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1  /*
2   High Technology High School Robotics - MATE ROV
3   Kevin Risden 2009
4
5   Purpose:
6    Control bottomside electronics for underwater ROV
7    * Takes serial input from topside arduino
8    * Outputs pwm to TLC5940 to control propulsion motors
9
10  Hardware:
11   1 - Arduino Nano
12   1 - TLC5940
13
14  Software:
15   Standard Header - stdlib.h
16   TLC5940 Library - http://code.google.com/p/tlc5940arduino/
17   Messenger Library - http://www.arduino.cc/playground/Code/Messenger
18 */
19
20 #include "stdlib.h"
21 #include "tlc_config.h"
22 #include "Tlc5940.h"
23 #include <Messenger.h>
24
25 Messenger message = Messenger(); //Instantiate Messenger object with the default separator (the space character)
26
27 //define joystick top and trigger pins
28 #define xyTopPin 2
29 #define xyTriggerPin 4
30 #define zTTopPin 7
31 #define zTTriggerPin 8
32
33 //declare output pin arrays
34 int digitalOutputPins[4] = {xyTopPin,xyTriggerPin,zTTopPin,zTTriggerPin};
35
36 //declare data var for serial input
37 int data[8] = {0,0,0,0,0,0,0,0};
38
39 //declare channel variable
40 int chan;
41
42 //declare percent x,y,T vars
43 float xper,yper,Tper;
44
45 //declare Motors to x,y,T - {1,2,3,4}
46 int Motx[4] = {-1,1,1,-1};
47 int Moty[4] = {-1,-1,1,1};
48 int MotT[4] = {-1,1,-1,1};
49
50 //declare temp var for calculations
51 float temp;
52
53 void setup() {
```

```
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] = map(message.readInt(), 0, 1023, 0, 4095)-2048; //map serial data from 0-1023 to ↵
    0-4095 for tlc pwm
77            //Serial.print(data[i]); //echo data received (debugging)
78            //Serial.print(" "); //echo space for readability (debugging)
79            i++;
80          }
81          //Serial.println(); //echo new line for next serial (debugging)
82        }
83      }
84
85      //declare x,y,T,z,channel vars
86      int x = data[0];
87      int y = data[1];
88      int T = data[2];
89      int z = data[3];
90
91      /*
92     //declare xytop, xytrigger, Ztop, Ztrigger
93     int xytop = data[4];
94     int xytrigger = data[5];
95     int zTtop = data[6];
96     int zTtrigger = data[7];
97     */
98
99      //set digital outputs to state of each joystick button
100     for(int i=0; i<5; i++) {
101       (data[i+3] == 1) ? digitalWrite(digitalOutputPins[i], HIGH) : digitalWrite(↵
    digitalOutputPins[i], LOW);
102     }
103     /*
104    if(xytop == 1){
```

```
105       digitalWrite(xyTopPin, HIGH);
106     } else {
107       digitalWrite(xyTopPin, LOW);
108     }
109     if(xytrigger == 1) {
110       digitalWrite(xyTriggerPin, HIGH);
111     } else {
112       digitalWrite(xyTriggerPin, LOW);
113     }
114     if(zTtop == 1) {
115       digitalWrite(zTTopPin, HIGH);
116     } else {
117       digitalWrite(zTTopPin, LOW);
118     }
119     if(zTtrigger == 1) {
120       digitalWrite(zTTriggerPin, HIGH);
121     } else {
122       digitalWrite(zTTriggerPin, LOW);
123     }*/
124
125       //gets percentage of power for x,y,T
126       xper = x/2048.0;
127       yper = y/2048.0;
128       Tper = T/2048.0;
129
130       //find power for each motor based on x,y,T inputs
131       for(int i=0; i<=3; i++) {
132         temp = (xper*Motx[i])+(yper*Moty[i])+(Tper*MotT[i]);
133         MotPow[i] = (temp > 1) ? 1 : temp; //if % > 1 then = 1
134         MotPow[i] = MotPow[i]*4095;
135       }
136
137       //direct mapping of z to motors 5+6
138       MotPow[4] = 2*z;
139       MotPow[5] = 2*z;
140
141       /*
142     for(int i=0; i<6;i++) {
143      if(MotPow[i] > 4095) {
144        MotPow[i] = 4095;
145      } else if(MotPow[i]<-4095) {
146        MotPow[i] = -4095;
147      }
148     }
149     */
150
151       //loop through data and set tlc pwm for each motor
152       for(int i=0; i<6; i++) {
153         chan = i*2;
154         if(MotPow[i]<0) {
155           Tlc.set(chan, 0);
156           Tlc.set(chan+1, constrain((-1)*MotPow[i], 0, 4095));
157           Serial.print(chan+1);
```

```
158       } else {
159         Tlc.set(chan, constrain(MotPow[i], 0, 4095));
160         Tlc.set(chan+1, 0);
161         Serial.print(chan);
162       }
163       Serial.print(" ");
164       Serial.print(MotPow[i]);
165       Serial.print(" ");
166     }
167 
168     /*for(int i=0; i<6; i++) {
169    Serial.print(i);
170    Serial.print(" ");
171    Serial.print(MotPow[i]);
172    Serial.print(" ");
173   }*/
174     for(int i=4; i<8; i++) {
175       Serial.print(i);
176       Serial.print(" ");
177       Serial.print(data[i]);
178       Serial.print(" ");
179     }
180     Serial.println();
181 
182     //send set pwm values to tlc5940
183     Tlc.update();
184   }
185 
```