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1:
2: //      W3SZ 8-20-2017 Remote Ethernet Power Meter
3: //      To work in conjunction with C# client also
4: //      written by W3SZ 8-20-2017
5:
6: #include <Ethernet.h> //for ethernet port
7: #include <string.h> // for string handling
8: #include <EthernetUdp.h> // UDP library from: bjoern@cs.stanford.edu 12/30/
   2008
9:
10: //variables
11: String commandInputString = "";
12:
13: // Enter MAC address and IP address for Arduino below.
14: byte mac[] = { 0x90, 0xAA, 0xBB, 0xCC, 0xDA, 0x02 };
15: IPAddress ip(192, 168, 10, 176); //<< ENTER YOUR IP ADDRESS HERE <<
16:
17: IPAddress displayIP(192,168,10,244); //IP of computer running C# program to process
   and display data
18:
19: unsigned int dataPort = 8888; // local port to send and receive data on
20:
21: // buffers for receiving and sending data
22: char packetBuffer[UDP_TX_PACKET_MAX_SIZE]; //buffer to hold incoming packet,
23: char ReplyBuffer[] = "acknowledged"; // a string to send back
24:
25: // An EthernetUDP instance to let us send and receive packets over UDP
26:
27: EthernetUDP Udp;
28:
29: int VoltA0 = 0;
30: int VoltA1 = 0;
31: int VoltA2 = 0;
32: int VoltA3 = 0;
33: int VoltA4 = 0;
34: int VoltA5 = 0;
35: int VoltA6 = 0;
36: int VoltA7 = 0;
37: int VoltA8 = 0;
38: int VoltA9 = 0;
39: int VoltA10 = 0;
40: int VoltA11 = 0;
41: int VoltA12 = 0;
42: int VoltA13 = 0;
43: int VoltA14 = 0;
44: int VoltA15 = 0;
45:
46: String MeterOn = "OFF"; //turns measurement UDP server on or off
47: String BANDA0 = "ON"; //turns sensor with this numeral on or off
48: String BANDA1 = "ON"; //turns sensor with this numeral on or off
49: String BANDA2 = "ON"; //turns sensor with this numeral on or off
50: String BANDA3 = "ON"; //turns sensor with this numeral on or off
51: String BANDA4 = "ON"; //turns sensor with this numeral on or off
52: String BANDA5 = "ON"; //turns sensor with this numeral on or off
53: String BANDA6 = "ON"; //turns sensor with this numeral on or off
54: String BANDA7 = "ON"; //turns sensor with this numeral on or off
55: String BANDA8 = "ON"; //turns sensor with this numeral on or off
56: String BANDA9 = "ON"; //turns sensor with this numeral on or off
57: String BANDA10 = "ON"; //turns sensor with this numeral on or off
58: String BANDA11 = "ON"; //turns sensor with this numeral on or off
59: String BANDA12 = "ON"; //turns sensor with this numeral on or off
60: String BANDA13 = "ON"; //turns sensor with this numeral on or off
61: String BANDA14 = "ON"; //turns sensor with this numeral on or off
62: String BANDA15 = "ON"; //turns sensor with this numeral on or off
63:
64: // *****
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65: // ***** S E T U P *****
66: // *****
67:
68: void setup() {
69:
70:     //set pin modes to input
71:     pinMode(A0, INPUT);
72:     pinMode(A1, INPUT);
73:     pinMode(A2, INPUT);
74:     pinMode(A3, INPUT);
75:     pinMode(A4, INPUT);
76:     pinMode(A5, INPUT);
77:     pinMode(A6, INPUT);
78:     pinMode(A7, INPUT);
79:     pinMode(A8, INPUT);
80:     pinMode(A9, INPUT);
81:     pinMode(A10, INPUT);
82:     pinMode(A11, INPUT);
83:     pinMode(A12, INPUT);
84:     pinMode(A13, INPUT);
85:     pinMode(A14, INPUT);
86:     pinMode(A15, INPUT);
87:
88:     // start the Ethernet connection and the server and the serial port:
89:     Ethernet.begin(mac, ip);
90:     Udp.begin(dataPort);
91:     Serial.begin(9600);
92:     Serial.println("Starting Server");
93:     Serial.println (Ethernet.localIP());
94:
95:     // Print a message to the serial port
96:
97:     Serial.println("Pwr Meter");
98:     Serial.println("1 MHz - 9 GHz");
99:     Serial.println("W3SZ 08/2017");
100:
101:     delay (4000);
102:
103: } // end of setup
104:
105: // *****
106: // ***** L O O P *****
107: // *****
108: //this is the main program loop.
