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ECGR 4161
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Lab6

URL Link: https://youtu.be/rn4lf3dvBJI

The objective of this lab was to be able to use the IR sensors that are on the TI-BOT and have it follow a line that consists of a straight 20 cm line into a ~45 degree turn into another 20 cm straight and stop at a 10 cm perpendicular line.

In this lab, the main focus was to demonstrate the capabilities of the IR sensors that come on the TI-BOT and to demonstrate the ability to use these sensors. While going through the lab, the first hurdle was to figure out how the IR sensors worked and how they use the data received move. Then figuring out how the robot will correct itself if the IR readings were not “correct”, as in if the TI-Bot was not on track, how it will know and how it will correct itself to stay on course.

In conclusion, the lab was to use the IR sensors and to demonstrate how to use it by having the TI-BOT go through a simple course.

Code:

```
#include "SimpleRSLK.h"

uint16_t sensorVal[LS_NUM_SENSORS];
uint16_t sensorCalVal[LS_NUM_SENSORS];
uint16_t sensorMaxVal[LS_NUM_SENSORS];
uint16_t sensorMinVal[LS_NUM_SENSORS];

void setup()
{
        Serial.begin(115200);

        setupRSLK();
        /* Left button on Launchpad */
        setupWaitBtn(LP_LEFT_BTN);
        /* Red led in rgb led */
        setupLed(RED_LED);
        clearMinMax(sensorMinVal,sensorMaxVal);
}

void floorCalibration() {
        /* Place Robot On Floor (no line) */
        delay(2000);
        String btnMsg = "Push left button on Launchpad to begin calibration.\n";
        btnMsg += "Make sure the robot is on the floor away from the line.\n";
        /* Wait until button is pressed to start robot */
        waitBtnPressed(LP_LEFT_BTN,btnMsg,RED_LED);

        delay(1000);
```

```
       Serial.println("Running calibration on floor");
       simpleCalibrate();
       Serial.println("Reading floor values complete");

       btnMsg = "Push left button on Launchpad to begin line following.\n";
       btnMsg += "Make sure the robot is on the line.\n";
       /* Wait until button is pressed to start robot */
       waitBtnPressed(LP_LEFT_BTN,btnMsg,RED_LED);
       delay(1000);

       enableMotor(BOTH_MOTORS);
}

void simpleCalibrate() {
       /* Set both motors direction forward */
       setMotorDirection(BOTH_MOTORS,MOTOR_DIR_FORWARD);
       /* Enable both motors */
       enableMotor(BOTH_MOTORS);
       /* Set both motors speed 20 */
       setMotorSpeed(BOTH_MOTORS,20);

       for(int x = 0;x<100;x++){
              readLineSensor(sensorVal);
              setSensorMinMax(sensorVal,sensorMinVal,sensorMaxVal);
       }

       /* Disable both motors */
       disableMotor(BOTH_MOTORS);
}

bool isCalibrationComplete = false;
void loop()
{
       uint16_t normalSpeed = 10;
       uint16_t fastSpeed = 20;

       /* Valid values are either:
        *  DARK_LINE  if your floor is lighter than your line
        *  LIGHT_LINE if your floor is darker than your line
        */
       uint8_t lineColor = DARK_LINE;

       /* Run this setup only once */
       if(isCalibrationComplete == false) {
              floorCalibration();
              isCalibrationComplete = true;
       }

       readLineSensor(sensorVal);
       readCalLineSensor(sensorVal,
                                   sensorCalVal,
                                   sensorMinVal,
                                   sensorMaxVal,
                                   lineColor);
```

```
      uint32_t linePos = getLinePosition(sensorCalVal,lineColor);

      if(linePos > 0 && linePos < 3000) {
             setMotorSpeed(LEFT_MOTOR,normalSpeed);
             setMotorSpeed(RIGHT_MOTOR,fastSpeed);
      } else if(linePos > 3500) {
             setMotorSpeed(LEFT_MOTOR,fastSpeed);
             setMotorSpeed(RIGHT_MOTOR,normalSpeed);
      }
   else if(linePos > 3000 && linePos < 3500) {
    disableMotor(BOTH_MOTORS);

      } else {
             setMotorSpeed(LEFT_MOTOR,normalSpeed);
             setMotorSpeed(RIGHT_MOTOR,normalSpeed);
   //disableMotor(BOTH_MOTORS);
      }
}
```