Faculty of Engineering

B.Eng. in Software Engineering

Microprocessor & Interfacing

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Introduction

At this present time, the condition of the people's mindset about disposing trash is fairly sad. In fact, there are still many people who don't care about the environment. The condition of the garbage facility is lacking in terms of quality and quantity, and the mindset of the people who still consider the most practical waste disposal by letting it lie on the roadside or dumping it into the river.

Smart Trash Bin will solve the problem. Smart Bins help to create a cleaner, safer, more hygienic environment and enhanced operational efficiency while reducing management costs, resources, and road-side emissions.

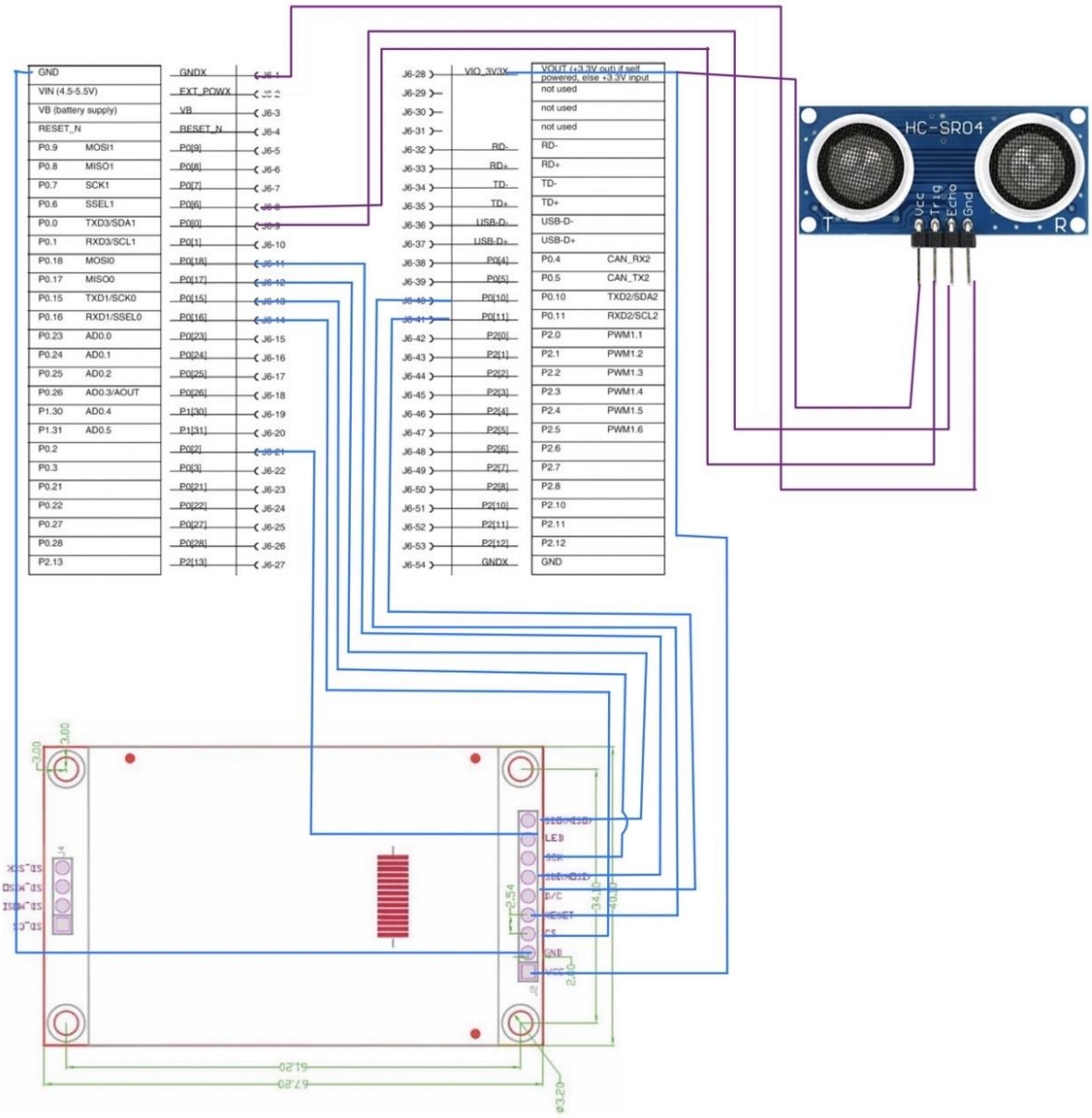
System Overview

The research on smart trash bin models consists of using Internet of Things (IoT) technology and ultrasonic sensor to measure the level of trash in percentage which will tell when it is full on the LCD screen.

