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/*
 High Technology High School Robotics - MATE ROV
 Kevin Risden 2009

 Purpose:
  Control bottomside electronics for underwater ROV
  * Takes serial input from topside arduino
  * Outputs pwm to TLC5940 to control propulsion motors

 Hardware:
  1 - Arduino Nano
  1 - TLC5940

 Software:
  Standard Header - stdlib.h
  TLC5940 Library - http://code.google.com/p/tlc5940arduino/
  Messenger Library - http://www.arduino.cc/playground/Code/Messenger
*/

#include "stdlib.h"
#include "tlc_config.h"
#include "Tlc5940.h"
#include <Messenger.h>

Messenger message = Messenger(); //Instantiate Messenger object with the default separator (the space character)

//define joystick top and trigger pins
#define xyTopPin 2
#define xyTriggerPin 4
#define zTTopPin 7
#define zTTriggerPin 8

//declare output pin arrays
int digitalOutputPins[4] = {xyTopPin,xyTriggerPin,zTTopPin,zTTriggerPin};

//declare data var for serial input
int data[8] = {0,0,0,0,0,0,0,0};

//declare channel variable
int chan;

//declare percent x,y,T vars
float xper,yper,Tper;

//declare Motors to x,y,T - {1,2,3,4}
int Motx[4] = {-1,1,1,-1};
int Moty[4] = {-1,-1,1,1};
int MotT[4] = {-1,1,-1,1};

//declare temp var for calculations
float temp;

void setup() {
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54      ///open serial port at 9600 bps
55      Serial.begin(9600);
56
57      //initialize the tlc5940 library
58      Tlc.init();
59
60      //set digitalOutputPins mode to Output
61      for(int i=0; i<4; i++) {
62        pinMode(digitalOutputPins[i], OUTPUT);
63      }
64    }
65
66    void loop() {
67      //clear old PWM settings and reset MotPow
68      Tlc.clear();
69      float MotPow[6] = {0,0,0,0,0,0};
70
71      //get serial information from top
72      while ( Serial.available() ) { //check if Serial available
73        if ( message.process(Serial.read() ) ){
74          int i=0;
75          while(message.available()) { //loop through all parts of serial
76            data[i] = message.readInt();
77            if(i<4) {
78              if((data[i]-512)<10&&(data[i]-512)>(-10)) {
79                data[i] = 0;
80              } else {
81                data[i] = map(data[i], 0, 1023, 0, 4095)-2048; //map serial data from 0-1023 to 0-4095 ↵
    for tlc pwm
82              }
83            }
84            //Serial.print(data[i]); //echo data received (debugging)
85            //Serial.print(" "); //echo space for readability (debugging)
86            i++;
87          }
88          //Serial.println(); //echo new line for next serial (debugging)
89        }
90      }
91
92      //declare x,y,T,z,channel vars
93      int x = data[0];
94      int y = data[1];
95      int T = data[2];
96      int z = data[3];
97
98      //gets percentage of power for x,y,T
99      xper = x/2048.0;
100     yper = y/2048.0;
101     Tper = T/2048.0;
102
103     //find power for each motor based on x,y,T inputs
104     for(int i=0; i<=3; i++) {
105       temp = (xper*Motx[i])+(yper*Moty[i])+(Tper*MotT[i]);
```

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106       MotPow[i] = (temp > 1) ? 1 : temp; //if % > 1 then = 1
107       MotPow[i] = MotPow[i]*4095;
108     }
109
110     //direct mapping of z to motors 5+6
111     MotPow[4] = 2*z;
112     MotPow[5] = 2*z;
113
114     //loop through data and set tlc pwm for each motor
115     for(int i=0; i<6; i++) {
116       chan = i*2;
117       MotPow[i] = constrain(MotPow[i], -4095, 4095);
118       if(MotPow[i]<0) {
119         Tlc.set(chan, 0);
120         Tlc.set(chan+1, (-1)*MotPow[i]);
121       } else {
122         Tlc.set(chan, MotPow[i]);
123         Tlc.set(chan+1, 0);
124       }
125     }
126
127     //set digital outputs to state of each joystick button
128     for(int i=0; i<4; i++) {
129       (data[i+4] == 1) ? digitalWrite(digitalOutputPins[i], LOW) : digitalWrite(↵
    digitalOutputPins[i], HIGH);
130     }
131
132     //debugging for motor outputs
133     for(int i=0; i<6; i++) {
134      Serial.print(i);
135      Serial.print(" ");
136      Serial.print(MotPow[i]);
137      Serial.print(" ");
138     }
139     Serial.print("      ");
140     //debugging for top and trigger buttons
141     for(int i=4; i<8; i++) {
142       Serial.print(i);
143       Serial.print(" ");
144       Serial.print(data[i]);
145       Serial.print(" ");
146     }
147     Serial.println();
148
149     //send set pwm values to tlc5940
150     Tlc.update();
151   }
152
```