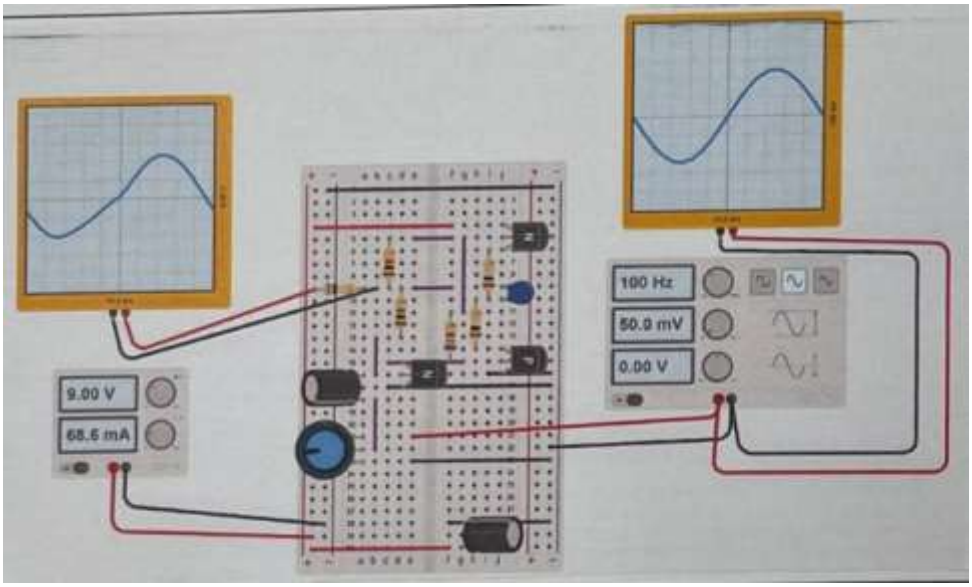
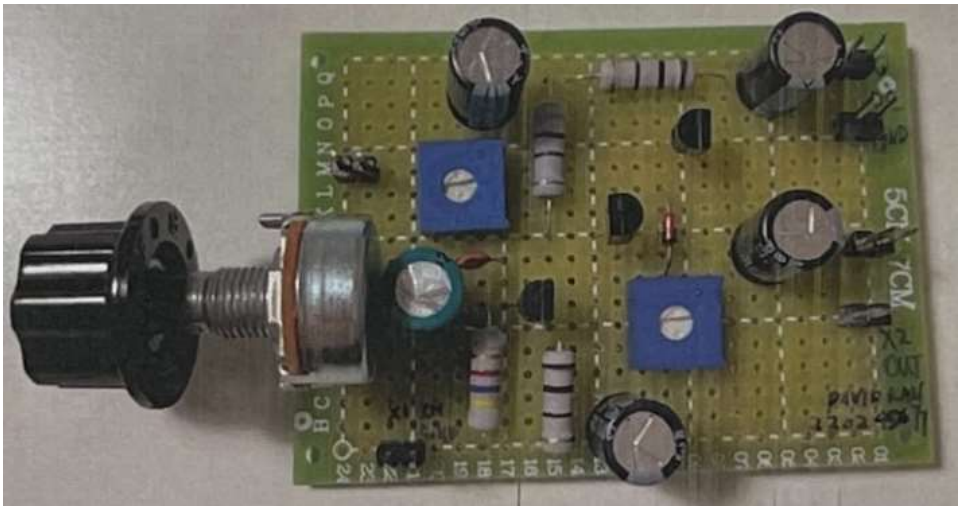
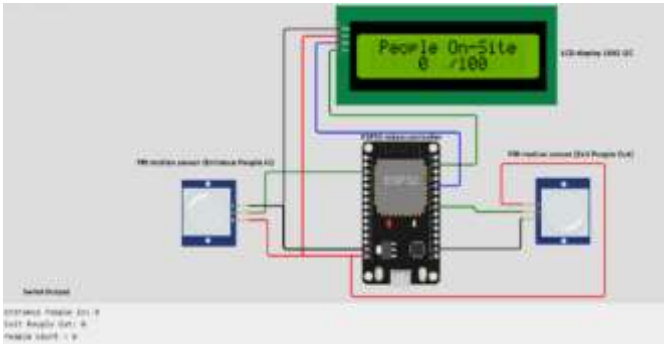
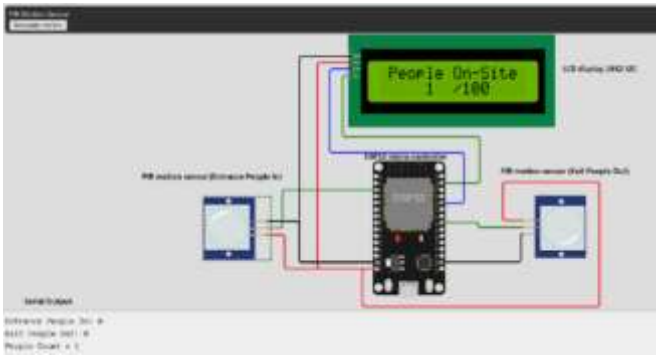
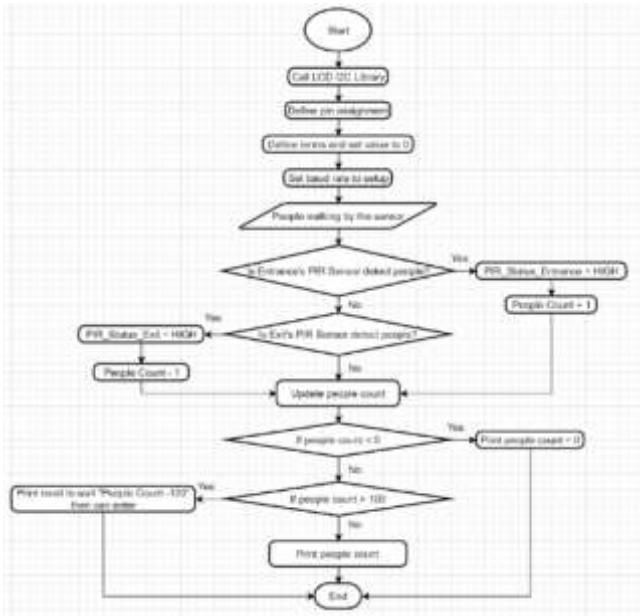
Kan Siu Keung's Learning Brief

Higher Diploma in Computer and Electronic Engineering (Hong Kong Institute of Vocational Education)

