جامعة القاهرة الجديدة التكنولوجية NCT NEW CAIRO TECHNOLOGICAL UNIVERSITY

| Sub. | Re-Sub |
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| LOs | LO1 | | LO2 | |
|---|---|---|---|---|
| Sub | | | | |
| Resub | P | Not Achieved | P | Not Achieved |

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|---|---|---|---|---|---|
| Student Name | محمد بنداري صابر بنداري علي | Code | 20241666 | Section | 4 |
| Unit No. & Title | ICT - D – 315 (Microprocessor)<br>ICT - N – 315 (Microprocessor) | | Microprocessors | | |
| Qualification | Bachelor of Technology in Information and Communications Technology (ICT) (S/W development Track and Network Track) (Y3). | | | | |
| | | | | | |
| Assignment No. | 1 | | Assessor Name | Dr. Usama Tharwat | |
| Evidence | Document | | IV Name | Associate Prof Dr. Sahar | |
| Hand out date | 29-12-2024 | | Hand in date | 6-12-2024 | |

| Targeted LO | Targeted criteria | Criteria achieved | Assessment comments |
|---|---|---|---|
| LO1 | Pass | | |
| | Merit | | |
| | Distinction | | |
| LO2 | Pass | | |
| | Merit | | |
| | Distinction | | |
| Assessor Signature: | | | |

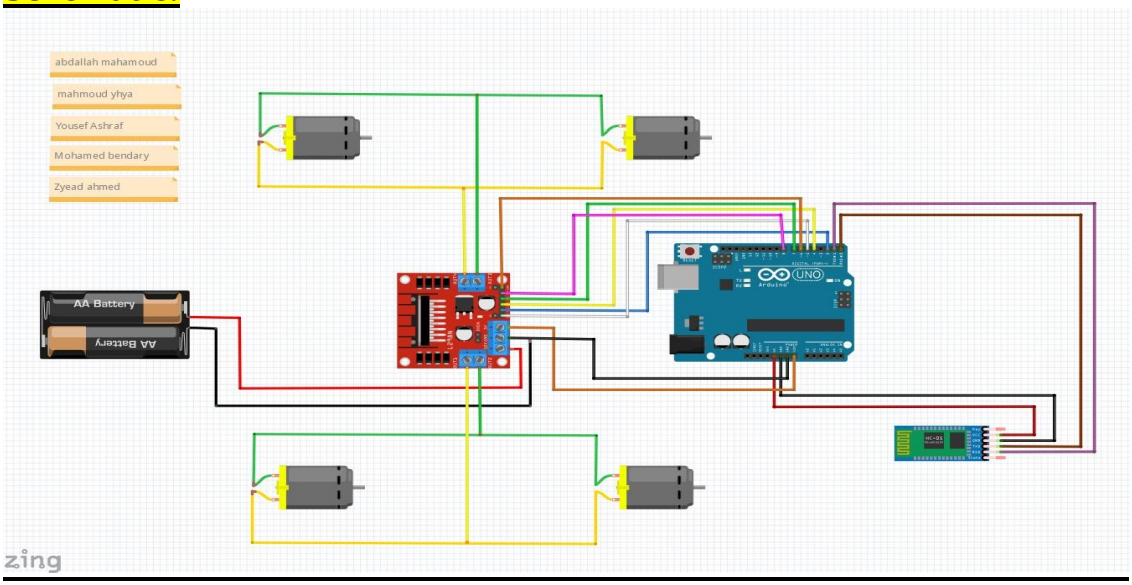
| Criteria reference | Targeted criteria | To achieve the criteria the evidence must show that the student is able to: | Evidence | Page numbers |
|---|---|---|---|---|
| LO1 Understand how to design microcontroller-based control circuits using various sensors and actuators | Pass | **P1** Explain the main components and working principals of microprocessor and microcontroller and their differences.<br>**P2** Illustrate the Arduino open source prototyping kit<br>**P3** Explore Arduino sensors and actuators. | Document | |
| | Merit | **M1** Figure out the main requirements of microcontroller-based control circuit<br>**M2** critically analyse the pin assignment and needed operational conditions for various Arduino sensors (such as LDR, LM35 …etc) and actuators (such as H-bridge). | Document | |
| | Distinction | **D1** Design control circuits for mini-projects according to specific scenarios using Arduino Uno or Mega and real life sensors and actuators; show your design using schematic diagrams. | Hardware | |
| LO2 Design, write, debug and upload diversity of embedded C sketches using Arduino Integrated Development Environment (Arduino) | Pass | **P4** Describe the Arduino Integrated Development Environment (IDE).<br>**P5** State the structure of sketch using embedded C language for ATmega microcontroller in Arduino IDE.<br>**P6** Describe the different embedded C language commands for programming the ATmega microcontroller in Arduino IDE. | Document | |
| | Merit | **M3** Design algorithms or draw flowcharts for different mini-projects based on ATmega microcontroller (mounted on Arduino kit). | Document | |
| | Distinction | **D2** Implement (compile, debug, upload and test) different mini-projects using Arduino Uno or Mega. | Hardware and software | |
| "I certify that this assignment is my own work, written in my own words. Any other person's work included in my assignment is referenced / acknowledged". | | | | |

