DISCUSSION (Chapter 4) - Adobe Acrobat Pro
File Edit View Window Help
Open Create Customize
26 / 40 108% Tools Fill & Sign Comment
Table 4.12 shows the effect of applying force to the piezoelectric material. From the observation, it can be concluded that as the force moving toward from one end to the other end, stress will be generated along the piezoelectric material. But, as can be seen from the results shown in the Table 4.13, the voltage generated were too small. This was expected due to the thickness of the beam, as the increased of beam thickness resulted in the lower voltage produced in the piezoelectric material. Besides, small voltage value was also expected due to the higher the poissons ratio of the material since the material are set to cast iron. From those consideration, the voltage generated of the material is expected to be increased by reducing the thickness of the material, since the whole material used
Discussion of results
Reasons/ Hypothesis
Student analysis/comment


FYP2 calendar sem Jan 2021.docx - Microsoft Word
WEEK 10 Workshop Technical Paper Writing 12 Apr – 16 Apr 2021
WEEK 11 Research/writing/meeting with supervisor 19 Apr – 23 Apr 2021
WEEK 12 Research/writing/meeting with supervisor 26 Apr – 30 Apr 2021
WEEK 13 Research/writing/meeting with supervisor 3 May – 7 May 2021
WEEK 14 Students submit to supervisor • complete draft of FYP Thesis to supervisor for correction and plagiarism check • logbook 10 May 2020
WEEK 15 FYP thesis draft correction and resubmission to supervisor 17 May – 21 May 2021
WEEK 16 Students submit to FYP coordinator • Final draft of FYP Thesis • Turnitin similarity report • Technical paper • Logbook 24 May 2021
WEEK 17 Presentation Day 2 Jun 2021
Students submit to FYP coordinator • Hardcover Thesis • Final Year Project Submission Form • Copyright Form • Metadata Form 18 Jun 2021

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 5**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
1/3/2021 – 4/3/2021	**Workaround with Manchester Encoding** To know on how the VLC supposed to work To identify basic information frame and parameters for transmission using LEDs To integrate coding with Arduino IDE-burn to micocontroller Weekly Summary: Forwarding to next week research Encoded part not working well (bit slower than expected) Still trying alternative code and programming variable match to the hardware prototype ArifAzam Student's Signature: Date: 4 March 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

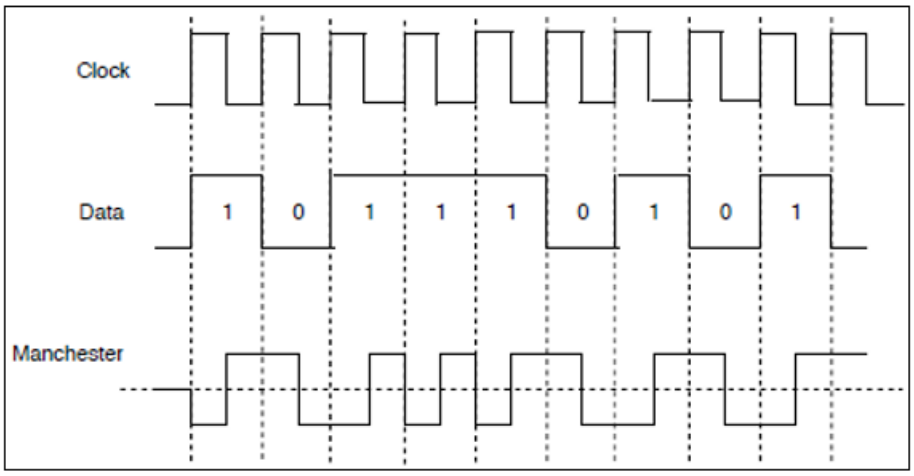


Figure 4.1: IEEE 802.3 standard Manchester encoding sample. (Roger Forster, 2000)

*C:\Users\AN515-52\Desktop\manchestertest.ino - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

adb.exe | manchestertest.ino

```
1  //param_manchester_encoding
2  //improvement on test
3  // c++ v2.1 Arif
4
5  # define TICK 3     //number millisecond per tick used for delay() function
6  # define CLOCK_HALF 5   //number of ticks per half clock
7  # define CLOCK (2*CLOCK_HALF)    // number ticks per clock (1 data bit)
8  # define GET_CLASSIFIER_TICKS (TICK * CLOCK * 3)
9  # DEFINE MINIMUM_HIGH_LOW_DIFFRENCE 50  //used in get_classifier()
10
11
```

Figure 4.2: Parameters in programing Manchester Encoding.

*C:\Users\AN515-52\Desktop\manchestertest.ino - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

adb.exe | manchestertest.ino

```
23 //c++ v2.1 Arif
24
25 Input: Basic Frame
26 Output: Manchester encoded data frame format
27 //set clock to 30ms;
28 //set midpoint to 30/2;
29 //set tick per clock to 10;
30 //send sync
31 //send start delimiter;
32
33     while //check until input data is transmitted
34     {
35       if {binary value = 1
36         //Manchester 1: 01;
37         LED Low (Logic 0);
38         delay(mid point);
39         LED High (Logic 1);
40         delay(mid point);
41       }
42       else
43       {//Manchester 0: 10;
44         LED High (Logic 1);
45         delay(mid point);
46         LED Low (Logic 0);
47         delay(mid point);
48       }
49 }
```

C++ source file | length : 567 lines : 49 | Ln : 49 Col : 6 Pos : 568 | Windows (CR LF) | UTF-8 | INS

Figure 4.3: Transmission configuration program.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 6**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
8/3/2021 – 12/3/2021	Testig workaround of coding (basic) have been initialised. Have been tested with Proteus but not to accurate.-need built hardware prototype as soon as possible List out testing matrix- possible 3 and prototype design **REFER APPENDIX SECTION FOR CODING PART Weekly Summary: Start writing additional thesis. Start to buy some component to built prototype Proceed for testing matrix on next week ArifAzam Student's Signature: Date: 12 March 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 7**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
15/3/2021 – 19/3/2021	Built basic circuit based on designed earlier VLC configuration Test done with 3 testing matrix -Maximum Communication Distance -Realibility communication -IOT integration *issue on IoT integration need to carry forward week to configure Weekly Summary: Making Table for testing matrix Discussion with Ir.Bad/ members on how to configure the circuit troubleshooting ArifAzam Student's Signature: Date: 19 March 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