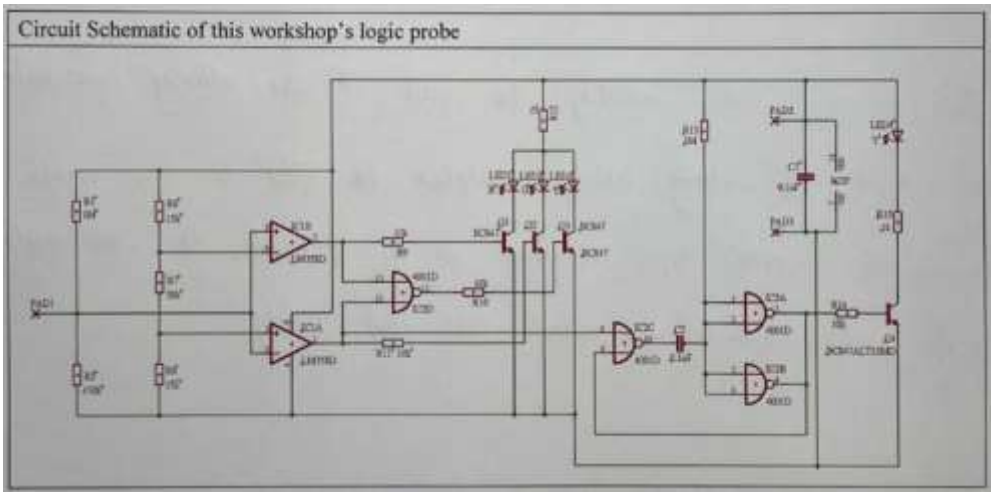
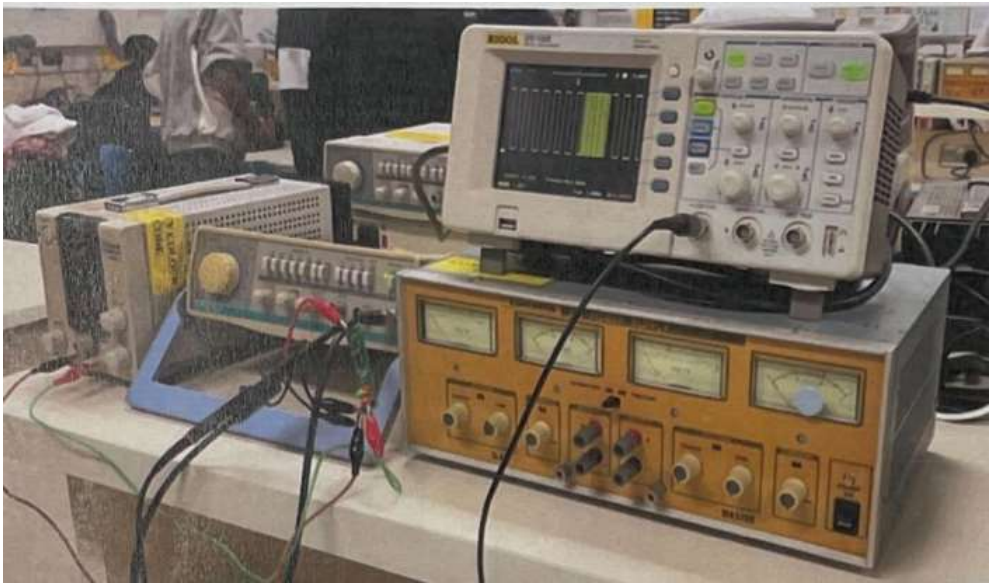
As I planned to further study onto the computer engineering last year in 2022, therefore I have enrolled into this program and study part-time evening. The brief of the subjects which I have studied up to now will be described below:

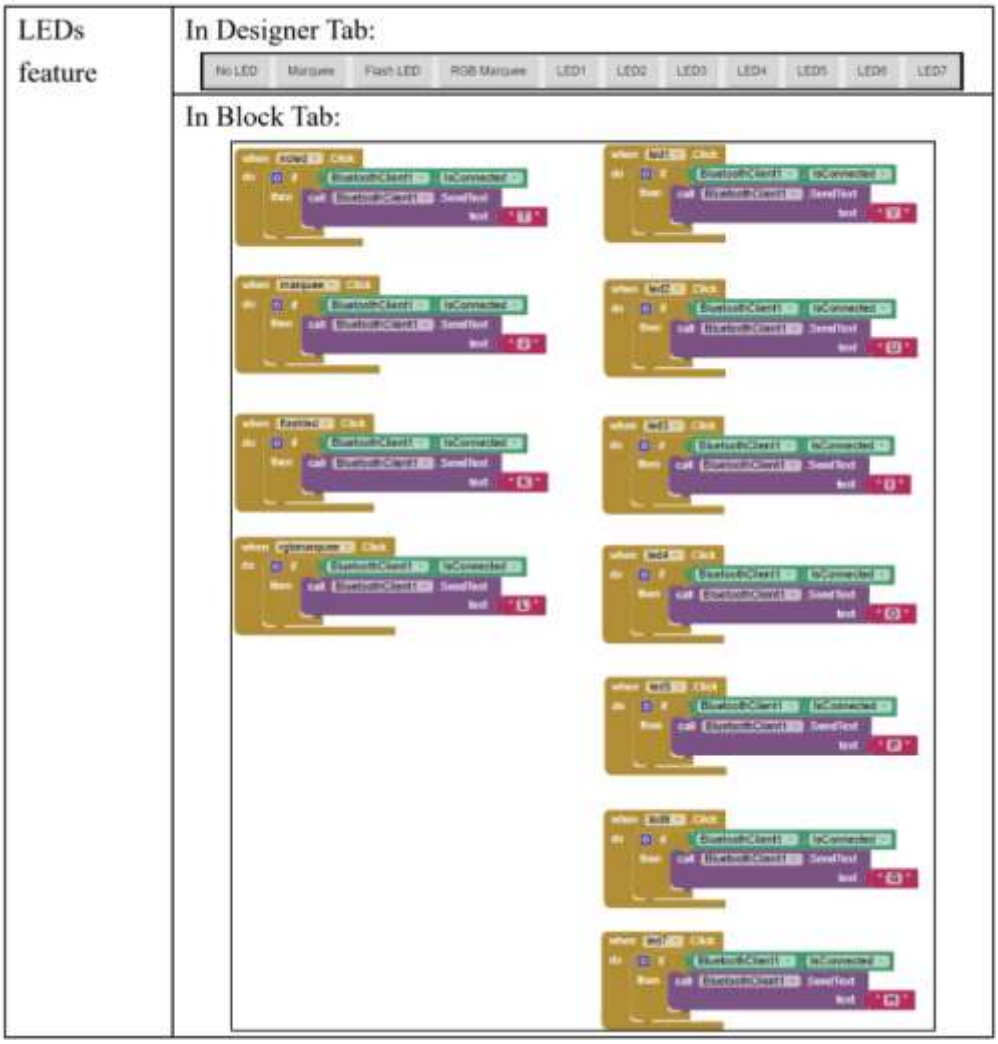
Semester 1 (From 2022-09 to 2022-12)

Subject	EEE3451 (Electronics Essentials)
Grade	A-
Description	Learning the: basic electronic circuit principles, components and equipment (lab power supply, multimeter, oscilloscopes, function generator, soldering), circuit theorem, number system, combinational logic, flip flop, diodes and transistors, photo-electric devices
On-hand project	Designing a power amplifier circuit, modify and troubleshoot the problem with the prototype. Simulation screen capture:  Hand-made prototyping: 

Subject	EEE3453 (Computer Programming for Microcontroller)
Grade	B
Description	-Employing a general programming language to perform simple I/O tasks in microcontroller system -Test and debug microcontroller programs in a simulated environment -Learning the C language and applying into the ESP32 development board
On-hand project	Design and develop a micro-controller application for People Counter. Block diagrams of starting the application of People counter All the serial output signal number are in “0”  Block diagrams of 1 people coming in and activate the “PIR motion sensor (Entrance People In)”  Flow Chart:  Programing code website: https://wokwi.com/projects/350779519189123667

