

CS26020: Experimenting with Sensors

Nathan Williams - naw21

March 4, 2018

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1 INTRODUCTION

1.1 Purpose of this Document

This document shows and discusses the result of experimenting with the IRSensors and Encoders on the Formula AllCode robots[1] and the in-robot API[2]

1.2 Objectives

- Collect Infrared Sensor data.
- Collect Encoders data
- Visualize the data.
- Analyze and discuss the data.

2 Infrared Sensors

2.1 Programming

To get the Sensor reading from the robot I wrote a function to display the data on screen.

```
void IRSensors() {
    double IRDataSum[8] = {0,0,0,0,0,0,0,0};
    int j;
    for(j =0;j <10;j++){
        int i;
        for(i =0;i <8;i++){
            IRDataSum[i]=IRDataSum[i]+FA_ReadIR(i);
        }
    }
    double IRDataAverage[8];
    int i;
    for(i =0;i <8;i++){
        IRDataAverage[i]=IRDataSum[i]/10.0;
        if (IRDataAverage[i]>600) {
            FA_LEDOn(i);
        } else {
            FA_LEDOff(i);
        }
    }
    FA_LCDClear();
    FA_LCDNumber(IRDataAverage[IR_RIGHT],0,12,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_REAR_RIGHT],0,1,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_REAR],40,1,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_REAR_LEFT],80,1,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_LEFT],80,12,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_FRONT_LEFT],80,20,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_FRONT],40,20,FontNormal,LCD_OPAQUE);
    FA_LCDNumber(IRDataAverage[IR_FRONT_RIGHT],0,20,FontNormal,LCD_OPAQUE);
    FA_DelayMillis(100);
}
```

2.2 Data Acquisition

2.3 Data Captured

2.4 Data Visualised

2.5 Discussion

3 Encoders

3.1 Programming

```
void encodersDataGathering(int power){
    FA_SetMotors(power, power);
    FA_DelayMillis(500 + power*10);
    int i;
    for(i = 0, i < 5, i++){
        FA_ResetEncoders();
        FA_DelayMillis(1000);
        FA_LCDNumber(FA_ReadEncoder(1), 20*power,
                     1, FONT_NORMAL, LCD_OPAQUE);
        FA_LCDNumber(FA_ReadEncoder(0), 20*power,
                     12, FONT_NORMAL, LCD_OPAQUE);
    }
}

int main(){
    FA_RobotInit();
    FA_LCDBacklight(50);
    int power = 0;

    while(1){
        if(FA_ReadSwitch(0)){
            FA_LCDClear();
            encodersDataGathering(power);
        }
        if(FA_ReadSwitch(1)){
            power++;
            FA_DelayMillis(200);
        }
    }
}
```

3.2 Data Acquisition

3.3 Data Captured

3.4 Data Visualised



3.5 Discussion

References

- [1] *Formula AllCode Robot* <https://www.matrixtsl.com/allcode/formula/>
- [2] *in-robot API* allcode_api.h & allcode_api.o Pete Todd & Laurence Tyler 1.1