| IV Signature: | Learner's signature: | Date: |
|---|---|---|

## The Algorithm:

Start.
Initialize pins:
Set in1, in2, in3, in4, ena, enb as output.
Begin serial communication at 9600 baud rate.
Set initial values:
Initialize variable i = 2.
Initialize variable t = NULL.
Enter main loop:
4.1. Call speed1() to set motor speed using PWM.
4.2. Check if serial data is available:
- If true, read the data into variable t.
4.3. Use t to determine action:
- If t == 'F': Call forward() to move motors forward.
- If t == 'B': Call reverse() to move motors backward.
- If t == 'L': Call Tleft() to turn left.
- If t == 'R': Call Tright() to turn right.
- If t == 'S': Stop all motors by setting all control pins to LOW.
Functions used:
forward(): Set motor pins for forward movement.
reverse(): Set motor pins for backward movement.
Tleft(): Set motor pins to rotate left.
Tright(): Set motor pins to rotate right.
speed1(): Adjust motor speed using analogWrite() and divide PWM (255) by variable i.
Repeat steps in the loop continuously.
End.

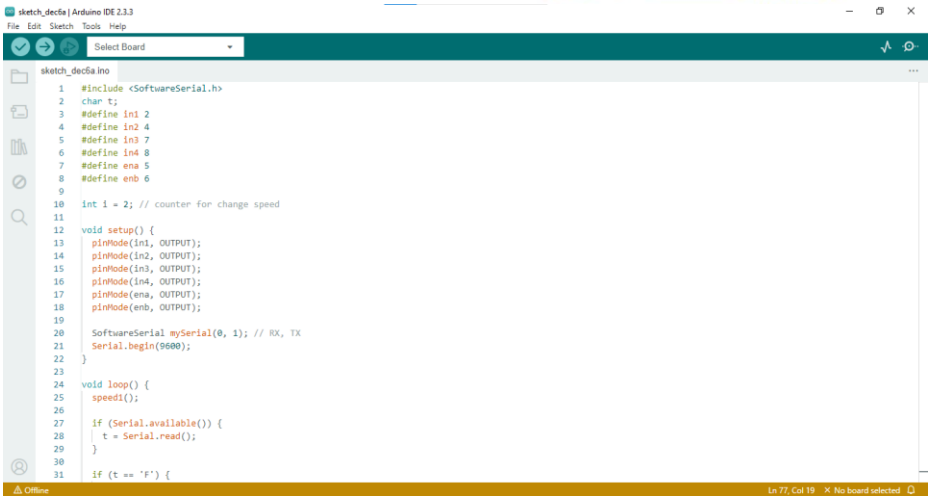
## Schematic:

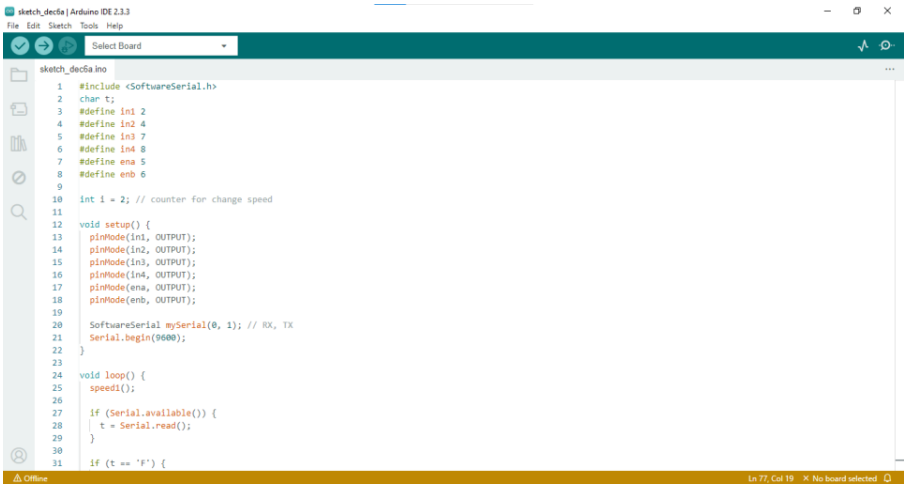


**Code:**

```
#include <SoftwareSerial.h>
char t;
#define in1 2
#define in2 4
#define in3 7
#define in4 8
#define ena 5
#define enb 6

int i = 2; // counter for change speed

void setup() {
  pinMode(in1, OUTPUT);
  pinMode(in2, OUTPUT);
  pinMode(in3, OUTPUT);
  pinMode(in4, OUTPUT);
  pinMode(ena, OUTPUT);
  pinMode(enb, OUTPUT);

  SoftwareSerial mySerial(0, 1); // RX, TX
  Serial.begin(9600);
}

void loop() {
  speed1();

  if (Serial.available()) {
    t = Serial.read();
  }

  if (t == 'F') {
    forward();
  } else if (t == 'B') {
    reverse();
  } else if (t == 'L') {
    Tleft();
  } else if (t == 'R') {
    Tright();
  } else if (t == 'S') {
    digitalWrite(in1, LOW);
```

```
  digitalWrite(in2, LOW);
  digitalWrite(in3, LOW);
  digitalWrite(in4, LOW);
 }
}

void forward() {
 digitalWrite(in1, LOW);
 digitalWrite(in2, HIGH);
 digitalWrite(in3, LOW);
 digitalWrite(in4, HIGH);
}

void reverse() {
 digitalWrite(in1, HIGH);
 digitalWrite(in2, LOW);
 digitalWrite(in3, HIGH);
 digitalWrite(in4, LOW);
}

void Tleft() {
 digitalWrite(in1, LOW);
 digitalWrite(in2, HIGH);
 digitalWrite(in3, HIGH);
 digitalWrite(in4, LOW);
}

void Tright() {
 digitalWrite(in1, HIGH);
 digitalWrite(in2, LOW);
 digitalWrite(in3, LOW);
 digitalWrite(in4, HIGH);
}

void speed1() {
 analogWrite(ena, 255 / i);
 analogWrite(enb, 255 / i);
}
```