Semester 2 (From 2023-01 to 2023-04)

Subject	EEE3452 (Computer and Electronic Practices)
Grade	A-
Description	Learning the: -PCB design using Eagle, assembly, and testing -Construction of an ethernet cable -Schematic diagrams study -Logic probe study (soldering/ desoldering on a PCB, perform trouble shoot and testing)  Circuit Schematic of this workshop's logic probe  Top view with painting Back view 

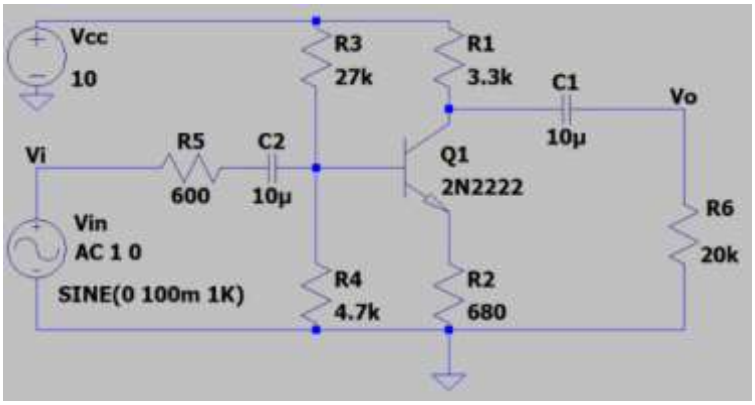
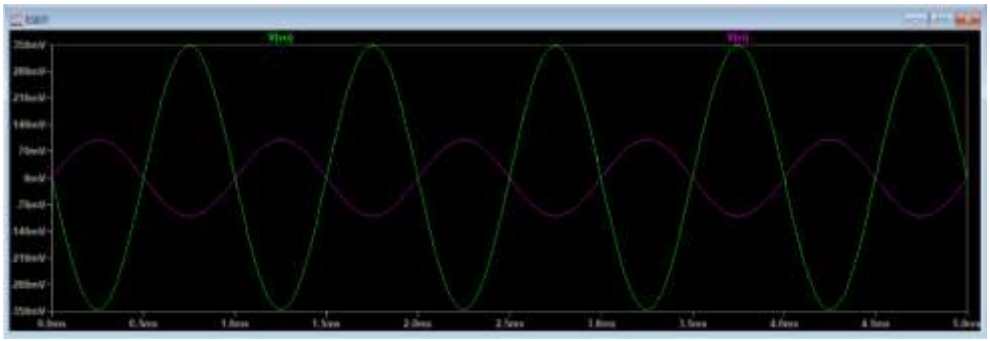
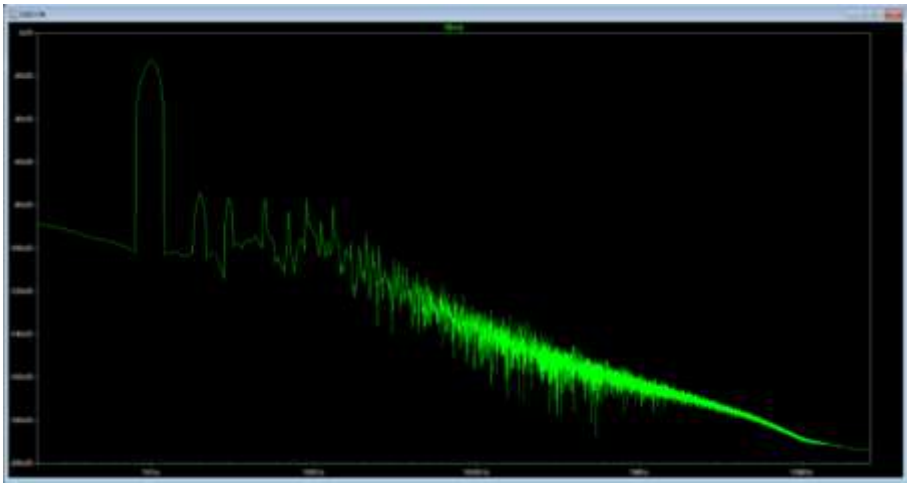
On-hand project	Designing a MIT App Inventor application to control ESP32 based remote car MIT App Inventor block design (example of LED feature)  Screen 1 (portrait mode) user interface design and Screen 2 (landscape mode) user interface design  

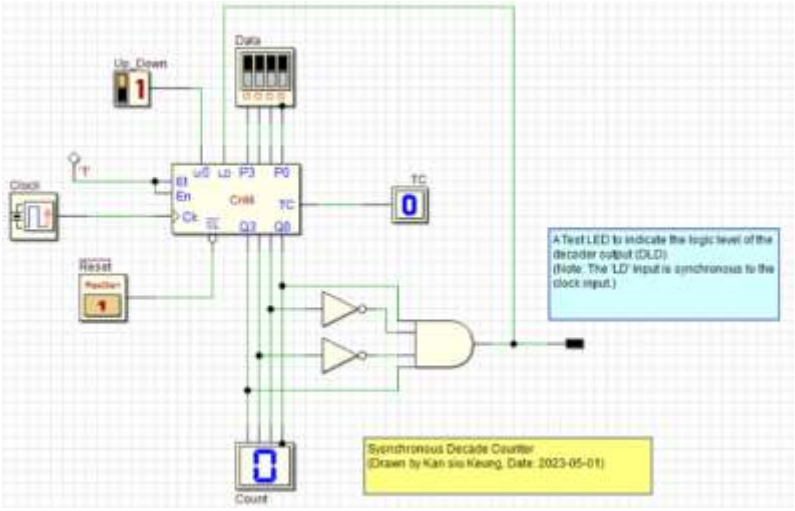
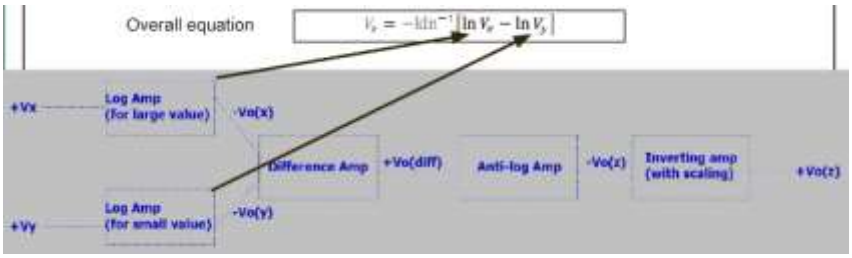
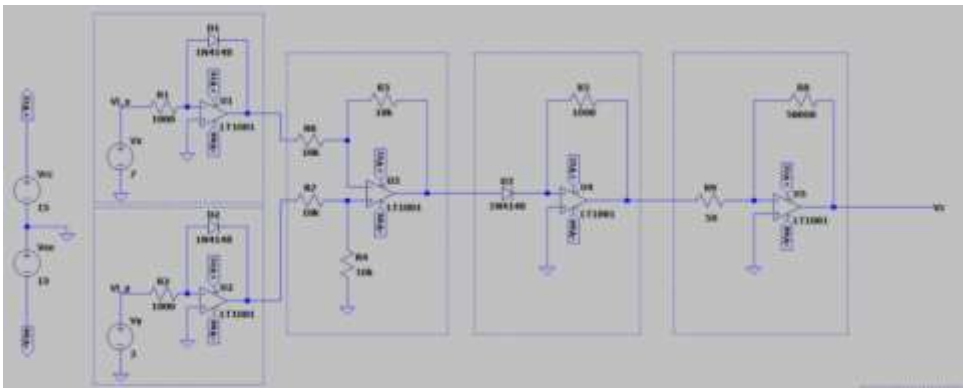
Arduino code with comment (few lines for example):

```
#include "BluetoothSerial.h" //call Bluetooth library

#if !defined(CONFIG_BT_ENABLED) || !defined(CONFIG_BLUEDROID_ENABLED)
#error Bluetooth is not enabled! Please run `make menuconfig` to and
enable it
#endif

BluetoothSerial SerialBT; //setup Bluetooth Port Name

#define resolution 8  //resolution value of PWM, 8-bit is 256 (0-255)

const int LEDFreq = 5000;  //PWM for LED frequency
const int LED3R = 4;  //Red color LED light PWM Channel
const int LED4G = 5;  //Green color LED light PWM Channel
const int LED5B = 6;  //Blue color LED light PWM Channel
int LED1 = 32;  //indicate LED1 I/O
int LED2 = 33;  //indicate LED2 I/O
const int LED3 = 25;  //indicate LED3 & LED3R (red) I/O
const int LED4 = 26;  //indicate LED4 & LED4G (green) I/O
const int LED5 = 27;  //indicate LED5 & LED5B (blue) I/O
int LED6 = 14;  //indicate LED6 I/O
int LED7 = 12;  //indicate LED7 I/O
byte LED[] = {32,33,14,12};  //marquee setting

int Motor1PinF = 19;  //indicate Motor 1 pin 1 I/O for GPIO 19, left
motor
int Motor1PinB =21;  //indicate Motor 1 pin 2 I/O for GPIO 21, left
motor
int Motor2PinF =16;  //indicate Motor 2 pin 1 I/O for GPIO 16, right
motor
int Motor2PinB =4;  //indicate Motor 2 pin 2 I/O for GPIO 4, right
motor

const int motorFreq = 100;  //motor PWM Frequency
const int Motor1F_PWMChannel_0 = 0;  //define motor1F PWM Channel 0
const int Motor1B_PWMChannel_1 = 1;  //define motor1B PWM Channel 1
const int Motor2F_PWMChannel_2 = 2;  //define motor2F PWM Channel 2
```