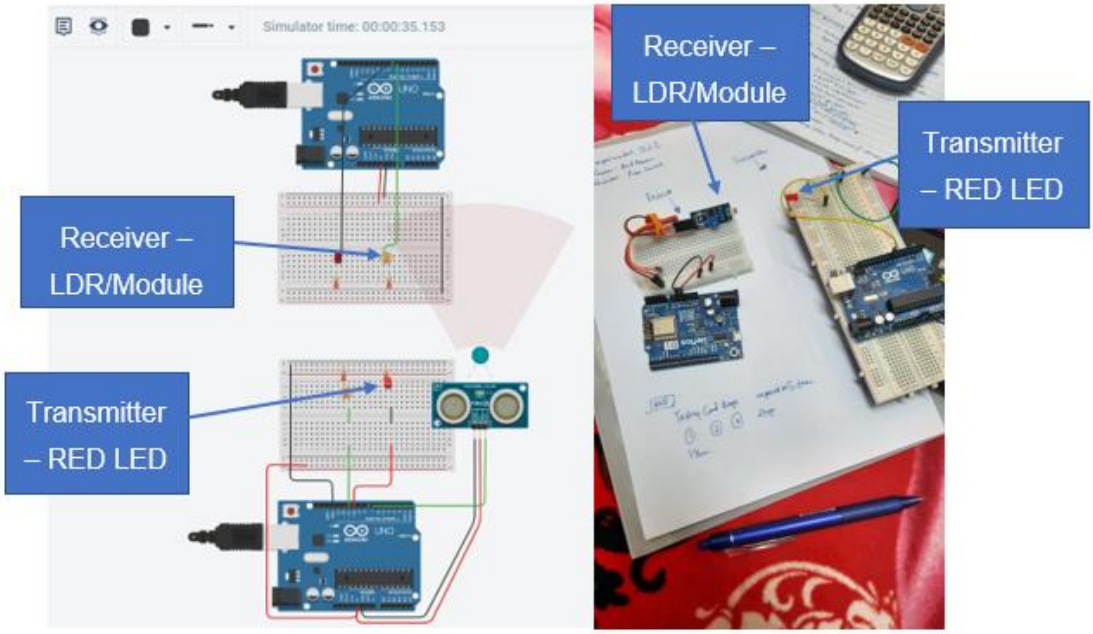


Figure 4.4: Setup of transceiver testing performed in software (TikerCAD) and hardware (Prototype) for distance test.

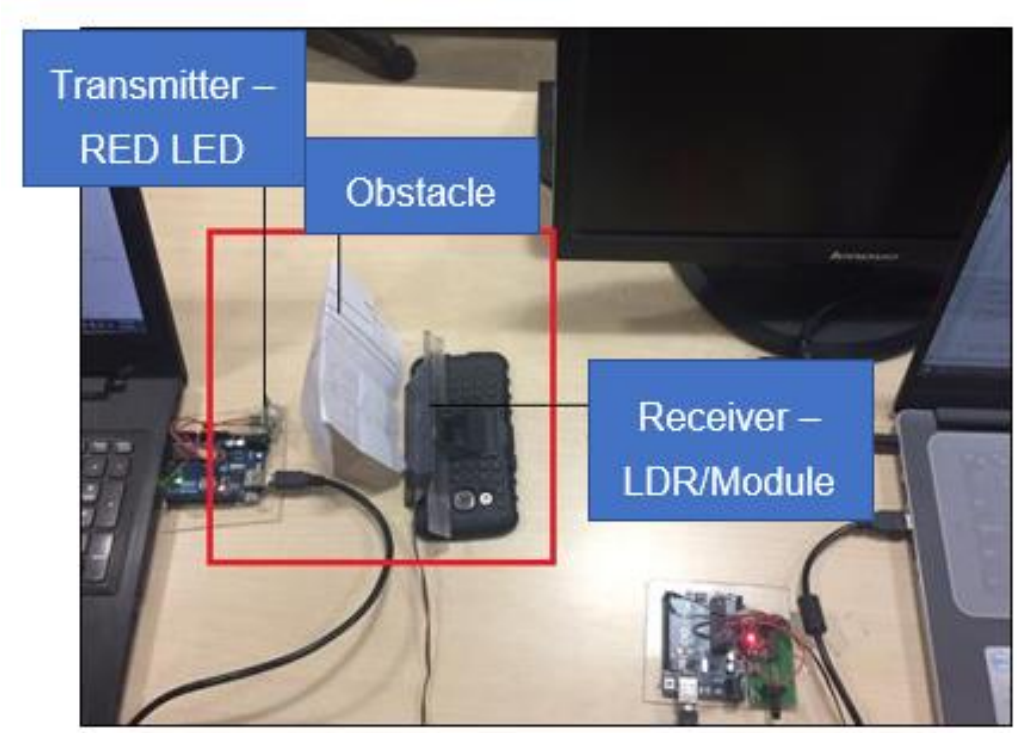


Figure 4.5: Testing transceiver blocked by an obstacle.

Table 4.1: Testing Matrix for LED Communication Distance of Visible Light Communication.

Colour of LED	**Communication Distance in (cm) with different TICK size** (*Based on single LED Transmitting on each test.)							
	3ms TICK				**4ms TICK**			
Testing Count	Test 1	Test 2	Test 3	Average	Test 1	Test 2	Test 3	Average
RED	5.8 cm	6.1 cm	6cm	6cm	17.2 cm	17 cm	17 cm	17 cm
BLUE	8.1 cm	8.1 cm	7.9 cm	8 cm	29.0 cm	29.1 cm	30 cm	29 cm
YELLOW	2.7 cm	3.0 cm	2.9 cm	2.9 cm	13 cm	13.1 cm	13 cm	13 cm
GREEN	4.2 cm	4.4 cm	4.4 cm	4.3 cm	24 cm	23 cm	23 cm	23 cm
WHITE	30 cm	30 cm	29 cm	30 cm	65 cm	68 cm	68 cm	66.5 cm

