



MICROS PERIPHERALS & INTERFACES ASSIGNMENT

Assignment



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	<u>Page</u>
<u>Introduction</u>	1
<u>Programme</u>	1
<u>Flow chart</u>	<u>6</u>
<u>Step-by-step of the programme</u>	<u>7</u>
<u>Challenges I faced</u>	<u>7</u>
<u>Strengths of my design</u>	<u>8</u>

Micros Peripherals & Interfaces Assignment

Introduction

In this assignment I will show all the skills and techniques that I have learnt throughout the duration of this topic and the software and terminology that we have been using within our studying. I will show the way to programme the software to create what you whatever you want the programme to do, this year we have used the TinkerCAD software to create our programmes and used the software to create the programme for this assignment, I will hopefully create a programme that is successful and shows my knowledge of the topic.

```
#include <Stepper.h>
```

```
const int button = 2;
```

```
const int sensor1 = 3;
```

```
const int sensor2 = 4;
```

```
const int green = 6;
```

```
const int red = 5;
```

```
const int FULL_SIGN = 7;
```

```
const int stepsPerRevolution = 200; // change this to fit the number of steps per revolution for your motor
```

```
unsigned int fullpark = 3; // max amount of cars
```

```
int cars = 0; //holds number of cars in car park
```

```
int x = 0;
```

```
int outsense = 0;  
int storedSensor2 = 0;
```

```
Stepper myStepper(stepsPerRevolution, 8, 11, 12, 13); // initialize the stepper library on pins 8  
through 11:
```

```
void setup() {  
  myStepper.setSpeed(60); // set the speed at 60 rpm:  
  Serial.begin(9600); // initialize the serial port:  
  pinMode(button, INPUT);  
  pinMode(sensor1, INPUT);  
  pinMode(sensor2, INPUT);  
  pinMode(green, OUTPUT);  
  pinMode(red, OUTPUT);  
  pinMode(FULL_SIGN, OUTPUT);
```

```
}
```

```
void loop() {
```

```
if (cars < fullpark){
```

```
if(digitalRead(button)==1){
```

```
myStepper.step(stepsPerRevolution/4);
```

```
digitalWrite(red, HIGH);
```

```
Serial.print("Raising barrier\n");
```

```
delay(1000);
```

```
digitalWrite(green, HIGH);
```

```
digitalWrite(red, LOW);
```

```
do
```

```
{
```

```
delay(50); // wait for sensors to stabilize
```

```
x = digitalRead(sensor1); // check sensor1
```

```
} while (x < 1);
```