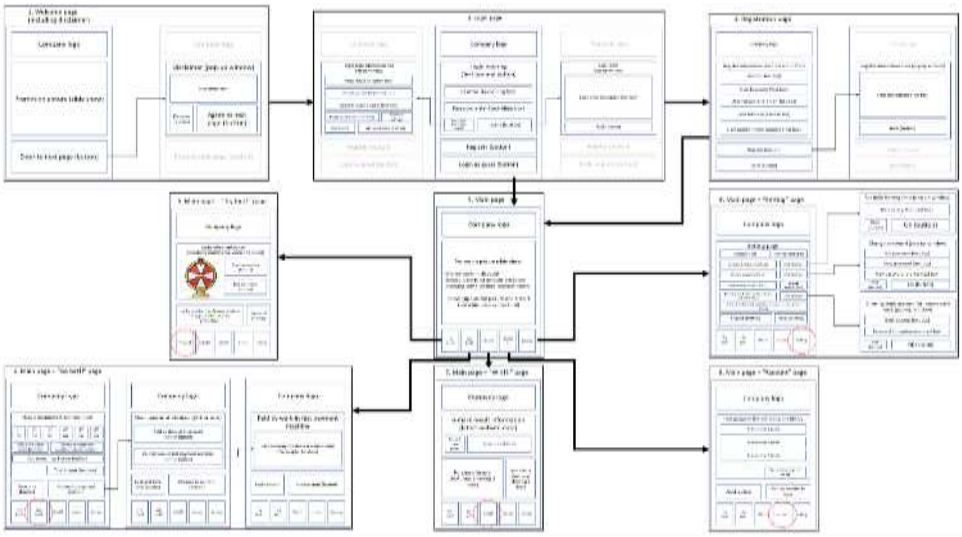
Demonstration setup:

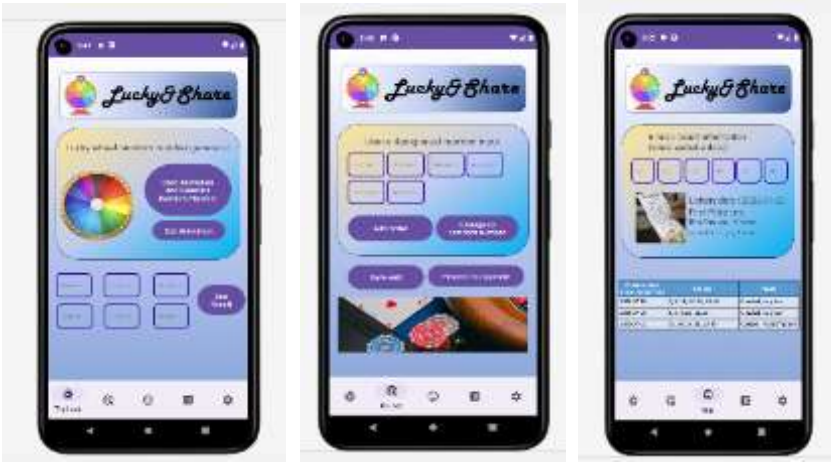
Screen1 (portrait mode)	
Screen2 (landscape mode)	

Subject	EEE3459 (Analogue and Digital Electronics)
Grade	A-
Description	Learning how to: -implement Operational Amplifiers based circuits by incorporating negative and / or positive feedback into the circuits for the required analogue applications -select appropriate Analogue-to-Digital Converter (ADC) and/or Digital-to-Analogue Converter (DAC) as interface between the analogue and digital domain -implement digital circuits for counting, timing and sequential control application using Programmable Logic Devices (PLD) -using the circuit simulation software LTspice and Deeds LTspice screen capture example:  (LTspice Schematic Diagram of Common Emitter Amplifier)  (Transient Simulation Waveform of Common Emitter Amplifier)  (FFT Waveform)

	Deeds example screen capture (Binary 4 Counter: Up count mode)  (Circuit diagram)  (Timing diagram)
On-hand project	Design OP-Amp Circuit with Analog Input using the principle of Log amp, Differential amp, Anti-log amp, Inverting amp.  (Mathematical derivation of the formulas)  (Final circuit schematic design)

Semester 3 (From 2023-05 to 2023-07)

Subject	EEE3457 (Object-oriented and Mobile Device Programming)
Grade	A-
Description	Introduce object-oriented programming, Java. -including data type, string, java operators, arithmetic operations, comparison operators, logical operators, user input, branching (if, if-else, if-elseif, nested if), switch statement, looping, (for loop, while loop, do while loop), break statement, continue statement, loop control, array, method. -also includes the introduction of object, class, constructor, inheritance, information hiding, encapsulation, abstraction, interfaces, polymorphism, method overriding.
On-hand project	Developing an android app using Java The app will be an example of the HKJC 6-mark application.  (App conceptual flow description) Page design of the app:  (Main page, login page and forgot password page)