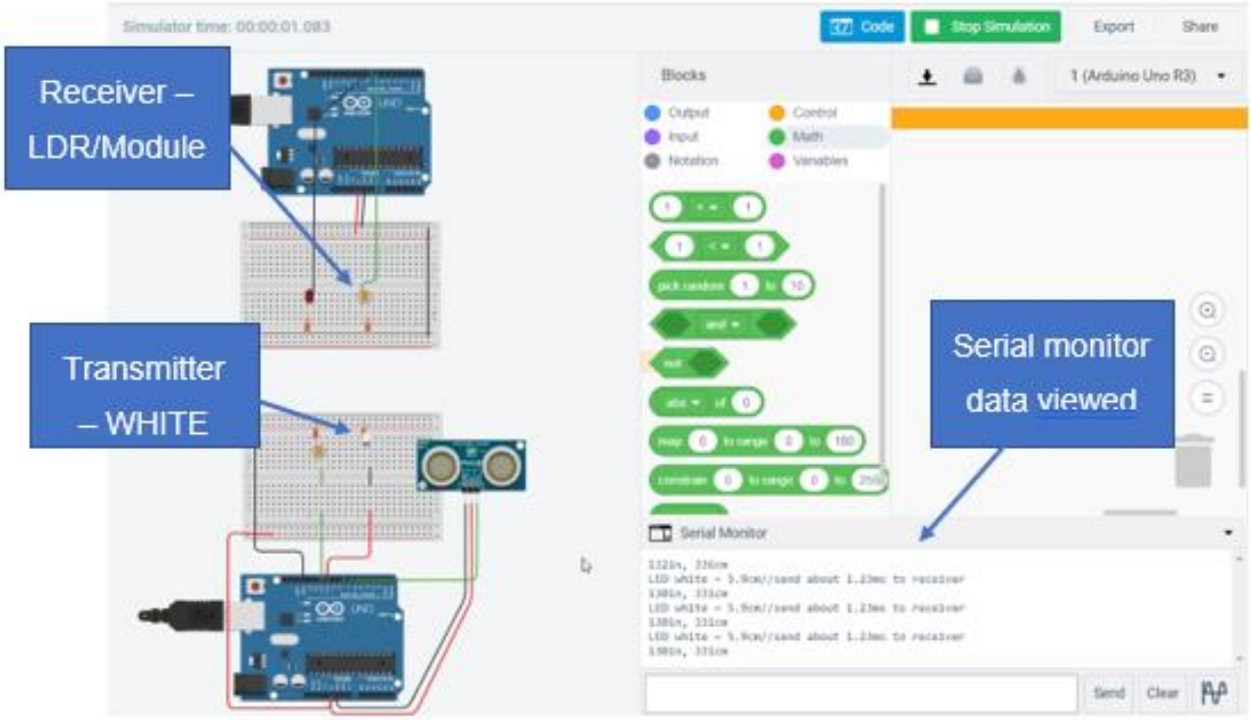


Figure 4.6: Setup configuration for software testing (reliability test).

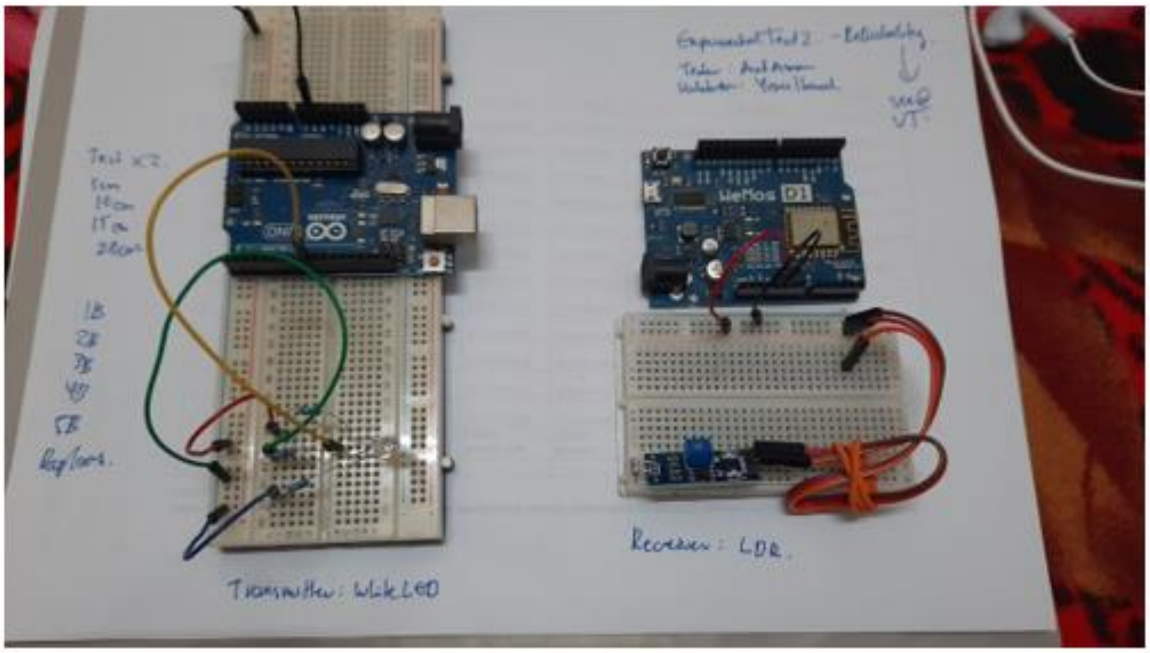


Figure 4.7: Setup configuration for hardware testing (reliability test).

Table 4.2: Testing Matrix for LED Communication Reliability of Visible Light Communication.

Payload	Difference communication Distance in (cm) with Reliability of transmitter and receiver (WHITE LED)							
	3ms TICK				4ms TICK			
Distance	5cm	10 cm	15 cm	20cm	5 cm	10 cm	15 cm	20cm
1B	99%	97%	96%	96%	99%	98%	97%	95%
2B	99%	98%	96%	96%	97%	96%	96%	95%
3B	98%	96%	95%	94%	97%	96%	95%	95%
4B	97%	96%	95%	93%	97%	96%	95%	94%
5B	97%	95%	93%	91%	96%	95%	94%	93%

*1% reduction will be counted as <= 1ms delay in the data acquired by the virtual terminal.

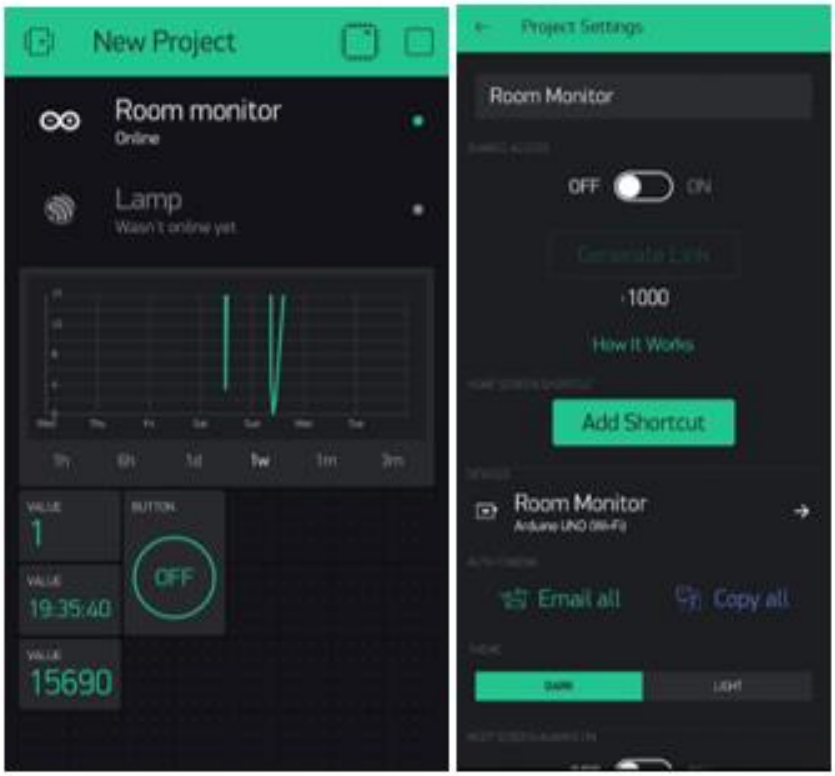


Figure 4.8: Simple dashboard IOT of Blynk for testing the distance & reliability of communication.

