

# Embedded Systems

## ELEC3020

<b>Lab Assignment 4 – Microcontroller Decision Circuit</b>	<b>Points: 10</b>
--	-------------------

**TEAMS:** This lab will be conducted in teams of 2 students

**EQUIPMENT:** Breadboard  
Power supply with cable (own laptop)  
Wires, LEDs, resistors  
TTGO controller

### EXPERIMENT 1 (4 points)

#### Which button was pressed first?

Two players, A and B have a push button in front of them. After a signal from the referee, both players try to push their button first. The system should record the first button push and display the player's number. Subsequent button pushes should be ignored.

Use the controller's two input buttons for player A and B.  
Use the controller's reset button for resetting the application.

*If input A goes from 0 to 1 first, then display 'A' on LCD (and stay there) and output  $01_2$  on two digital pins (visualize with LEDs).*

*If input B goes from 0 to 1 first, then display 'B' on LCD (and stay there) and output  $10_2$  on the digital pins.*

### EXPERIMENT 2 (3 points)

#### Game Mode – Two Players

1. After pressing the controller's reset button, use a *random* function to generate a random number in the range of [10..50].
2. Let the controller do a wait loop of random length within 1.0–5.0 seconds
3. Display "GO" on the LCD to signal the start of the game.
4. If any button was pressed **before** game start, display "Disq. A" for disqualification of A or "Disq. B" for disqualification of B.
5. Once a button was pressed **after** game start, record and display the winner as "A" or "B".
6. Any subsequent button pushes must not change the result or the display.

### EXPERIMENT 3 (3 points)

#### Game Mode – Single Player – Reaction Timer

1. After pressing the controller's reset button, use a *random* function to generate a random number in the range of [10..50].
2. Let the controller do a wait loop of random length within 1.0–5.0 seconds
3. Display "GO" on the LCD to signal the start of the game.
4. If any button was pressed **before** game start, display "Disqualified"
5. After game start, display a running timer with tens and hundredth of a second while monitoring button presses.
6. Once a button was pressed (after game start), stop the timer.  
(Any subsequent button pushes must not change the result or the display).