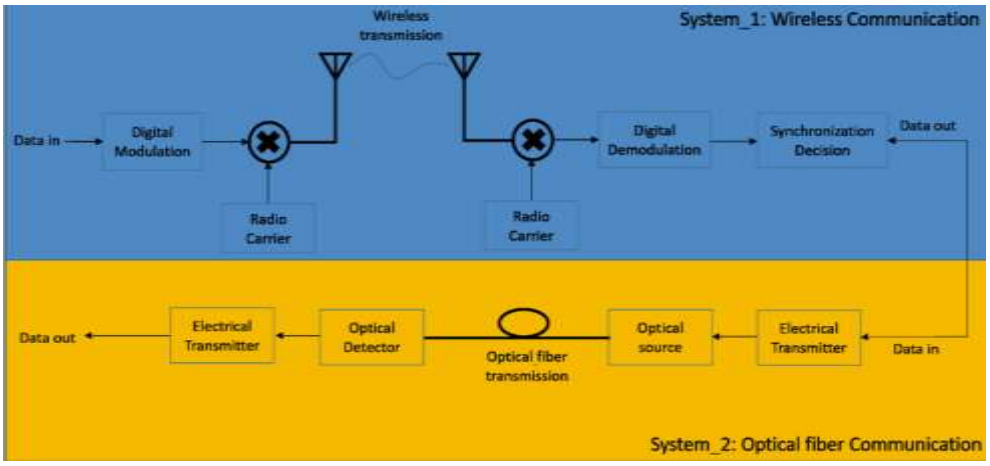


(Content page with navigation bar)

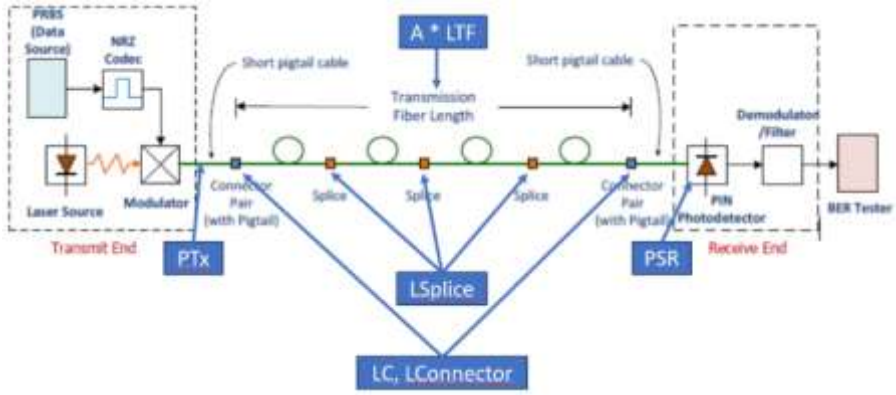
Java function used:

-Import library (e.g. bundle, fragment, layoutinflater, view, database, toast, button, objectanimator, annotation, intent), private/public function, comment function, onCreate, onCreate View, onUpgrade, onClick, switch function, set up class, string and more.

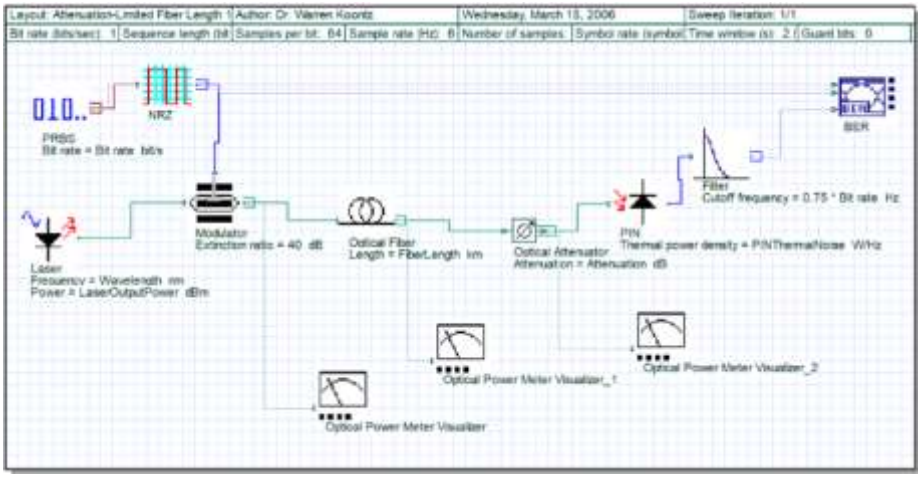
App poster design:

Subject	EEE3460 (Telecommunications Technology)
Grade	B
Description	Learning the knowledge of: Noise in Communications Systems -Electronic Noise, -Signal-to-Noise Ratio, Carrier-to-Noise Ratio, Noise Figure Mobile Radio Propagation -Frequency, Radio Spectrum, Bandwidth -Basic propagation mechanism (reflection, diffraction, scattering); -Propagation model: free space, 2-ray (ground reflection) model; Small scale fading, Multipath fading channels. Digital Modulation and Demodulation -Power and bandwidth efficiency, jitter, ISI, Eye Diagram, channel equalization -I/Q Format, QPSK, QAM, signal orthogonality, constellation diagram Multiple Access -ALOHA, FDMA, TDMA, CDMA, OFDMA; -Spread spectrum: direct sequence, frequency hopping, time hopping. Optical Fiber Transmission Systems -Optical Laws, Snell's Law -Types of optical fibers and modes of propagation -Transmission characteristics of an optical fiber: Numerical -Aperture, Attenuation, Scattering, Absorption and Dispersion. -Functional blocks of a point-to-point optical fiber transmission system
On-hand project	Design a communication system of wireless and optical fiber transmission with specific system diagrams and parameters. Block diagram of system 1 and system 2: 

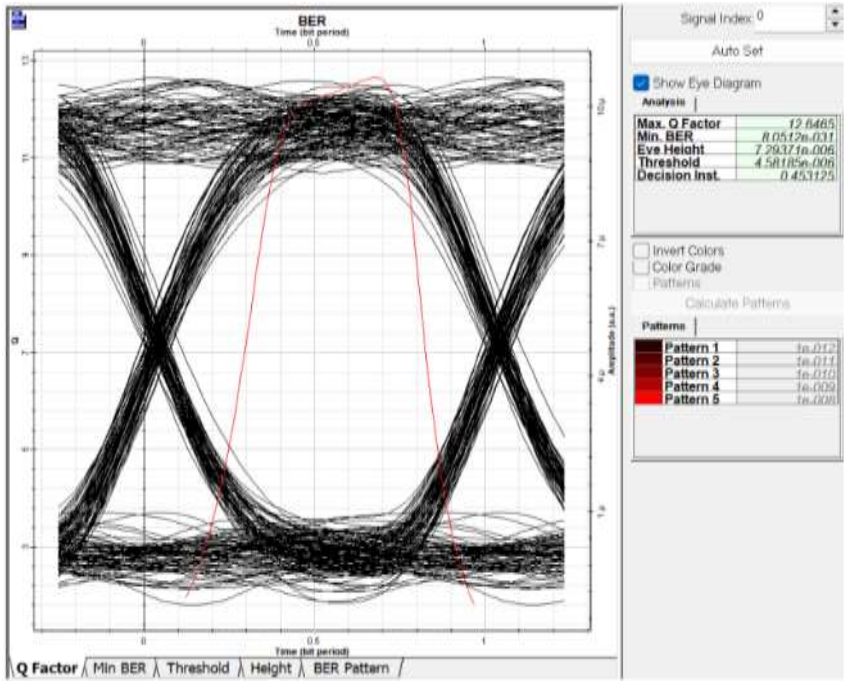
Block diagram showing the flow of transmitting and receiving optical fiber signal