Figure 4.9: Testing with real prototype of certain parts of LED and Microcontroller of Visible Light Communication.

Table 4.3: Testing Matrix for Distance & Reliability Communication Distance with IOT Blynk integration

White LED	Difference communication Distance in (cm) with Reliability of transmitter and receiver							
	3ms TICK				4ms TICK			
Distance	100cm	200cm	300 cm	400 cm	100cm	200 cm	300cm	400 cm
1B	99%	98%	95%	94%	99%	98%	97%	95%
2B	99%	97%	95%	93%	98%	95%	95%	94%
3B	96%	94%	93%	92%	96%	95%	94%	94%
4B	95%	94%	92%	92%	93%	92%	92%	91%
5B	94%	93%	92%	91%	91%	90%	90%	89%

*1% reduction will be counted as <= 1ms delay in the data acquired by the virtual terminal.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 8**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
22/3/2021	Doing Additional research on Visible Light Communication Making some adjustment on previous writing point Supervisor have shared previous student journals for references purposes. Weekly Summary: Make some writing on logbook and thesis Update every possible week that not done yet on previous task Prepare prototype build ArifAzam Student's Signature: Date:22 March 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 9**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
19/3/2021 – 2/4/2021	To test related hardware component with possible data on communication distance and reliability of Visible Light Communications with proposed circuit. -testing on transceiver node of VLC -IoT integration (still in progress) -design of circuit/model Do some discussion part based on result obtained Weekly Summary: Build prototype based on planned earlier Add some testing matrix IoT integration 85% Do some writings on result in thesis ArifAzam Student's Signature: Date: 2 April 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

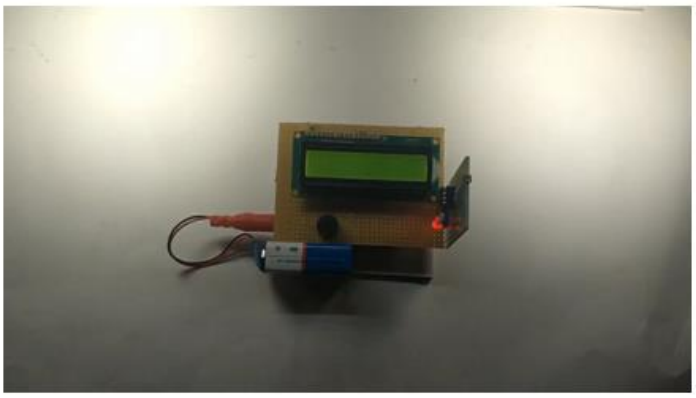


Figure 4.11: Prototype of receiver node of Visible Light Communication

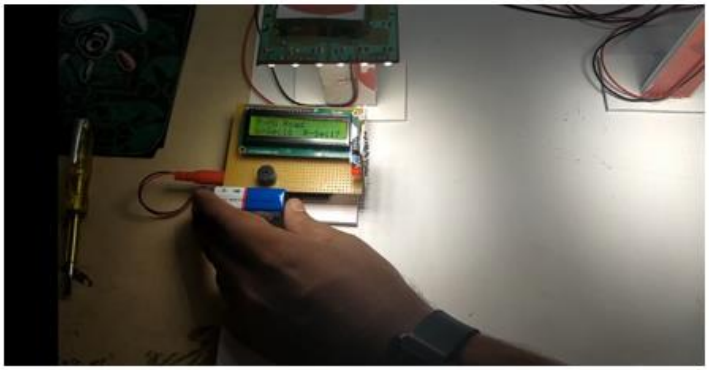


Figure 4.12: Receiver under LED transmitter shows data on LCD Display.

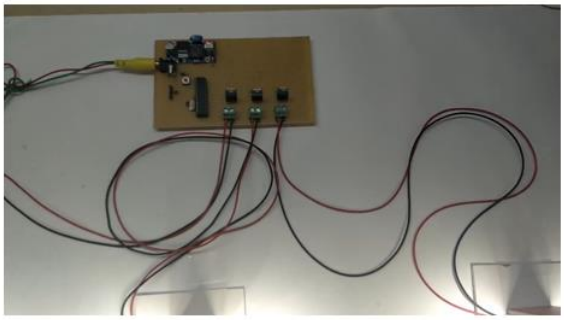


Figure 4.13: Circuit of transmitter node constructed on the breadboard.

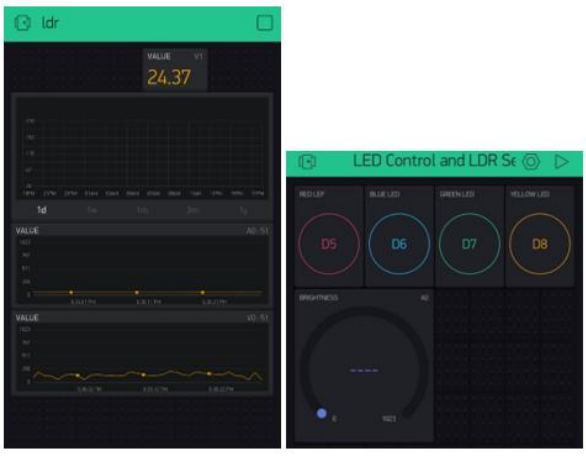


Figure 4.15: Blynk IOT Dashboard of LDR Status.

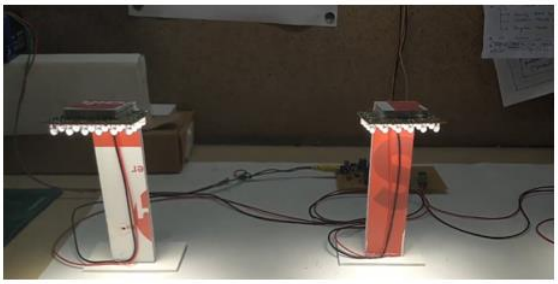


Figure 4.14: Transmitter LED pole lamp of Visible Light Communication.