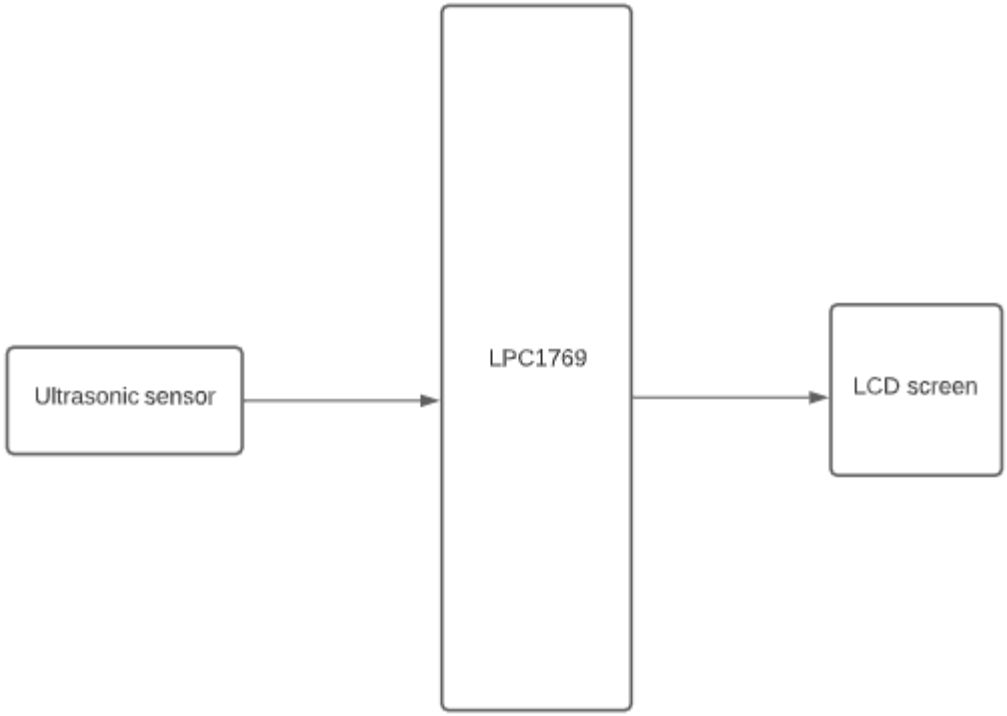
Hardware

- LPCXpresso LPC1769
- LCD screen
- Ultrasonic sensor HC-SR04
- Bread board

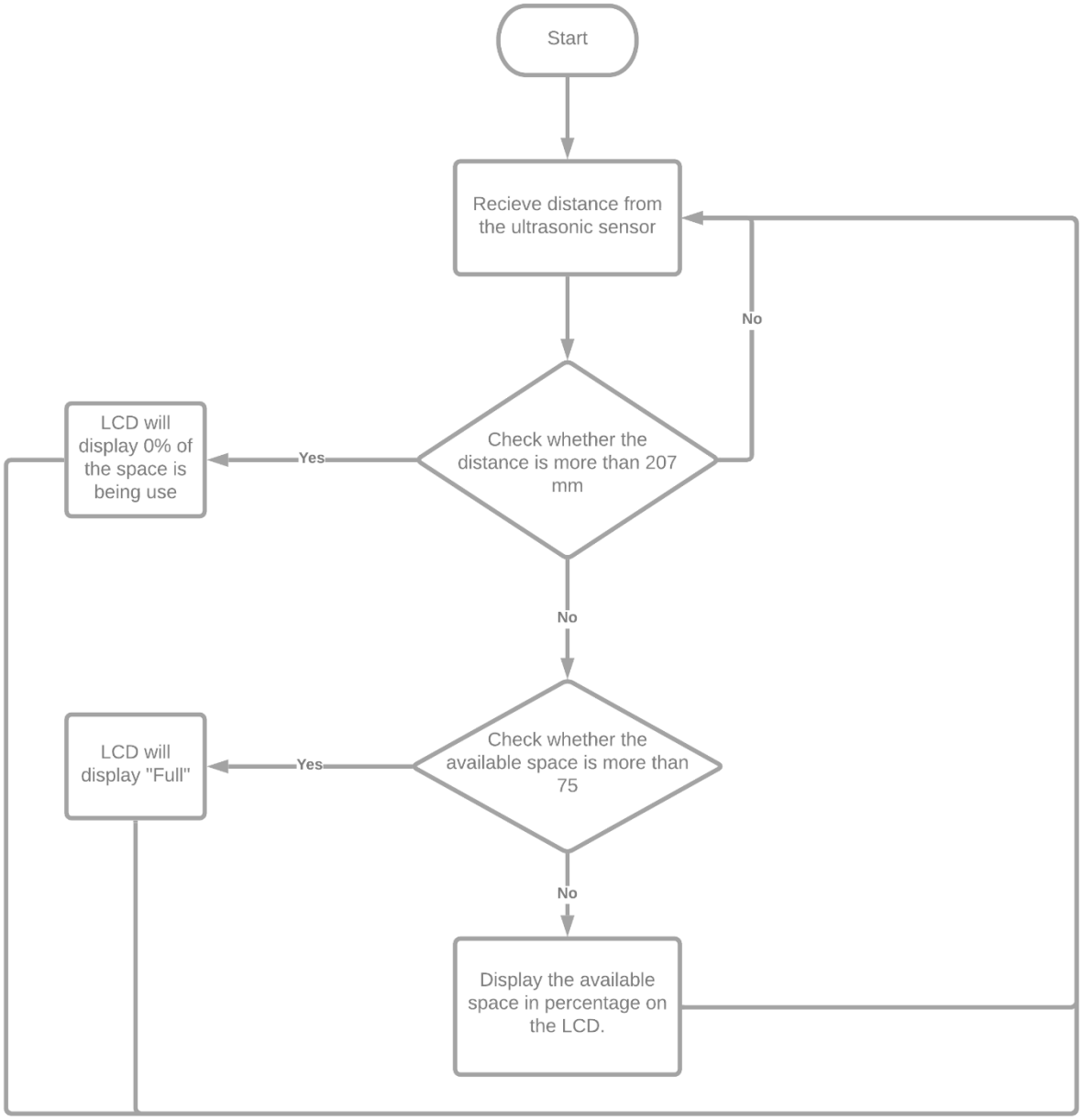
Schematic Diagram & Block Diagram



Block Diagram



Flowchart


Start
Recieve distance from the ultrasonic sensor
Check whether the distance is more than 207 mm
No
Yes
LCD will display 0% of the space is being use
No
Check whether the available space is more than 75
Yes
LCD will display "Full"
No
Display the available space in percentage on the LCD.

Libraries

```
#include <stdio.h>
#include "mbed.h"
#include "SPI_TFT_ILI9341.h"
#include <string>
#include "Arial12x12.h"
#include "Arial24x23.h"
#include "Arial28x28.h"
#include "font_big.h"
#include "ultrasonic.h"
```

Code

```
#include <stdio.h>
#include "mbed.h"
#include "SPI_TFT_ILI9341.h"
#include <string>
#include "Arial12x12.h"
#include "Arial24x23.h"
#include "Arial28x28.h"
#include "font_big.h"
#include "ultrasonic.h"

SPI_TFT_ILI9341 TFT(P0_18, P0_17, P0_15, P0_16, P0_10, P0_11,"TFT"); // mosi, miso, sclk, cs, reset, dc
DigitalOut LCD_LED(P0_2);

void dist(int distance)
{
    int space = ((207.0 - distance)/207.0) * 100.0;
    //put code here to happen when the distance is changed
    LCD_LED = 1; // backlight on
    TFT.claim(stdout);
    TFT.background(Black);
    TFT.foreground(White);
    TFT.set_orientation(1);
    TFT.cls();
    if(distance > 207){