Shows the setup of OptiPerformer software

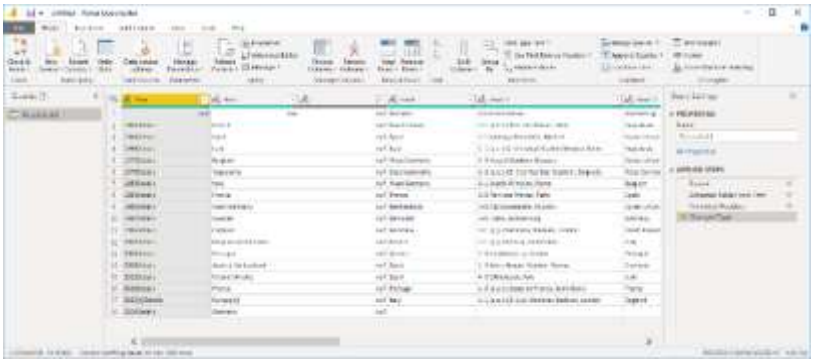
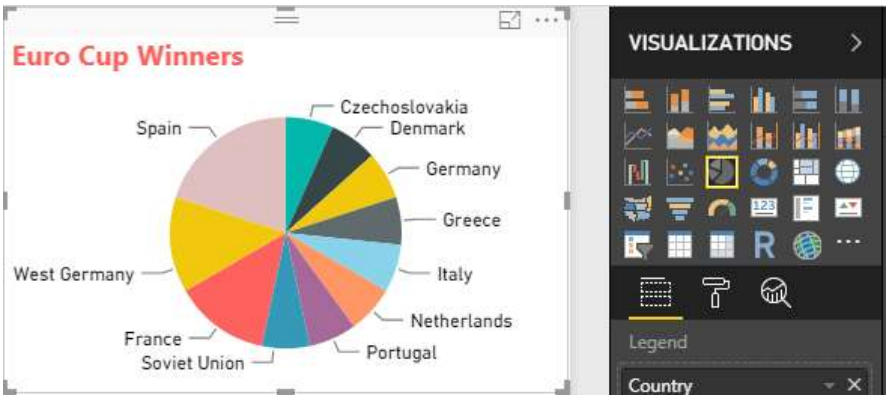


Shows one of the simulation results and represent in eye diagram.



Cumulative GPA: 3.44

Semester 4 (From 2023-09 to present)

Subject	ITE3009 (Information Technology Essentials)
Grade	N/A
Description	Introduce varies information technology tools. For example: -PowerBI for data visualization -Micro:bit for smart sensors -Google teachable machine for cloud platform machine learning using TensorFlow -Blender for model building and further develop with AR/VR software for immersive experience
On-hand project	PowerBI for data visualization -Connect to a web data source and navigate across its available tables,  -Shape and transform data in the Power Query Editor, -Name a query and import it into a Power BI Desktop report, and Create and customize a map and a pie chart visualization  

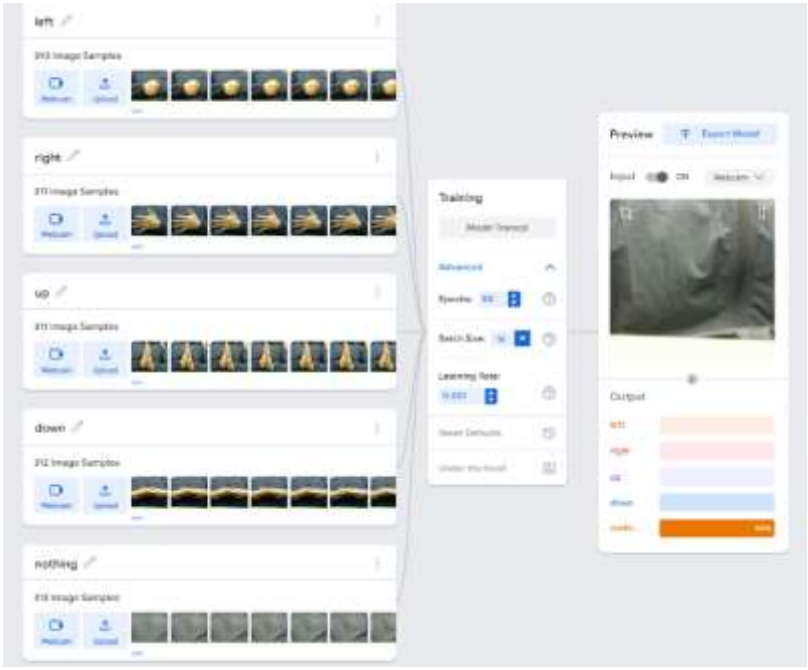
-Micro:bit for smart sensors

Create a dice game and send the number to other board. If the received number is lower than your die number, you can get one mark.

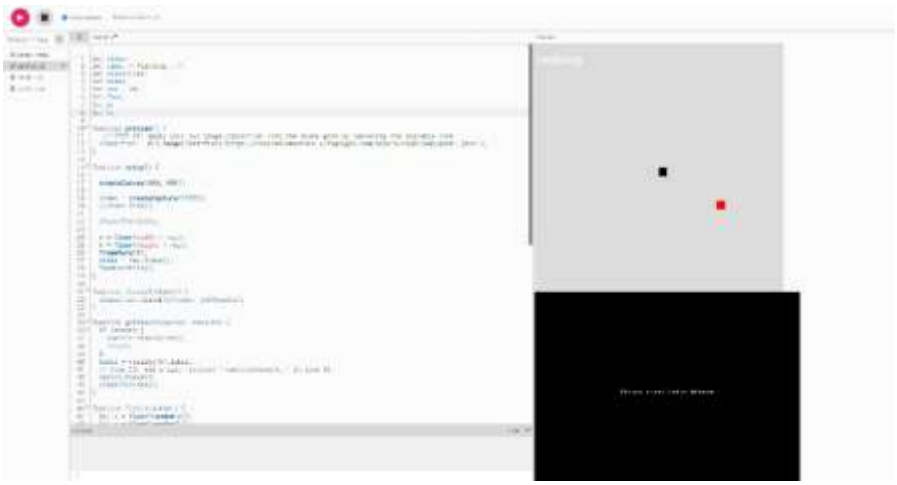
Block snapshot:

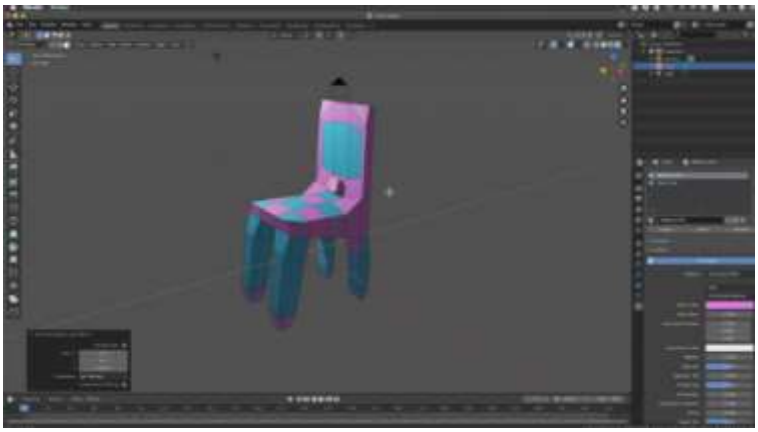
-Google teachable machine for cloud platform machine learning using TensorFlow

Screen capture of the gestures to be trained.