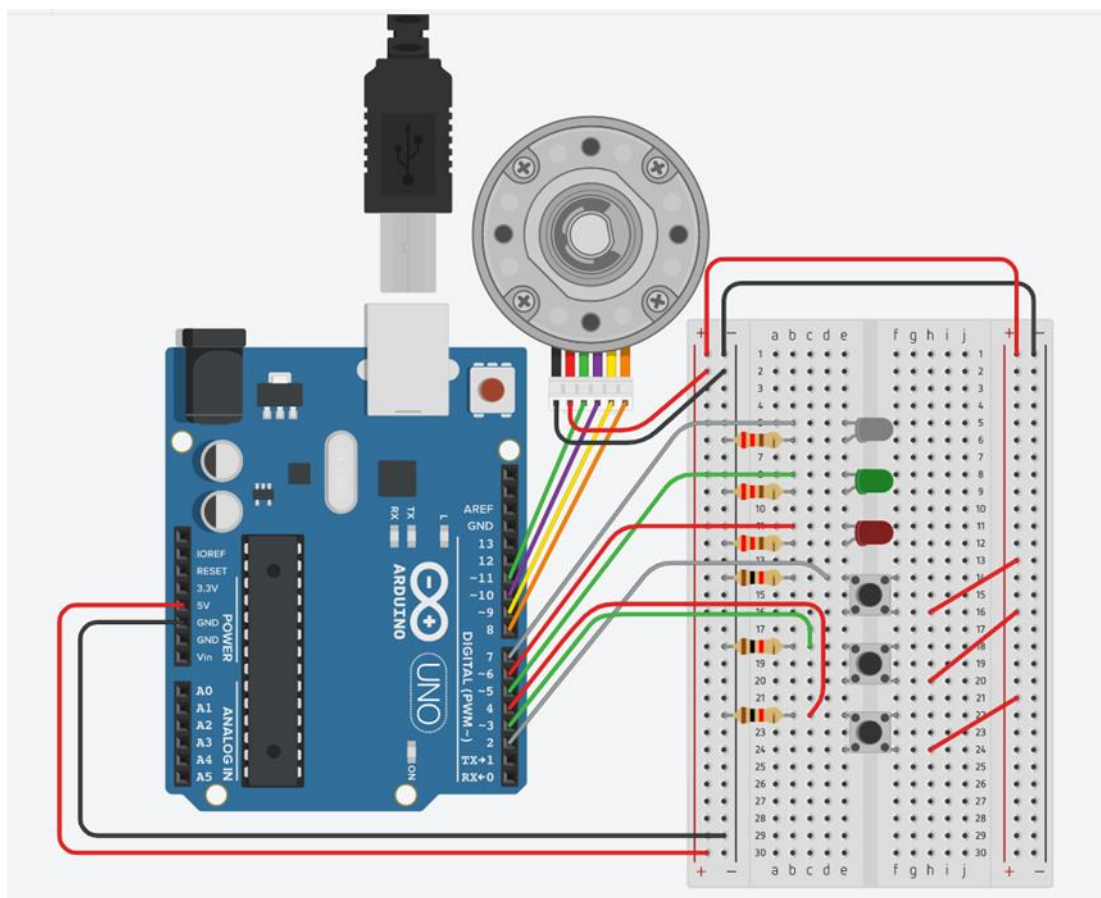
```
Serial.print("Lowering barrier\n");
myStepper.step(-stepsPerRevolution/4);
digitalWrite(green, LOW);
digitalWrite(red, HIGH);
cars++; //increase the number of cars in the car park
delay(500);
Serial.print("The count is now ");
Serial.println(cars);

}

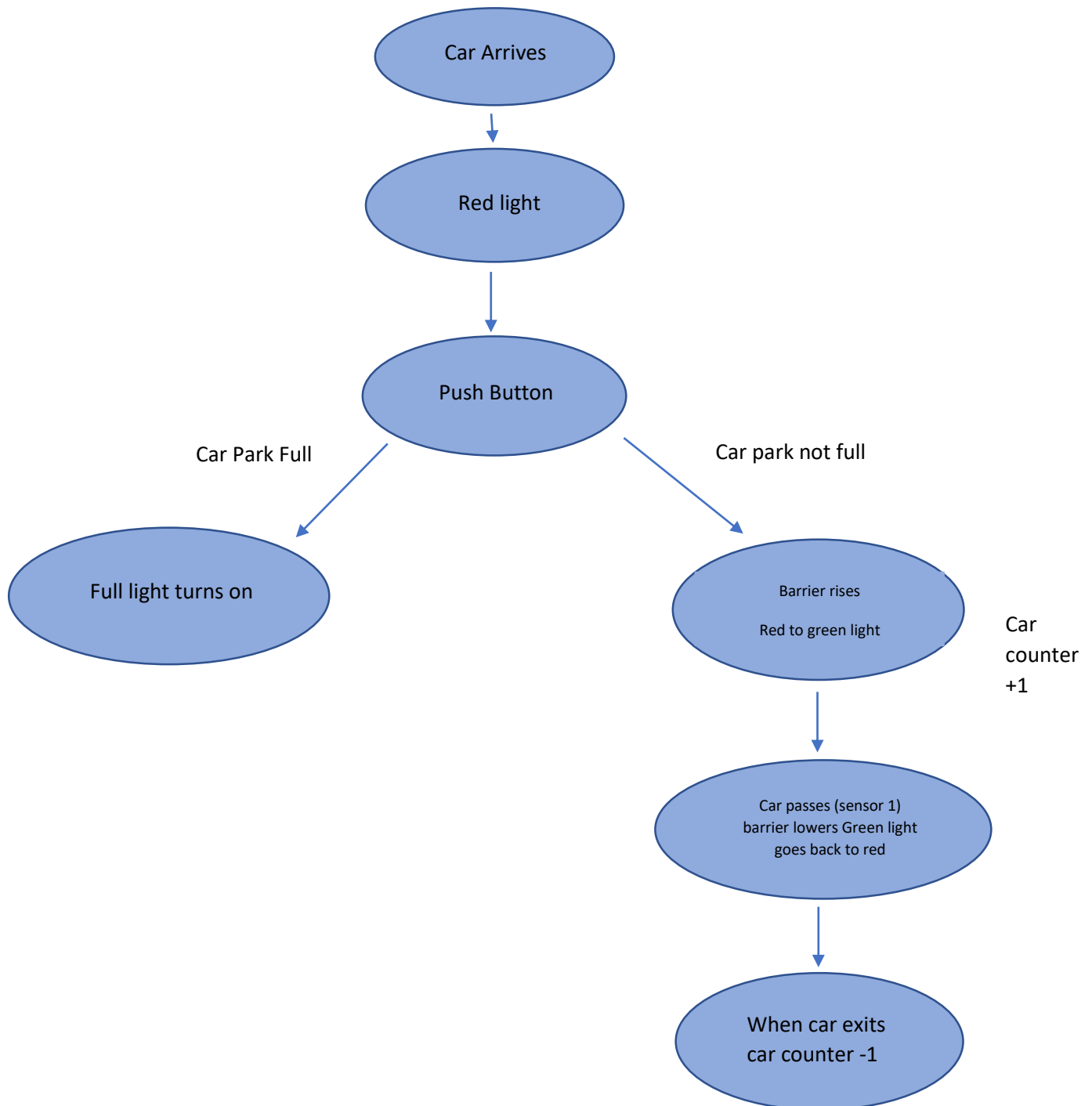
{
outsense = digitalRead(sensor2); // see if car is leaving

if(outsense == 1){
if (storedSensor2 == 0) {
cars--;
Serial.print("The count is now ");
Serial.println(cars);
digitalWrite(FULL_SIGN, LOW);
}
}
storedSensor2 = outsense;
}
```

```
if (cars == fullpark){  
  delay(300);  
  digitalWrite(FULL_SIGN, HIGH);  
  digitalWrite(red, HIGH);  
  Serial.println("Sorry, The car park is full\n");  
  delay(300);  
}  
}
```



