CS26020: Experimenting with Sensors

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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,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_REAR_RIGHT],0,1,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_REAR] 40,1,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_REAR_LEFT],80,1 ,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_LEFT],80,12,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_FRONT_LEFT],80,20,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_FRONT],40,20,FONT_NORMAL,LCD_OPAQUE);
 FA_LCDNumber(IRDataAverage[IR_FRONT_RIGHT],0,20,FONT_NORMAL,LCD_OPAQUE);
 FA_DelayMillis(100);
}
```

2.2 Data Acquistion

2.3 Data Captured

2.4 Data Visualised

2.5 Discussion

3 Encoders

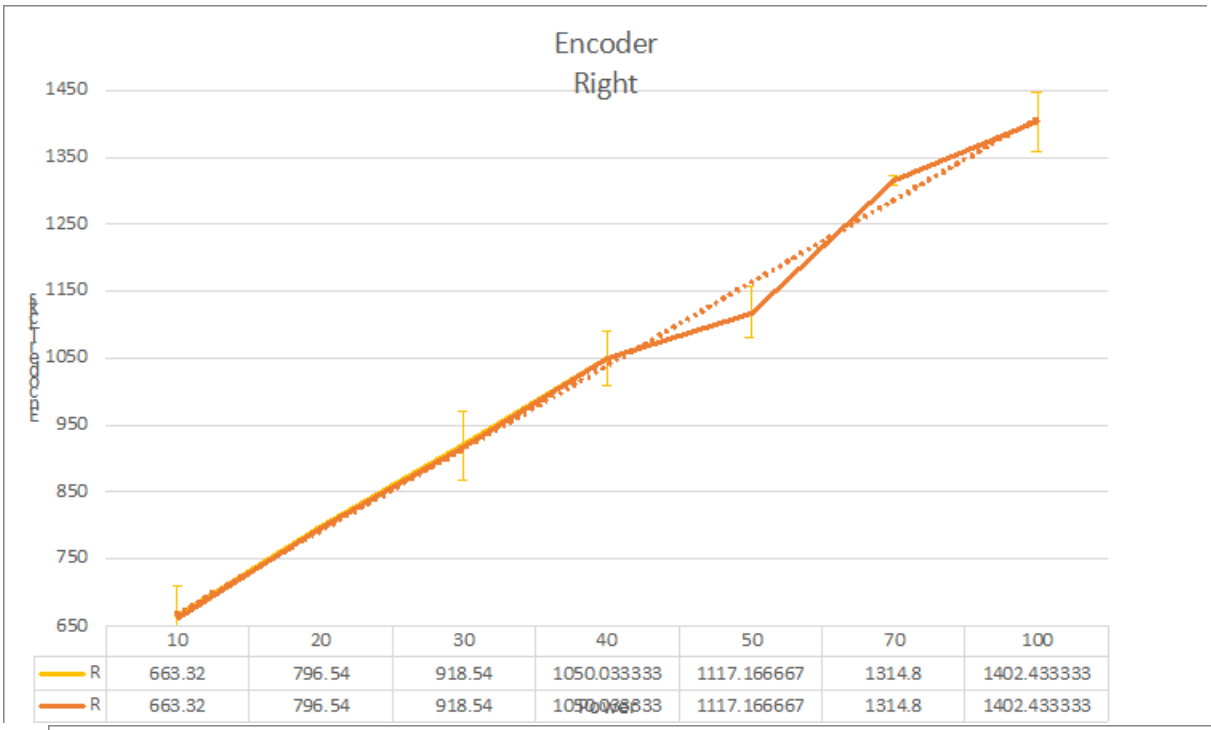
3.1 Programming

```
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(true)){
                        FA_LCDClear();
                        encodersDataGathering(power);
                }
                if(FA_ReadSwitch(true)){
                        power++;
                        FA_DelayMillis(200);
                }
        }
}
```

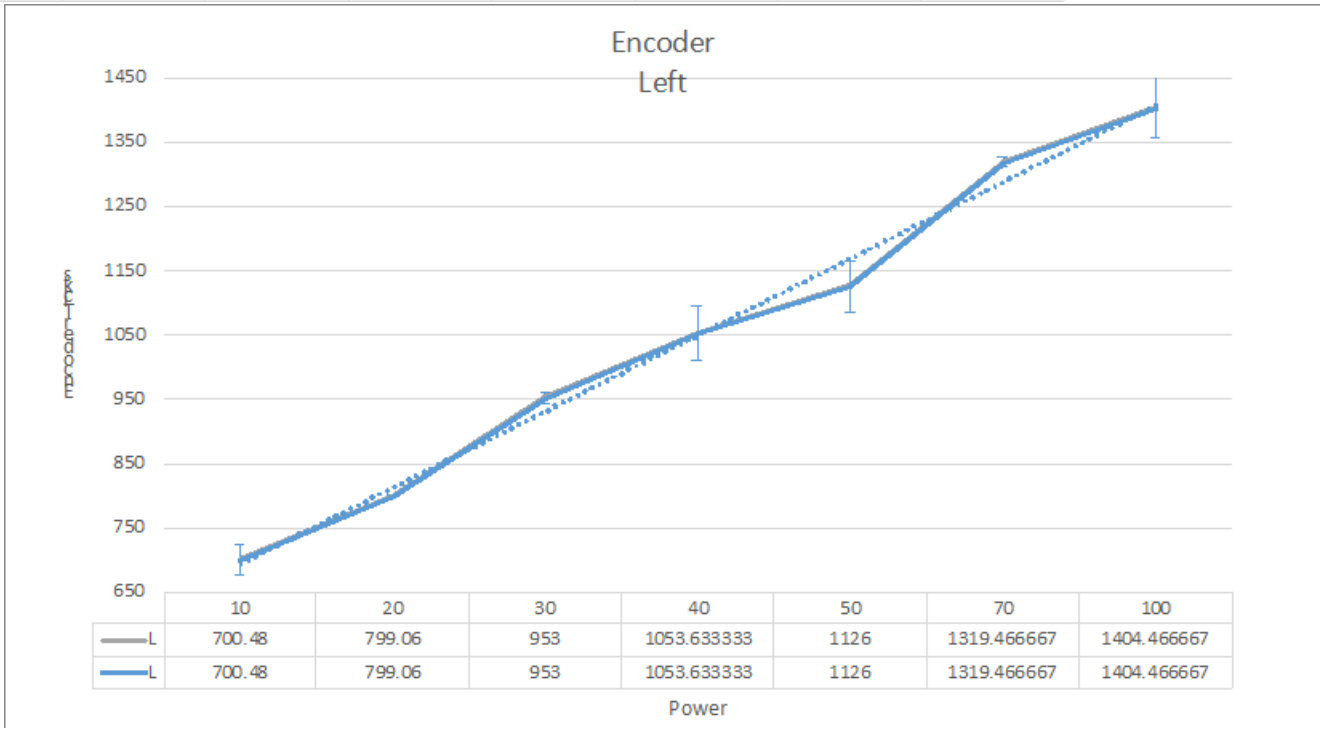
3.2 Data Acquistion

3.3 Data Captured

3.4 Data Visualised



	10	20	30	40	50	70	100
R	663.32	796.54	918.54	1050.033333	1117.166667	1314.8	1402.433333
R	663.32	796.54	918.54	1050.033333	1117.166667	1314.8	1402.433333



	10	20	30	40	50	70	100
L	700.48	799.06	953	1053.633333	1126	1319.466667	1404.466667
L	700.48	799.06	953	1053.633333	1126	1319.466667	1404.466667

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