The University of Western Australia
School of Engineering
Prof. Thomas Bräunl

# Embedded Systems
## ELEC3020

| **Lab Assignment 6 – Internet of Things** | **Points: 10** |
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**TEAMS:**      This lab will be conducted in teams of 2 students

**EQUIPMENT:**   TTGO Embedded Controller
USB cable to connect to laptop
1 Servo
1 analog PSD sensor

### EXPERIMENT 1  (4 points)

Connect the servo to a controller output.
Write a program to remote control a TTGO controller.

- Setup your TTGO as a server

- Display its IP address on the LCD

- Set up a simple web page to interface with the TTGO and connect to it using your laptop (through the IP address on a browser)

- The web page should implement a dial (or a value slider or a numeric input) which should be transmitted to the TTGO to drive the servo to the desired orientation.

### EXPERIMENT 2  (3 points)

Connect the PSD sensor to an analog controller input.
For every button push on the TTGO, transmit the current reading of the PSD sensor and display it on the remote web page.
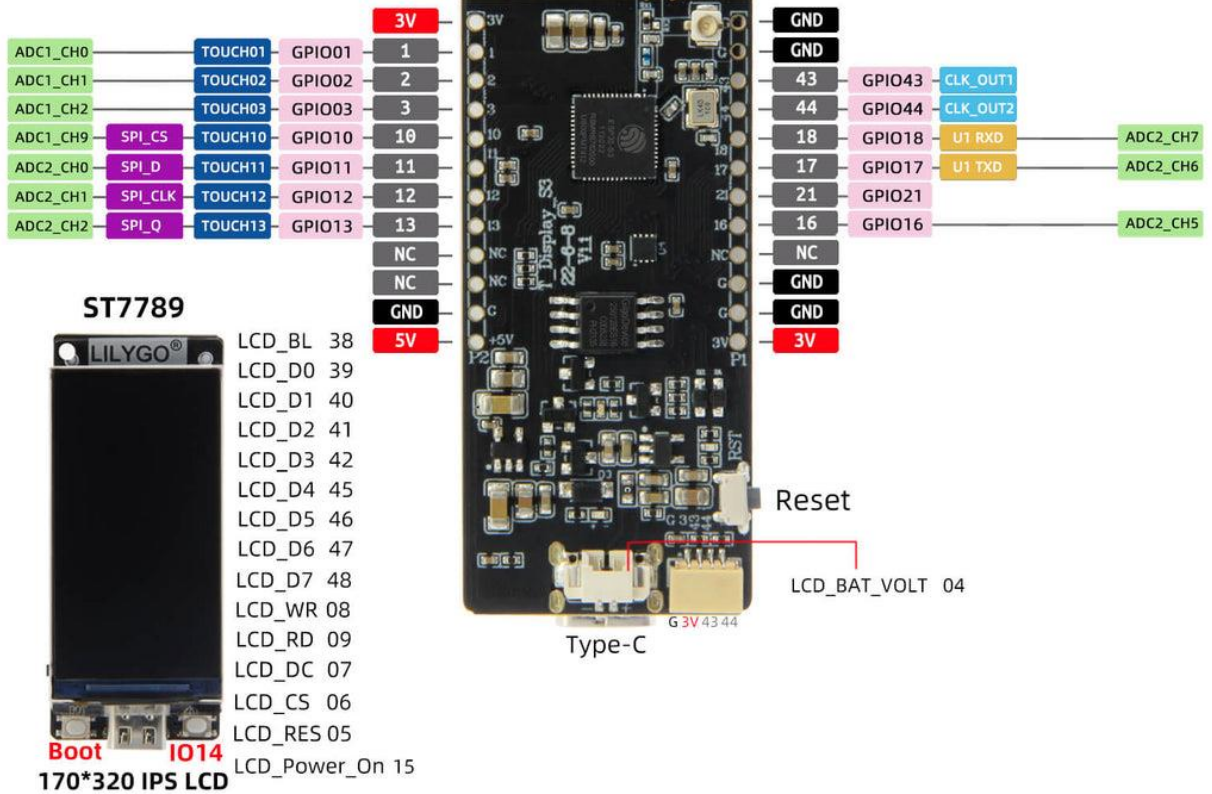
### EXPERIMENT 3  (3 points)

Let two TTGO controllers communicate wirelessly. One TTGO is connected to the PSD sensor, the other to the servo. Input from the PSD on the first TTGO should drive the servo on the second TTGO.

# ESP32-S3R8

WiFi + BLE                                    FLASH:16MB

| ADC1_CH0 | | TOUCH01 | GPIO01 | 1 |
| ADC1_CH1 | | TOUCH02 | GPIO02 | 2 |
| ADC1_CH2 | | TOUCH03 | GPIO03 | 3 |
| ADC1_CH9 | SPI_CS | TOUCH10 | GPIO10 | 10 |
| ADC2_CH0 | SPI_D | TOUCH11 | GPIO11 | 11 |
| ADC2_CH1 | SPI_CLK | TOUCH12 | GPIO12 | 12 |
| ADC2_CH2 | SPI_Q | TOUCH13 | GPIO13 | 13 |

3V

| GND |
| GND |
| 43 | GPIO43 | CLK_OUT1 |
| 44 | GPIO44 | CLK_OUT2 |
| 18 | GPIO18 | U1 RXD | ADC2_CH7 |
| 17 | GPIO17 | U1 TXD | ADC2_CH6 |
| 21 | GPIO21 |
| 16 | GPIO16 | ADC2_CH5 |

NC
NC
GND
5V

NC
GND
3V

## ST7789

LCD_BL    38
LCD_D0    39
LCD_D1    40
LCD_D2    41
LCD_D3    42
LCD_D4    45
LCD_D5    46
LCD_D6    47
LCD_D7    48
LCD_WR    08
LCD_RD    09
LCD_DC    07
LCD_CS    06
LCD_RES 05
LCD_Power_On 15

LILYGO®

Boot        IO14
170*320 IPS LCD

Reset

LCD_BAT_VOLT  04

Type-C

G 3V 43 44

# LILYGO T-Display ESP32-S3
## 1.9 inch ST7789 Resolution 170*320 TFT IPS LCD