Flow Chart



Step-by-Step of the Programme

The programme I have written is for a car park, the step by step of the programme would be ,

The car arrives a red light will appear, There is a maximum number of spaces for the car park which is 255 if this is reached then the programme will make the Car park Full light to come on which is the grey light, if the car park is not full then the programme will skip that code for the full light to come on, the red light will go low then the barrier will raise, then the green light will come on for the car to enter the car park, then sensor 1 will sense the car coming past and will indicate that the car has past the barrier and that will cause the programme both +1 to the car counter for the car park, it will also lower the barrier and then place a red light on again so the whole programme can be set ready for the next car to enter the car park.

Then when a car exits the car park it will cause sensor 2 to make the exit barrier raise, then the car can exit the car park and it will cause the car counter for the car park to -1 from the counter.

Challenges I faced

When creating the programme I faced a few challenges due to my lack of knowledge when we started the assignment, but as I went through the assignment I gained a better understanding of the programme and the software also the topic as a whole because at the start of learning this topic I was a blank sheet and had no prior knowledge of microprocessors or writing programmes and I believe I have come on a lot but I faced a lot of errors when doing the assignment here is a few of them.

When writing the programme, I had no idea how to shape and create the programme write so I kept on writing the incorrect word or including the wrong symbol which meant when I went on to test my programme I kept on getting a lot of error messages which was a hindrance and I kept on getting stuck but as I was learning from my mistakes and errors I learnt more and more which meant I reduced the amount of errors I did and meant I could complete the programme and meant the programme was a success and ran correctly.

Another challenge I faced was where the wires should go and if they are in the correct place the like when connecting the Arduino to the breadboard I had no clue on where the wires went so I had to connect it to where I thought it might go the test it and see if the wire was in the correct place but once I did this I had a bit of knowledge on where the wires might go and I then proceeded on to connect up the rest of the breadboard to the Arduino and as I went on it got easier due to me having more and more knowledge as I advanced throughout connecting the Arduino to the breadboard but when I connected the + wires to the sensors and buttons I first of all placed the wires to the top of the sensors but when I tested the programme the sensors did not work so I had to trail and error and then I came on the conclusion that the wires were connecting to the wrong part of the sensors and buttons but as I went on throughout the assignment I gained a better knowledge of the system.

Final challenge I faced was also connecting up wires, but it was when I was connecting up the stepper motor for the barrier I connecting up the wires wrong and connected the wires in the wrong order with the green going to port 8, purple going to port 9, yellow going to port 10 and orange going to port 11 and the red going to the black and black going to the red port but after I went to test the motor and see if it connected correctly to the programme I noticed I connected the motor backwards and would mean that it would definitely not follow the programme, but it was my fault and my error because I did not correctly connect the component and did not notice my error but I then stopped the testing and wired up the stepper motor correctly and when I went to test the motor it followed the programme correctly and operated when the barrier needed raising or lowering.

When progressing throughout this assignment I have faced a lot of challenges, but I have faced them and tried to overcome them and also learnt from them which meant I could progress through the assignment and eventually complete the assignment and meant the programme was successful and operated correctly but I believe that the challenges I faced meant I gained a better knowledge and meant I had a better understanding of the system and topic.

Strengths of my Design

I believe there is a lot of strengths in my design but I believe my major strength of my design was when I decided to add a stepper motor to the programme, the stepper motor operates the movement of the barrier and the step up for the barrier to rise and then lower once the car has passed, I believe this was a key idea because it was a suggestion in the brief to add once but you could of decided to add another motor for the barrier but I believe that I should go with the suggestion of the assignment to make sure I followed the brief to ever last detail. in my design I do not believe there was any other strengths of it because that would suggest that the design could be improved which I believe would reduce the output and the success of my design so believe that the rest of the design was the best that we can currently create the design from and believe it was a success.