109: //it listens for an HTML client and when it gets input from the client it builds a
    string from the client's input
110: //it then parses the input and if it finds a valid command in the input, it uses that
    command to set each of 16 sensors
111: //(BANDS) ON or OFF or to START or STOP the measurement process altogether
112: //
113: //it reports the command received to the serial monitor and
114: //it calls the function sendReply which reads the Power/SDR values and reports them
    via UDP to C# client running on another
115: //computer
116:
117: void loop() {
118:
119:     //read sensors
120:     VoltA0 = analogRead(A0);           // Read A0 sensor voltage
121:     VoltA1 = analogRead(A1);           // Read A1 sensor voltage
122:     VoltA2 = analogRead(A2);           // Read A2 sensor voltage
123:     VoltA3 = analogRead(A3);           // Read A3 sensor voltage
124:     VoltA4 = analogRead(A4);           // Read A4 sensor voltage
125:
126:     VoltA5 = analogRead(A5);           // Read A5 sensor voltage
127:     VoltA6 = analogRead(A6);           // Read A6 sensor voltage
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128: VoltA7 = analogRead(A7);           // Read A7 sensor voltage
129: VoltA8 = analogRead(A8);           // Read A8 sensor voltage
130: VoltA9 = analogRead(A9);           // Read A9 sensor voltage
131:
132: VoltA10 = analogRead(A10);          // Read A10 sensor voltage
133: VoltA11 = analogRead(A11);          // Read A11 sensor voltage
134: VoltA12 = analogRead(A12);          // Read A12 sensor voltage
135: VoltA13 = analogRead(A13);          // Read A13 sensor voltage
136: VoltA14 = analogRead(A14);          // Read A14 sensor voltage
137: VoltA15 = analogRead(A15);          // Read A15 sensor voltage
138:
139: // listen for incoming UDP Packet
140: // if there's data available, read a packet
141: int packetSize = Udp.parsePacket();
142: if (packetSize) {
143:   Serial.print("Received packet of size ");
144:   Serial.println(packetSize);
145:   Serial.print("From ");
146:   IPAddress remote = Udp.remoteIP();
147:   for (int i = 0; i < 4; i++) {
148:     Serial.print(remote[i], DEC);
149:     if (i < 3) {
150:       Serial.print(".");
151:     }
152:   }
153:   Serial.print(", port ");
154:   Serial.println(Udp.remotePort());
155:
156:   // read the packet into packetBuffer
157:   Udp.read(packetBuffer, UDP_TX_PACKET_MAX_SIZE);
158:   Serial.println("Contents:");
159:   Serial.println(packetBuffer);
160:
161:   commandInputString = (String)packetBuffer;
162:   int stringStart = commandInputString.indexOf('~');
163:   int stringEnd = commandInputString.indexOf('$');
164:   String commandOut = commandInputString.substring(1 + stringStart, stringEnd);
165:   if (commandOut == "START") {
166:     String HTMString = "START MEASUREMENT";
167:     Serial.println(HTMString);
168:     MeterOn = "ON";
169:   }
170:   else if (commandOut == "STOP") {
171:     String HTMString = "STOP MEASUREMENT";
172:     Serial.println(HTMString);
173:     MeterOn = "OFF";
174:   }
175:
176:   else if (commandOut == "BANDA0ON") {
177:     String HTMString = "BAND A0 is ON";
178:     Serial.println(HTMString);
179:     BANDA0 = "ON";
180:   }
181:   else if (commandOut == "BANDA0OFF") {
182:     String HTMString = "BAND A0 is OFF";
183:     Serial.println(HTMString);
184:     BANDA0 = "OFF";
185:   }
186:
187:   else if (commandOut == "BANDA1ON") {
188:     String HTMString = "BAND A1 is ON";
189:     Serial.println(HTMString);
190:     BANDA1 = "ON";
191:   }
192:   else if (commandOut == "BANDA1OFF") {
193:     String HTMString = "BAND A1 is OFF";
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194:         Serial.println(HTMString);