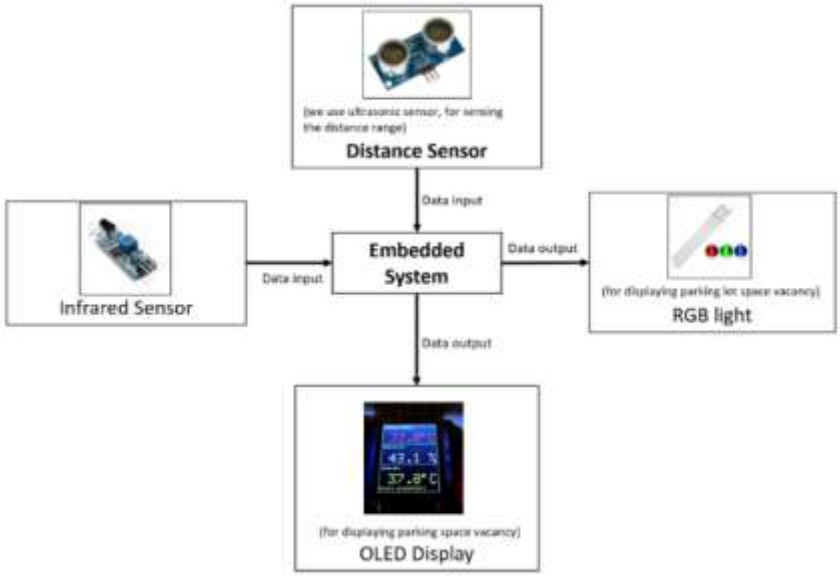
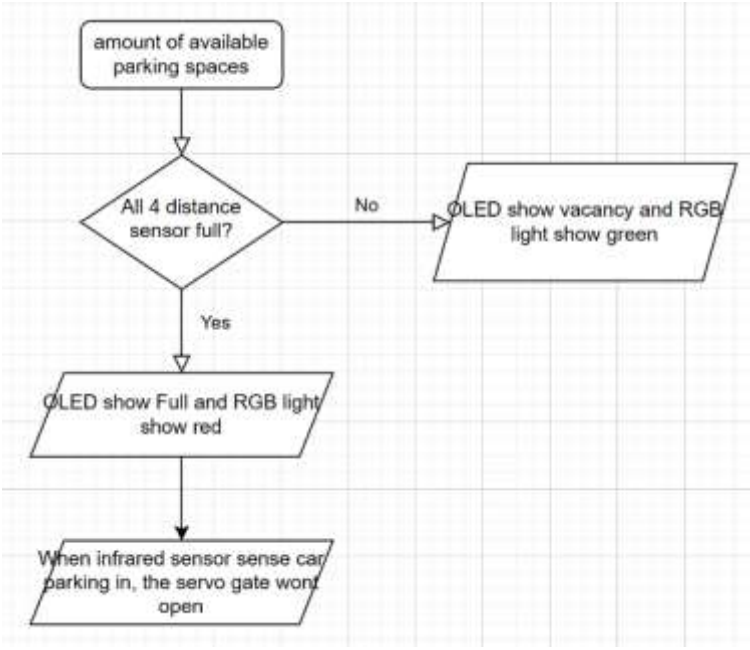
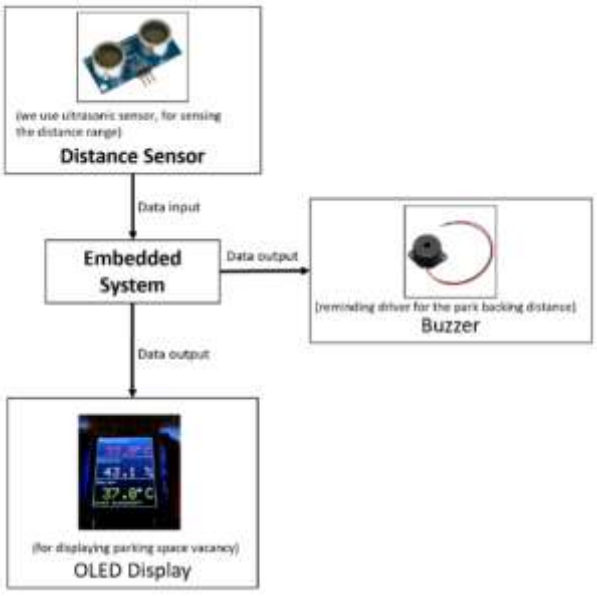


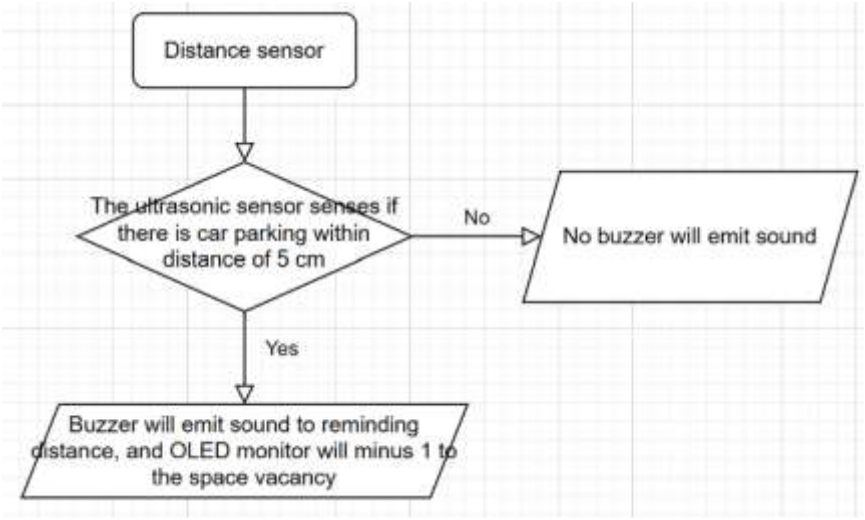
User can control the movement of the red dot by identifying their gesture from the camera



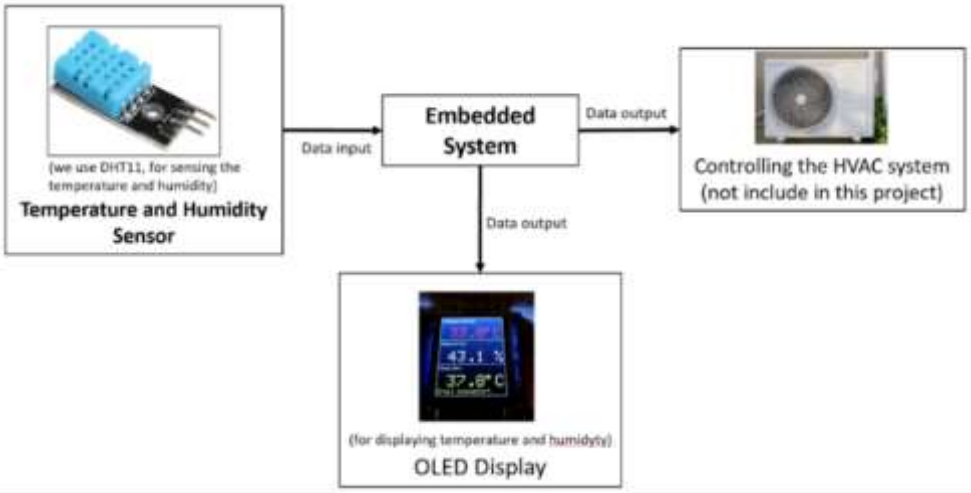
	-Blender for model building and further develop with AR/VR software for immersive experience Screen capture of building the mesh of a chair from the blender: 