Testing component compability

NO	TEST DETAILS	METHOD	RESULT	STATUS
1	Checking prototype status	Power up prototype with battery and USB powered source	Prototype both transmitter and receiver initialize well & functioning	PASSED
2	LED data transmit	Placed receiver under LED (transmitter source)	Short word displayed on LCD Display	PASSED
3	IOT Integration	Connect microcontroller via Blynk to monitor LED status	LED status were shown on Blynk on the receiver node via LDR	PASSED
4	Blocking transmitter source	Add a obstacle nearby	Data not shown on LCD Display	PASSED
5	Different scene effect to transmitter and receiver	Place under normal lightings indoor	Data shown a bit delay since having ambient light source	Smaller scope will specify the uses of VLC in early stage
6	Battery duration for power supply	Placed with receiver for standalone prototype	Can withstand for long period as the transmitter node only use low power 5V, 1A max	PASSED
7	Testing other microcontroller as a part of the transmitter and receiver node	Adding support for NodeMCU ESP 8266	Not much significant details acquired, but powerful core will much having more transmission speed for the project	PASSED but can be improved
8	Flicker on LED Transmitter	Observe on LED Transmitter behaviour	Acceptable, a bit flicker since the data were transmitted to the receiver node	PASSED but can be improved

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

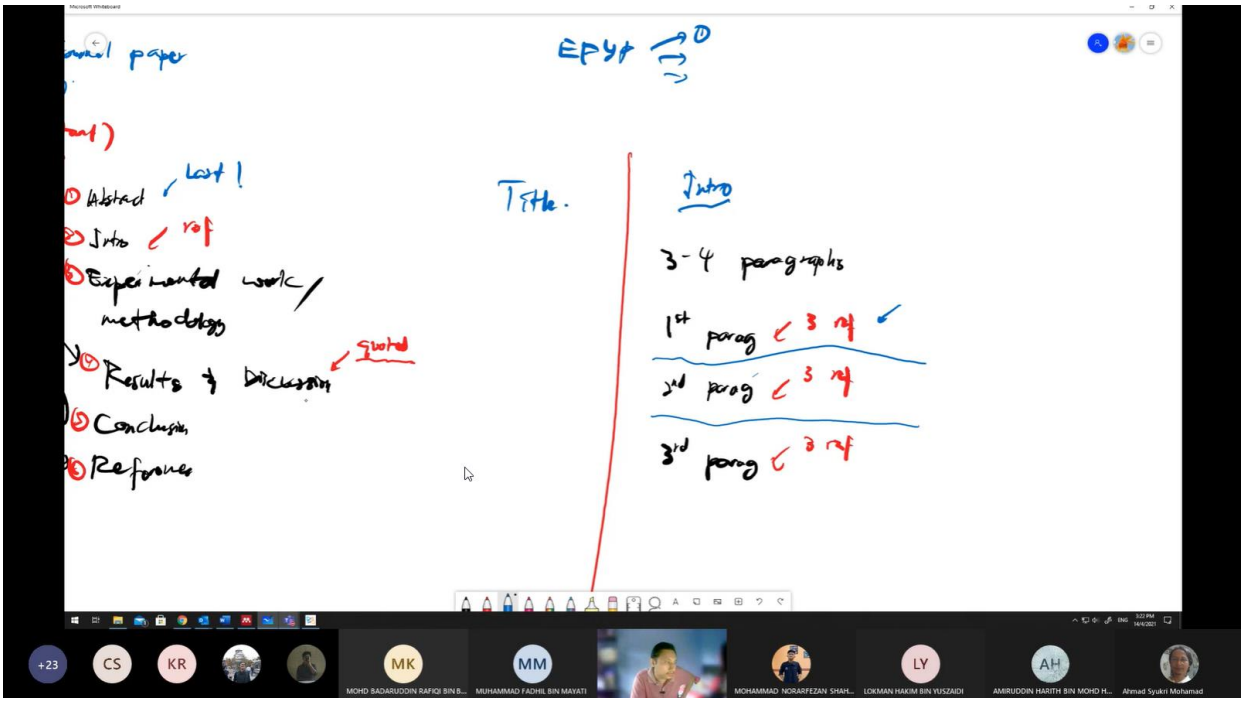
Project Title **Week 10**

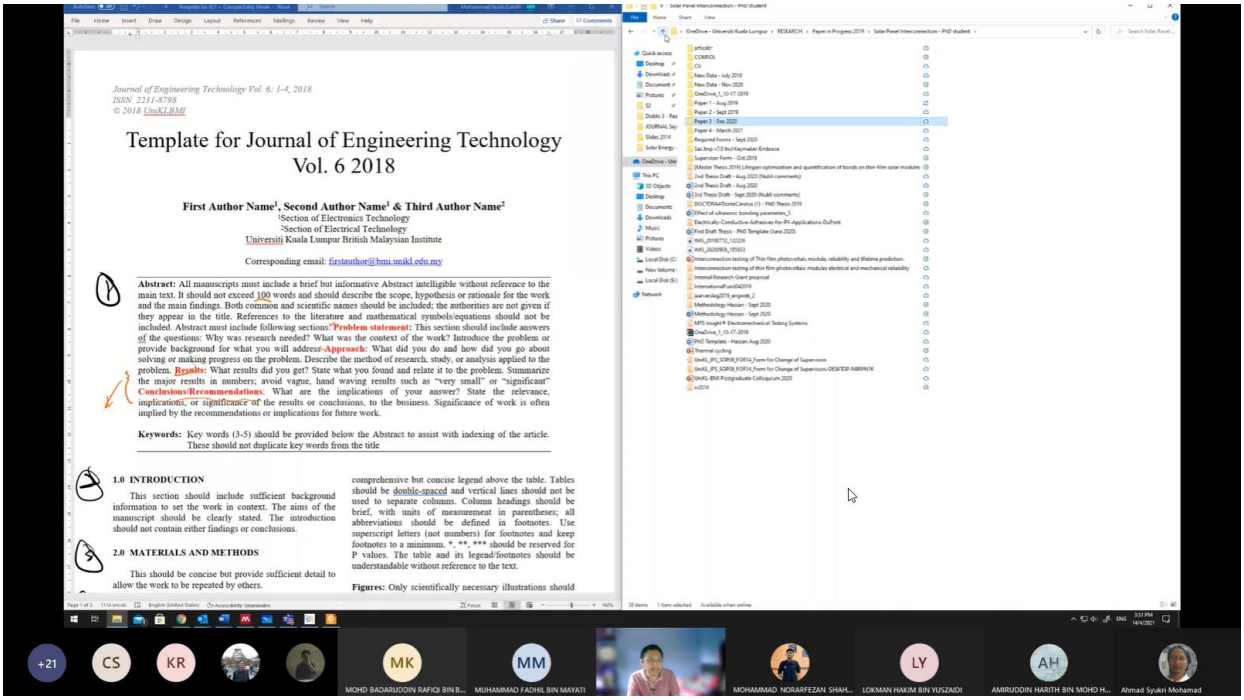
A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
12/4/2021 – 16/4/2021	Workshop- Technical Paper Writing To give the overview of the flow on Technical Paper Writing To explain the marking scheme on the Technical Paper Writings To explain the method on how to occupy the technical paper writing skills Weekly Summary: Initial discussion regarding writing technical paper writing with supervisor Still research the previous project that related to the proposed project. ArifAzam Student's Signature: Date: 16 April 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)