sketch_dec6a | Arduino IDE 2.3.3
File Edit Sketch Tools Help
Select Board
sketch_dec6a.ino
#include <SoftwareSerial.h>
char t;
#define in1 2
#define in2 4
#define in3 7
#define in4 8
#define ena 5
#define enb 6
int i = 2; // counter for change speed
void setup() {
pinMode(in1, OUTPUT);
pinMode(in2, OUTPUT);
pinMode(in3, OUTPUT);
pinMode(in4, OUTPUT);
pinMode(ena, OUTPUT);
pinMode(enb, OUTPUT);
SoftwareSerial mySerial(0, 1); // RX, TX
Serial.begin(9600);
}
void loop() {
speed1();
if (Serial.available()) {
t = Serial.read();
}
if (t == 'F') {
Offline
Ln 77, Col 19
No board selected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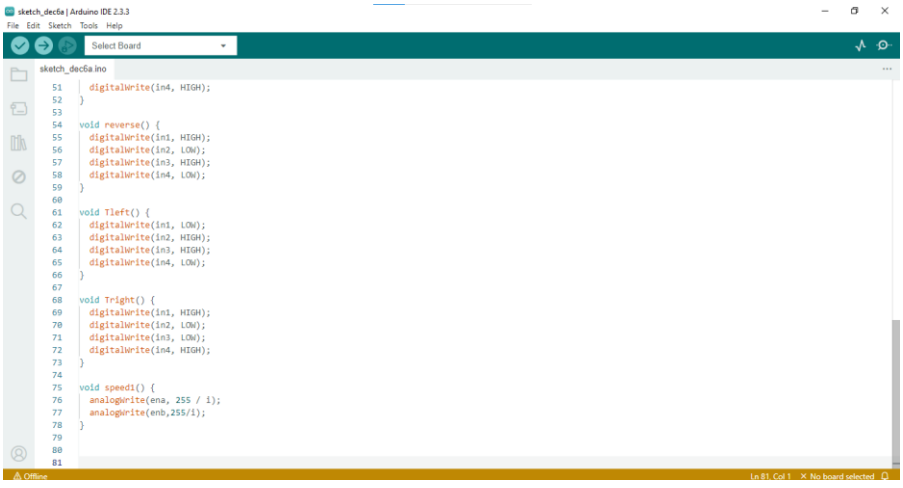
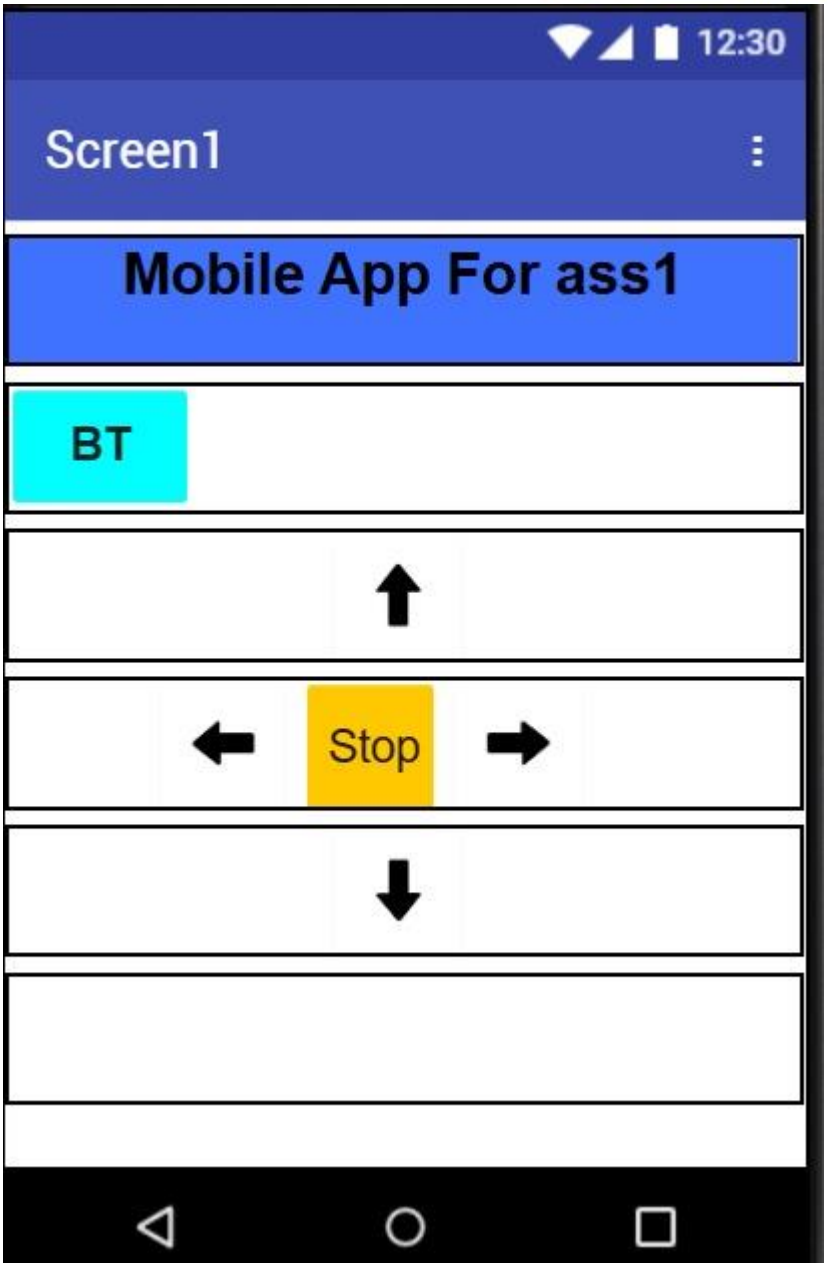
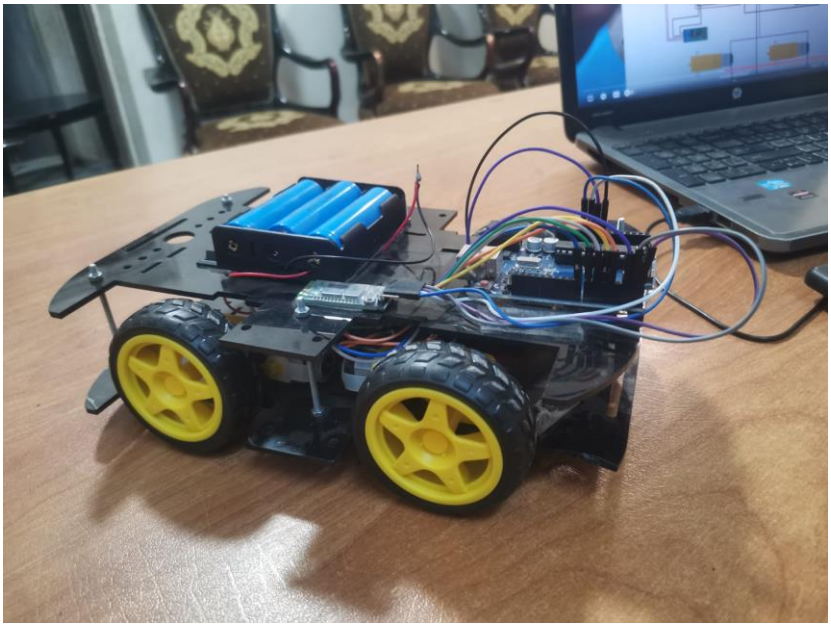
Serial.begin(9600);
}
void loop() {
speed1();
if (Serial.available()) {
t = Serial.read();
}
if (t == 'F') {
Offline
Ln 77, Col 19
No board selected


sketch_dec6a | Arduino IDE 2.3.3
File Edit Sketch Tools Help
Select Board
sketch_dec6a.ino
digitalWrite(in4, HIGH);
}
void reverse() {
digitalWrite(in1, HIGH);
digitalWrite(in2, LOW);
digitalWrite(in3, HIGH);
digitalWrite(in4, LOW);
}
void Tleft() {
digitalWrite(in1, LOW);
digitalWrite(in2, HIGH);
digitalWrite(in3, HIGH);
digitalWrite(in4, LOW);
}
void Tright() {
digitalWrite(in1, HIGH);
digitalWrite(in2, LOW);
digitalWrite(in3, LOW);
digitalWrite(in4, HIGH);
}
void speed1() {
analogWrite(ena, 255 / i);
analogWrite(enb,255/i);
}
Offline
Ln 81, Col 1
No board selected


12:30
Screen1
Mobile App For ass1
BT
Stop



WhatsApp Video 2024-12-06 at 20.14.30_ab8f7a0e.mp4