195:         BANDA1 = "OFF";
196:     }
197:
198:     else if (commandOut == "BANDA2ON") {
199:         String HTMString = "BAND A2 is ON";
200:         Serial.println(HTMString);
201:         BANDA2 = "ON";
202:     }
203:     else if (commandOut == "BANDA2OFF") {
204:         String HTMString = "BAND A2 is OFF";
205:         Serial.println(HTMString);
206:         BANDA2 = "OFF";
207:     }
208:
209:     else if (commandOut == "BANDA3ON") {
210:         String HTMString = "BAND A3 is ON";
211:         Serial.println(HTMString);
212:         BANDA3 = "ON";
213:     }
214:     else if (commandOut == "BANDA3OFF") {
215:         String HTMString = "BAND A3 is OFF";
216:         Serial.println(HTMString);
217:         BANDA3 = "OFF";
218:     }
219:
220:     else if (commandOut == "BANDA4ON") {
221:         String HTMString = "BAND A4 is ON";
222:         Serial.println(HTMString);
223:         BANDA4 = "ON";
224:     }
225:     else if (commandOut == "BANDA4OFF") {
226:         String HTMString = "BAND A4 is OFF";
227:         Serial.println(HTMString);
228:         BANDA4 = "OFF";
229:     }
230:
231:     else if (commandOut == "BANDA5ON") {
232:         String HTMString = "BAND A5 is ON";
233:         Serial.println(HTMString);
234:         BANDA5 = "ON";
235:     }
236:     else if (commandOut == "BANDA5OFF") {
237:         String HTMString = "BAND A5 is OFF";
238:         Serial.println(HTMString);
239:         BANDA5 = "OFF";
240:     }
241:
242:     else if (commandOut == "BANDA6ON") {
243:         String HTMString = "BAND A6 is ON";
244:         Serial.println(HTMString);
245:         BANDA6 = "ON";
246:     }
247:     else if (commandOut == "BANDA6OFF") {
248:         String HTMString = "BAND A6 is OFF";
249:         Serial.println(HTMString);
250:         BANDA6 = "OFF";
251:     }
252:
253:     else if (commandOut == "BANDA7ON") {
254:         String HTMString = "BAND A7 is ON";
255:         Serial.println(HTMString);
256:         BANDA7 = "ON";
257:     }
258:     else if (commandOut == "BANDA7OFF") {
259:         String HTMString = "BAND A7 is OFF";
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260:         Serial.println(HTMString);
261:         BANDA7 = "OFF";
262:     }
263:
264:     else if (commandOut == "BANDA8ON") {
265:         String HTMString = "BAND A8 is ON";
266:         Serial.println(HTMString);
267:         BANDA8 = "ON";
268:     }
269:     else if (commandOut == "BANDA8OFF") {
270:         String HTMString = "BAND A8 is OFF";
271:         Serial.println(HTMString);
272:         BANDA8 = "OFF";
273:     }
274:
275:     else if (commandOut == "BANDA9ON") {
276:         String HTMString = "BAND A9 is ON";
277:         Serial.println(HTMString);
278:         BANDA9 = "ON";
279:     }
280:     else if (commandOut == "BANDA9OFF") {
281:         String HTMString = "BAND A9 is OFF";
282:         Serial.println(HTMString);
283:         BANDA9 = "OFF";
284:     }
285:
286:     else if (commandOut == "BANDA10ON") {
287:         String HTMString = "BAND A10 is ON";
288:         Serial.println(HTMString);
289:         BANDA10 = "ON";
290:     }
291:     else if (commandOut == "BANDA10OFF") {
292:         String HTMString = "BAND A10 is OFF";
293:         Serial.println(HTMString);
294:         BANDA10 = "OFF";
295:     }
296:
297:     else if (commandOut == "BANDA11ON") {
298:         String HTMString = "BAND A11 is ON";
299:         Serial.println(HTMString);
300:         BANDA11 = "ON";
301:     }
302:     else if (commandOut == "BANDA11OFF") {
303:         String HTMString = "BAND A11 is OFF";
304:         Serial.println(HTMString);
305:         BANDA11 = "OFF";
306:     }
307:
308:     else if (commandOut == "BANDA12ON") {
309:         String HTMString = "BAND A12 is ON";
310:         Serial.println(HTMString);
311:         BANDA12 = "ON";
312:     }
313:     else if (commandOut == "BANDA12OFF") {
314:         String HTMString = "BAND A12 is OFF";
315:         Serial.println(HTMString);
316:         BANDA12 = "OFF";
317:     }
318:
319:     else if (commandOut == "BANDA13ON") {
320:         String HTMString = "BAND A13 is ON";
321:         Serial.println(HTMString);
322:         BANDA13 = "ON";
323:     }
324:     else if (commandOut == "BANDA13OFF") {
325:         String HTMString = "BAND A13 is OFF";
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326:         Serial.println(HTMString);
327:         BANDA13 = "OFF";
328:     }
329:
330:     else if (commandOut == "BANDA14ON") {
331:         String HTMString = "BAND A14 is ON";
332:         Serial.println(HTMString);
333:         BANDA14 = "ON";
334:     }
335:     else if (commandOut == "BANDA14OFF") {
336:         String HTMString = "BAND A14 is OFF";
337:         Serial.println(HTMString);
338:         BANDA14 = "OFF";
339:     }
340:
341:     else if (commandOut == "BANDA15ON") {
342:         String HTMString = "BAND A15 is ON";
343:         Serial.println(HTMString);
344:         BANDA15 = "ON";
345:     }
346:     else if (commandOut == "BANDA15OFF") {
347:         String HTMString = "BAND A15 is OFF";
348:         Serial.println(HTMString);
349:         BANDA15 = "OFF";
350:     }
351:     commandInputString = "";
352: } // end if UDP data received
353:
354: //send Sensor Data
355: String data = "DATA";
356:
357: if(BANDA0 == "ON"){
358:     data = data + ",A00=" +String(VoltaA0);
359: }
360: if(BANDA1 == "ON"){
361:     data = data + ",A01=" +String(VoltaA1);
362: }
363: if(BANDA2 == "ON"){
364:     data = data + ",A02=" +String(VoltaA2);
365: }
366: if(BANDA3 == "ON"){
367:     data = data + ",A03=" +String(VoltaA3);
368: }
369: if(BANDA4 == "ON"){
370:     data = data + ",A04=" +String(VoltaA4);
371: }
372: if(BANDA5 == "ON"){
373:     data = data + ",A05=" +String(VoltaA5);
374: }
375: if(BANDA6 == "ON"){
376:     data = data + ",A06=" +String(VoltaA6);
377: }
378: if(BANDA7 == "ON"){
379:     data = data + ",A07=" +String(VoltaA7);
380: }
381: if(BANDA8 == "ON"){
382:     data = data + ",A08=" +String(VoltaA8);
383: }
384: if(BANDA9 == "ON"){
385:     data = data + ",A09=" +String(VoltaA9);
386: }
387: if(BANDA10 == "ON"){
388:     data = data + ",A10=" +String(VoltaA10);
389: }
390: if(BANDA11 == "ON"){
391:     data = data + ",A11=" +String(VoltaA11);
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392:     }
393:     if(BANDA12 == "ON"){
394:         data = data + ",A12=" +String(VoltA12);
395:     }
396:     if(BANDA13 == "ON"){
397:         data = data + ",A13=" +String(VoltA13);
398:     }
399:     if(BANDA14 == "ON"){
400:         data = data + ",A14=" +String(VoltA14);
401:     }
402:     if(BANDA15 == "ON"){
403:         data = data + ",A15=" +String(VoltA15);
404:     }
405:
406:     if(MeterOn == "ON")
407:     {
408:         int datalength = 1 + data.length();
409:         char databuf[datalength];
410:         data.toCharArray(databuf, datalength);
411:         // send a reply to the IP address and port that sent us the packet we received
412:         Udp.beginPacket(displayIP, dataPort);
413:         Udp.write(databuf);
414:         Udp.endPacket();
415:         // Serial.println(datalength);
416:         // Serial.print("DATA IS: ");
417:         // Serial.println(data);
418:         // Serial.print("DATABUF IS: ");
419:         // Serial.println(databuf);
420:     }
421:     delay(50);
422: } //end loop
423:
424:
```