Workshop held on Week 10

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

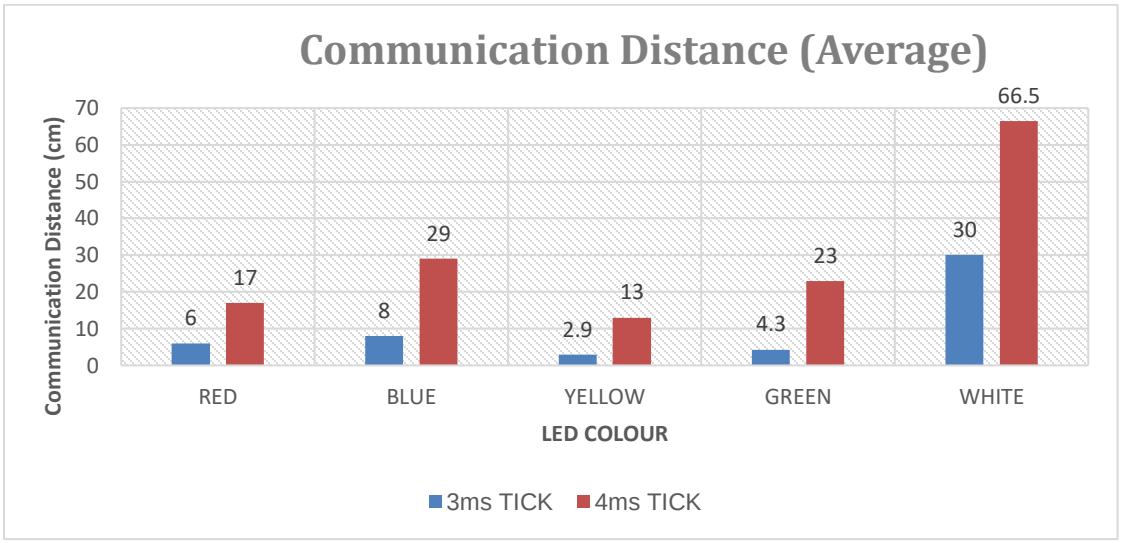
Project Title **Week 11**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

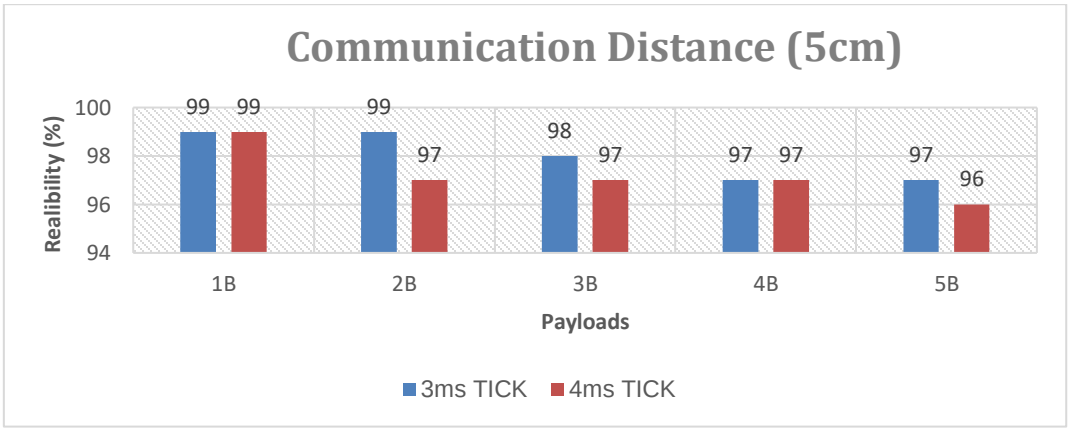
DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
19/4/2021 – 23/4/2021	Discussion In this section, the experimental results and the parameters of the Visible Light Communication are evaluated to identify the good transceiver pair and communication reliability. Integration of VLC communication in smart home is evaluated. Relationship between Distance and Reliability of Visible Light Communication Maximum Communication Distance The maximum communication experiment discussed provides the experimental results of both LED based VLC transceiver and LDR based VLC transceiver. Reliability of the Visible Light Communication protocol this experiment gives the reliability of the protocol, which plays a major role in communication. The reliability is verified between two nodes with the rate of successful reception of data explained in figure on reference section Weekly Summary: Prepare grapgh for discussion in details Do some writing on thesis ArifAzam Student's Signature: Date: 23 April 2021	Supervisor's Signature: Date:

Note:

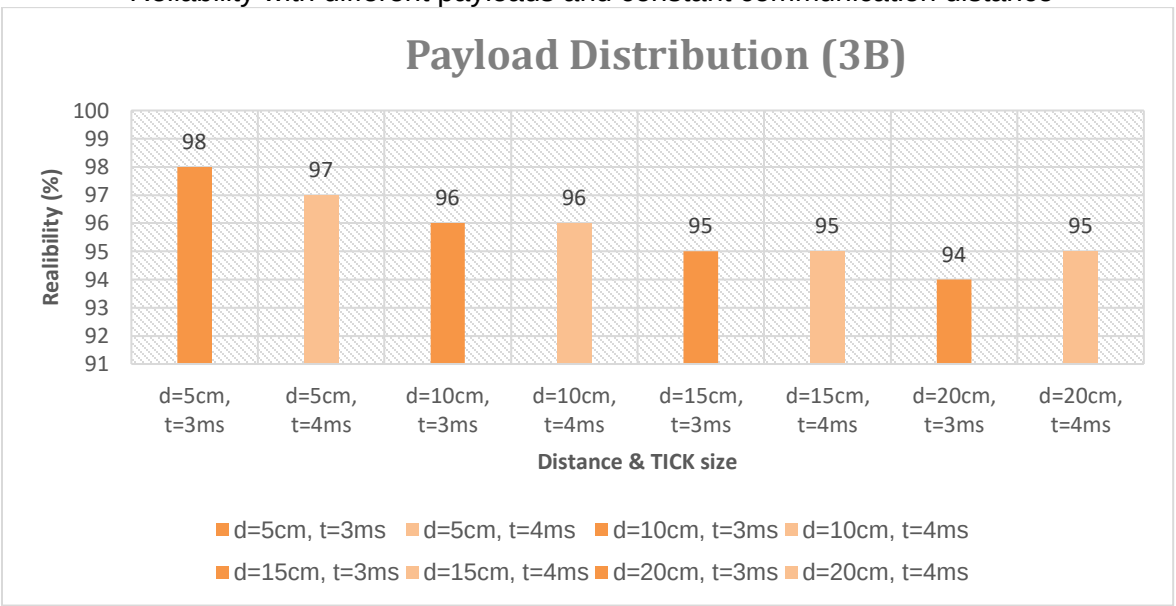
1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)



Bar chart for average LED Communication Distance of Visible Light Communication 3ms & 4ms.