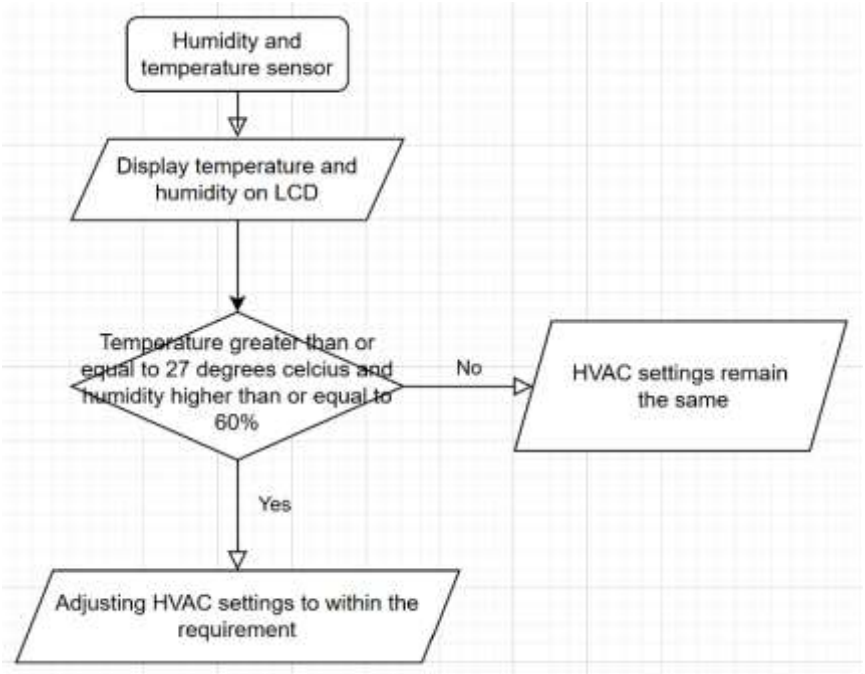
Subject	EEE3456 (Embedded Systems)
Grade	N/A
Description	Learning the knowledge of: Functional Components of a Microcontroller System -Microcontroller architecture -Input / Output Devices implementation with microcontroller -Latest trend of microcontroller systems Basic Data Types Operations -Primitive Data Types, Variables, Constants, Evaluation of Arithmetic and Logical Expression, Type Conversions -Bitwise Logic Manipulations Control Structures -Condition, Selection, Repetition, and Iteration Statements Function Call -Basic Standard Library Function, User Defined Function, Parameter Passing Methods, Scope of Variables -Creation of Library Applications Development Techniques -Application Development Cycle -Case Studies -Debugging and Testing Python Programming for Raspberry Pi -python comments, variable, data type, strings, arithmetic operator, logical operator, logical operator, comparison operator, identity operator, list, input/output, decision making, nested-if, loop control, range function, etc.

On-hand project	Design the prototype of a smart parking lot with raspberry pi Block diagram of Scenario 1, driver can know the amount of available parking spaces.   Block diagram of Scenario 2, Distance sensor sensing the parking distance. 

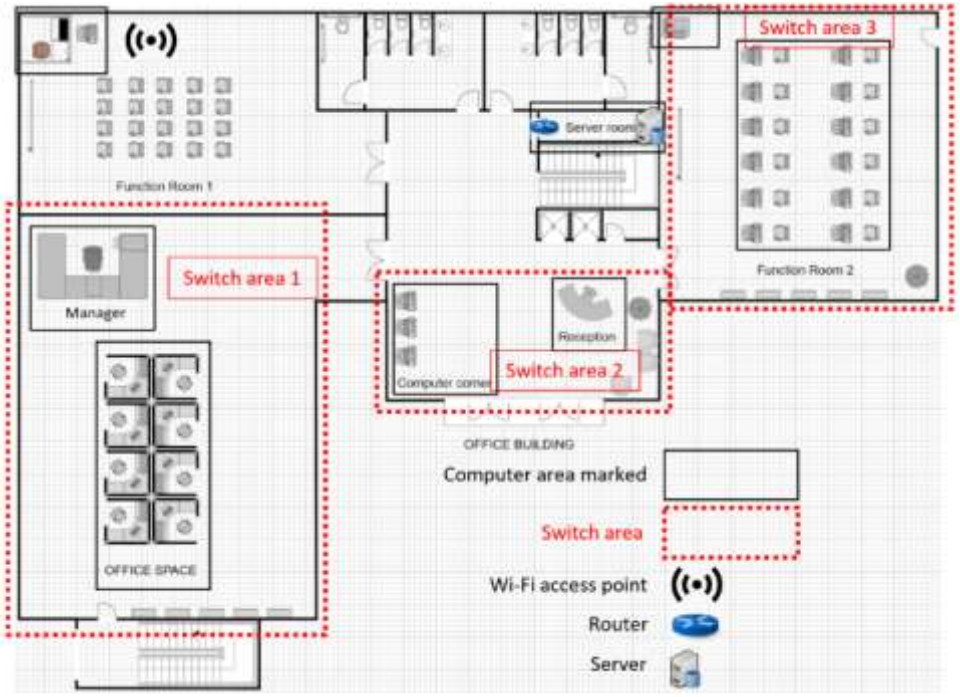


Block diagram of Scenario 3, Temperature and humidity sensing.





Subject	EEE4455 (Communications and Network Engineering)
Grade	N/A
Description	Learning the knowledge of: Data Communications System -Simplex and duplex, serial and parallel transmission -Analog and digital signals, frequency and time domains -Bandwidth, data rate -Transmission impairment, channel capacity -Line coding -Analog-to-digital conversion -Multiplexing -Error control, flow control -Transmission media -Interfaces Wireless Technologies -Wireless communications and networks -Wi-Fi -Bluetooth -Other wireless technologies, e.g. 5G Local Area Network (LAN) -Networking models -Network topologies -Ethernet -Spanning tree -Virtual LAN -Routing process -Routing protocols Transmission Control Protocol/Internet Protocol (TCP/IP) -The protocol suite -IP addressing -Subnetting Wide Area Network (WAN) -Circuit switching -Packet switching -Digital subscriber line (DSL) -Hybrid fiber-coaxial (HFC) network

On-hand project	Design a network according to the requirements of the SME client. Floor plan shows the hardware distribution of switch, Wi-Fi access point, router and server in the center.  Also the details will be considerate of users' network usage such as wired network and wireless network, minimum network speed, acceptable latency, peak hour, hardware selection, budget calculation, etc.