        TFT.set_font((unsigned char*) Arial24x23);
        TFT.locate(0,100);
        TFT.printf(" 0 %%");
    }

    else if(space > 75){
        TFT.set_font((unsigned char*) Arial24x23);
        TFT.locate(0,100);
        TFT.printf("Full", space);
        }

    else{
        TFT.set_font((unsigned char*) Arial24x23);
        TFT.locate(0,100);
        TFT.printf("%d %%", space);
    }

}
```

```
45 ultrasonic mu(P0_6, P0_0, .1, 1, &dist);    //Set the trigger pin to P0_6 and the echo pin to P0_0
46                                             //have updates every .1 seconds and a timeout after 1
47                                             //second, and call dist when the distance changes
48
49 int main()
50 {
51     mu.startUpdates();//start measuring the distance
52     while(1)
53     {
54         mu.checkDistance();     //call checkDistance() as much as possible, as this is where
55                                 //the class checks if dist needs to be called.
56     }
57 }
```

Improvement

We will make the bin door open automatically when the ultrasonic sensor can detect someone nearby using servo motor to power the servo leg to open the bin's door.

Conclusion

The project uses the knowledge we have learnt from the lecture and lab. We also get to work in a team and create new useful things. We also experience many errors during work but eventually we find the right solution on time.