Reliability with different payloads and constant communication distance



Reliability with different communication distance and constant payloads.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 12**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
26/4/2021 – 30/4/2021	Performance Evaluation of Visible Light Communication The performance of VLC protocol is evaluated based on the transmission time of frame. Initially, the transmission time is calculated with different parameters and information frame With smaller TICK size the transmission time is less compared higher TICK size for the same amount of data transmitted. The output is calculated from the time taken to transmit one bit of binary data Do list out and some writigs on conclusion part and recommendation-final Weekly Summary: Prepare graph based result obtained from table Prepare 1-2 page of chapter 5- must conclude all ArifAzam Student's Signature: Date: 30 April 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
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- TICK(T) = 3 ms and 4 ms and 5 ms // number of milliseconds per Tick
- CLOCK_HALF(c) = 5 // number of ticks per half clock
- CLOCK(C) = (2 * CLOCK_HALF) //number of ticks per clock (1 bit of data)

The calculation of transmission time for 1 B payload is shown below:

$$T = 3 \text{ ms} \quad (4.1)$$

$$c = 5 \times 3 \text{ ms} \quad (4.2)$$

$$= 15 \text{ ms} \quad (4.3)$$

$$C = 2 \times c \quad (4.4)$$

$$= 30 \text{ ms} \quad (4.5)$$

$$1 \text{ bit} = 30 \text{ ms} \quad (4.6)$$

$$\Rightarrow 1 \text{ B} = 8 \times 30 \text{ ms} \quad (4.7)$$

$$= 240 \text{ ms} \quad (4.8)$$

$$8 \text{ B} = 8 \times 240 \text{ ms} \quad (4.9)$$

$$= 1920 \text{ ms} \quad (4.10)$$

Calculation based transmission time taken theoretical part

Table 4.5: Transmission time for different payloads and TICK sizes.

Payload	Transmission time with different TICK sizes	
	3ms TICK	4ms TICK
1B	1920ms	2560ms
2B	2160ms	2880ms
3B	2400ms	3200ms
4B	2640ms	3520ms
5B	2880ms	3840ms

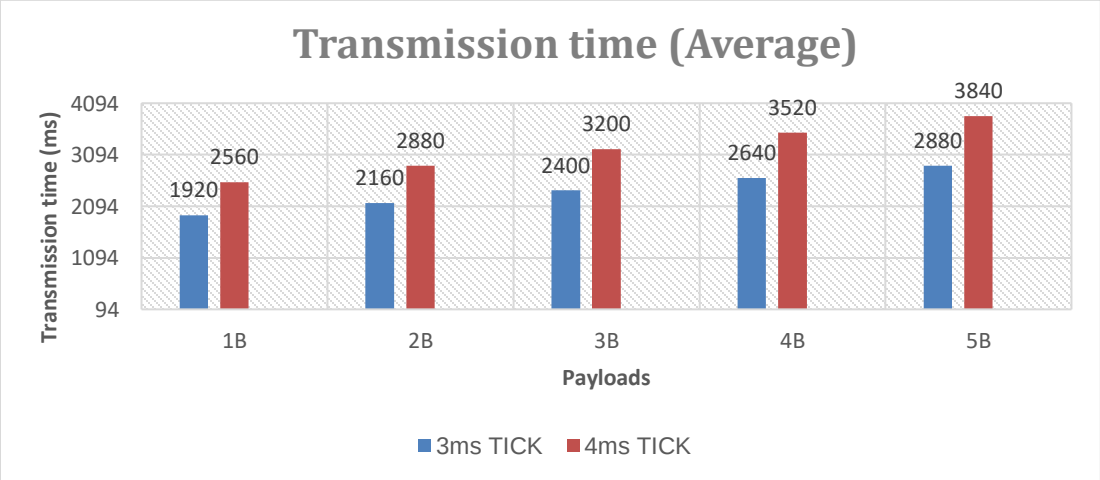


Figure 4.19: Transmission time with different TICK sizes.

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 13**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
3/5/2021 – 7/5/2021	Final Preparation of complete FYP2 thesis, technical report and logbook to Supervisor based on comment supervisor latest report emailed Checking and approval from supervisor to submission for Sir Syukri Submission turintin report (10% < 20%) achieved. Email: ahmadsyukri@unikl.edu.my; badrulhishamismail@unikl.edu.my; Final touchup for Logbook Adding some figures, Appendix section (organized well) Submission date on 25 May 2021…..Submission to supervisor I.r Badrulhisham and cc to Sir Syukri Weekly Summary: Last checking for next week submission FYP2 Report No more DRAFT! Update info that missed during preparation of the report Make sure all data updated inside logbook ArifAzam Student's Signature: Date: 7 May 2021	Supervisor's Signature: Date:

Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

[FYP2 submission][51218218108][ArifAzam]

ORIGINALITY REPORT

16%	9%	7%	9%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Otto-von-Guericke-Universität Magdeburg Student Paper	1%
2	Yunlu Wang, Xiping Wu, Harald Haas. "Load Balancing Game With Shadowing Effect for Indoor Hybrid LiFi/RF Networks", IEEE Transactions on Wireless Communications, 2017 Publication	1%
3	P Prakash, Rinki Sharma, S Sindhu, Tejaswini Shankar. "Visible Light Communication using Solar Panel", 2017 2nd International Conference On Emerging Computation and Information Technologies (ICECIT), 2017 Publication	1%
4	Submitted to University Computing Centre (SRCE) Croatia Student Paper	1%
5	Submitted to Victoria University College Student Paper	1%

LOGBOOK ENGINEERING FINAL YEAR PROJECT

Name: MUHAMAD ARIF BIN MAT AZAM **Student ID No. 51218218108**

Project Title **Week 14**

A Development of secure IoT Wireless Communication Signal using Visible Light Source for Smart home.

DATE	RESEARCH ACTIVITIES	COMMENTS BY SUPERVISOR
10/5/2021 – 14/5/2021	Submission of FYP1 Report to Sir Syukri (FINALE) I.r Badulhisham approved overall report layout and formatiing were well organised Last meeting with supervisor on report project activity Dateline extend to 25 May 2021, (before 24 May) Well checked! Weekly Summary: Prepare Final Submission report FYP2, technical report and logbook Make slide presentation upcoming week ArifAzam Student's Signature: Date: 14 May 2021	Supervisor's Signature: Date:

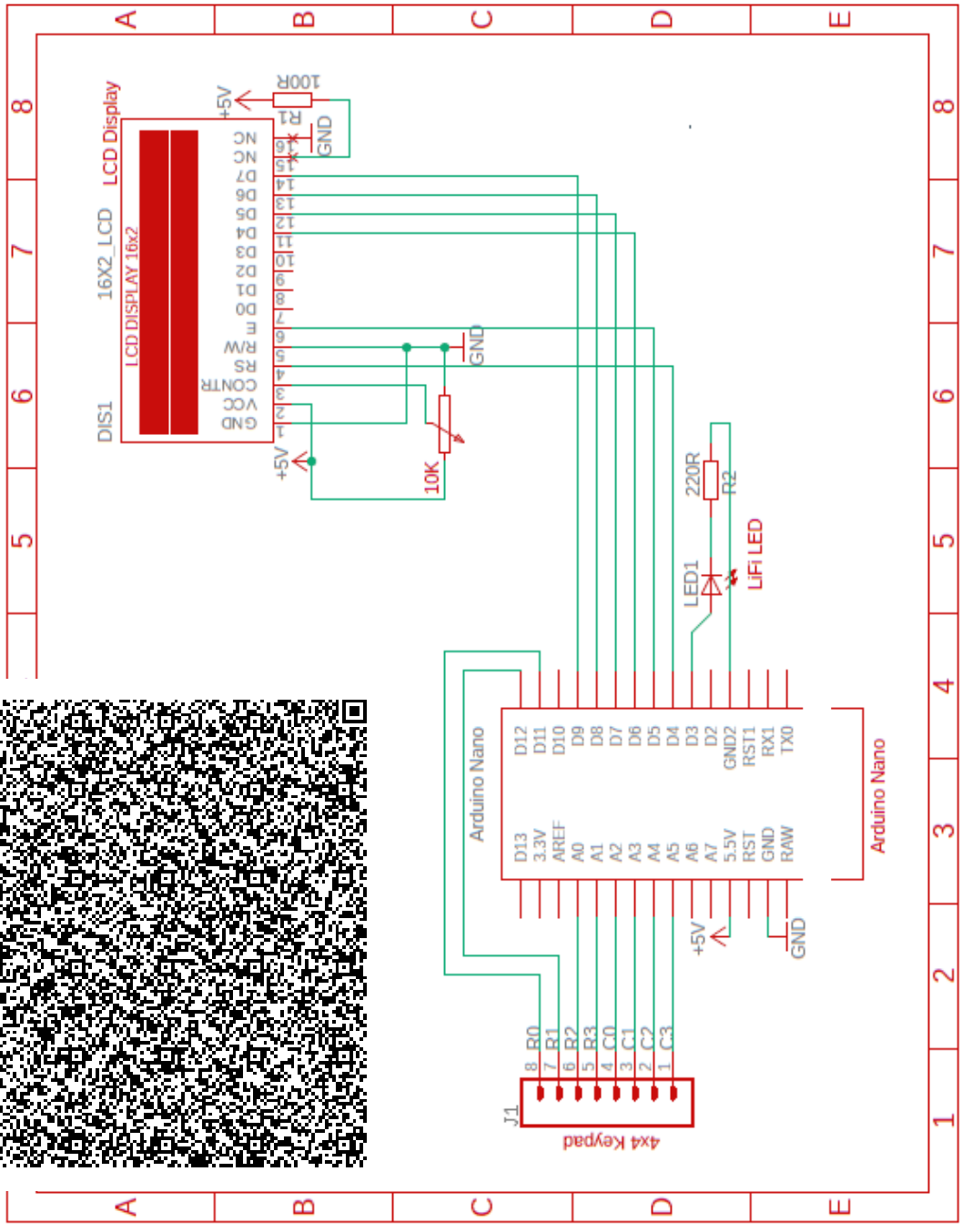
Note:

1. Students and Supervisor signatures to be done at the end of task and comments.
2. Attach additional resources (information, sketch, design, data, articles, journals, etc)

APPENDIX

APPENDIX A

VISIBLE LIGHT COMMUNICATION TRANSMITTER SCHEMATICS



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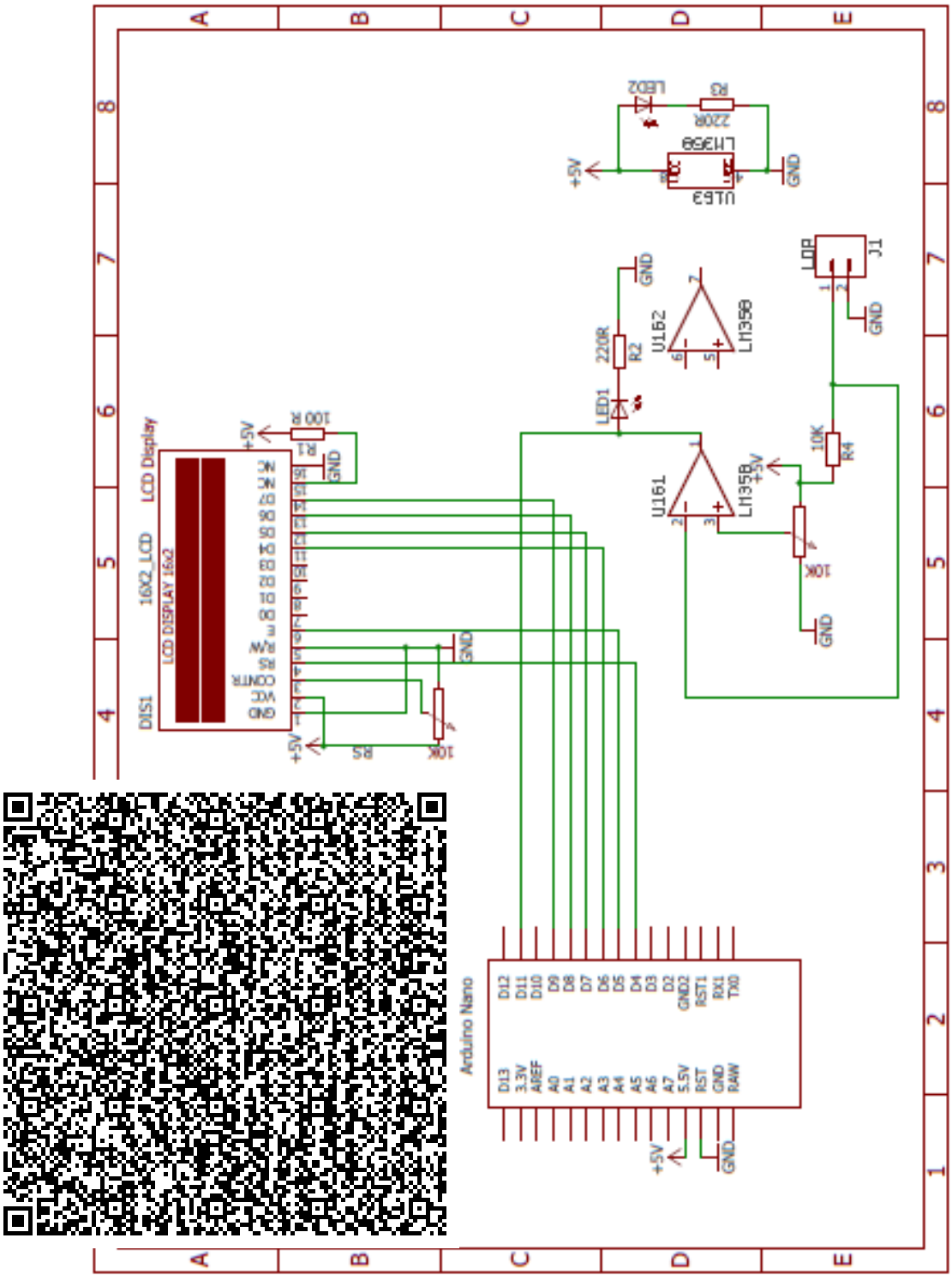
APPENDIX D

VISIBLE LIGHT COMMUNICATION RECEIVER SCHEMATICS



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