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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:
8:
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, 0x03 };
15: IPAddress ip(192, 168, 1, 180); //<< ENTER ARDUINO IP ADDRESS HERE <<
16:
17: IPAddress displayIP(192,168,1,77); //IP of computer running C# program
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: // *****
65: // ***** S E T U P *****
66: // *****
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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:   //set pin modes for relays to output
89:   pinMode(9, OUTPUT);
90:   pinMode(11, OUTPUT);
91:   pinMode(12, OUTPUT);
92:   pinMode(13, OUTPUT);
93:
94:   //set initial relays levels to low (input routed to Bird Wattmeters)
95:   digitalWrite(9, LOW);
96:   digitalWrite(11, LOW);
97:   digitalWrite(12, LOW);
98:   digitalWrite(13, LOW);
99:
100:  // start the Ethernet connection and the server and the serial port:
101:  Ethernet.begin(mac, ip);
102:  Udp.begin(dataPort);
103:  Serial.begin(9600);
104:  Serial.println("Starting Server");
105:  Serial.println (Ethernet.localIP());
106:
107:  // Print a message to the serial port
108:
109:  Serial.println("Pwr Meter");
110:  Serial.println("1 MHz - 9 GHz");
111:  Serial.println("W3SZ 08/2017");
112:
113:  delay (4000);
114:
115: } // end of setup
116:
117: // *****
118: // ***** L O O P *****
119: // *****
120: //this is the main program loop. it listens for an HTML client
121: //when it gets input from the client it builds a string from the client's input
122: //it parses the input and if it finds a valid command in the input, it uses
123: //that command to set each of 16 sensors (BANDS) ON or OFF or to START or
124: //STOP the measurement process altogether
125: //it reports the command received to the serial monitor and
126: //it calls the function sendReply which reads the Power/SDR values
127: //and reports them via UDP to C# client running on another computer
128:
129: void loop() {
130:
131:   //read sensors
132:   VoltA0 = analogRead(A0);           // Read A0 sensor voltage
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133: VoltA1 = analogRead(A1);           // Read A1 sensor voltage
134: VoltA2 = analogRead(A2);           // Read A2 sensor voltage
135: VoltA3 = analogRead(A3);           // Read A3 sensor voltage
136: VoltA4 = analogRead(A4);           // Read A4 sensor voltage
137:
138: VoltA5 = analogRead(A5);           // Read A5 sensor voltage
139: VoltA6 = analogRead(A6);           // Read A6 sensor voltage
140: VoltA7 = analogRead(A7);           // Read A7 sensor voltage
141: VoltA8 = analogRead(A8);           // Read A8 sensor voltage
142: VoltA9 = analogRead(A9);           // Read A9 sensor voltage
143:
144: VoltA10 = analogRead(A10);          // Read A10 sensor voltage
145: VoltA11 = analogRead(A11);         // Read A11 sensor voltage
146: VoltA12 = analogRead(A12);         // Read A12 sensor voltage
147: VoltA13 = analogRead(A13);         // Read A13 sensor voltage
148: VoltA14 = analogRead(A14);         // Read A14 sensor voltage
149: VoltA15 = analogRead(A15);         // Read A15 sensor voltage
150:
151: // listen for incoming UDP Packet
152: // if there's data available, read a packet
153: int packetSize = Udp.parsePacket();
154: if (packetSize) {
155:   Serial.print("Received packet of size ");
156:   Serial.println(packetSize);
157:   Serial.print("From ");
158:   Serial.print(Udp.remoteIP());
159:   Serial.print(", port ");
160:   Serial.println(Udp.remotePort());
161:
162:   // read the packet into packetBuffer
163:   Udp.read(packetBuffer, UDP_TX_PACKET_MAX_SIZE);
164:   Serial.println("Contents:");
165:   Serial.println(packetBuffer);
166:
167:   commandInputString = (String)packetBuffer;
168:   int stringStart = commandInputString.indexOf('~');
169:   int stringEnd = commandInputString.indexOf('$');
170:   String commandOut = commandInputString.substring(1 + stringStart, stringEnd);
171:   if (commandOut == "START") {
172:     String HTMString = "START MEASUREMENT";
173:     Serial.println(HTMString);
174:     MeterOn = "ON";
175:     digitalWrite(9, HIGH);
176:     digitalWrite(11, HIGH);
177:     digitalWrite(12, HIGH);
178:     digitalWrite(13, HIGH);
179:   }
180:   else if (commandOut == "STOP") {
181:     String HTMString = "STOP MEASUREMENT";
182:     Serial.println(HTMString);
183:     MeterOn = "OFF";
184:     digitalWrite(9, LOW);
185:     digitalWrite(11, LOW);
186:     digitalWrite(12, LOW);
187:     digitalWrite(13, LOW);
188:   }
189:
190:   else if (commandOut == "BANDA0ON") {
191:     String HTMString = "BAND A0 is ON";
192:     Serial.println(HTMString);
193:     BANDA0 = "ON";
194:   }
195:   else if (commandOut == "BANDA0OFF") {
196:     String HTMString = "BAND A0 is OFF";
197:     Serial.println(HTMString);
198:     BANDA0 = "OFF";
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199:         }
200:
201:     else if (commandOut == "BANDA1ON") {
202:         String HTMLString = "BAND A1 is ON";
203:         Serial.println(HTMLString);
204:         BANDA1 = "ON";
205:     }
206:     else if (commandOut == "BANDA1OFF") {
207:         String HTMLString = "BAND A1 is OFF";
208:         Serial.println(HTMLString);
209:         BANDA1 = "OFF";
210:     }
211:
212:     else if (commandOut == "BANDA2ON") {
213:         String HTMLString = "BAND A2 is ON";
214:         Serial.println(HTMLString);
215:         BANDA2 = "ON";
216:     }
217:     else if (commandOut == "BANDA2OFF") {
218:         String HTMLString = "BAND A2 is OFF";
219:         Serial.println(HTMLString);
220:         BANDA2 = "OFF";
221:     }
222:
223:     else if (commandOut == "BANDA3ON") {
224:         String HTMLString = "BAND A3 is ON";
225:         Serial.println(HTMLString);
226:         BANDA3 = "ON";
227:     }
228:     else if (commandOut == "BANDA3OFF") {
229:         String HTMLString = "BAND A3 is OFF";
230:         Serial.println(HTMLString);
231:         BANDA3 = "OFF";
232:     }
233:
234:     else if (commandOut == "BANDA4ON") {
235:         String HTMLString = "BAND A4 is ON";
236:         Serial.println(HTMLString);
237:         BANDA4 = "ON";
238:     }
239:     else if (commandOut == "BANDA4OFF") {
240:         String HTMLString = "BAND A4 is OFF";
241:         Serial.println(HTMLString);
242:         BANDA4 = "OFF";
243:     }
244:
245:     else if (commandOut == "BANDA5ON") {
246:         String HTMLString = "BAND A5 is ON";
247:         Serial.println(HTMLString);
248:         BANDA5 = "ON";
249:     }
250:     else if (commandOut == "BANDA5OFF") {
251:         String HTMLString = "BAND A5 is OFF";
252:         Serial.println(HTMLString);
253:         BANDA5 = "OFF";
254:     }
255:
256:     else if (commandOut == "BANDA6ON") {
257:         String HTMLString = "BAND A6 is ON";
258:         Serial.println(HTMLString);
259:         BANDA6 = "ON";
260:     }
261:     else if (commandOut == "BANDA6OFF") {
262:         String HTMLString = "BAND A6 is OFF";
263:         Serial.println(HTMLString);
264:         BANDA6 = "OFF";
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265:         }
266:
267:     else if (commandOut == "BANDA7ON") {
268:         String HTMLString = "BAND A7 is ON";
269:         Serial.println(HTMLString);
270:         BANDA7 = "ON";
271:     }
272:     else if (commandOut == "BANDA7OFF") {
273:         String HTMLString = "BAND A7 is OFF";
274:         Serial.println(HTMLString);
275:         BANDA7 = "OFF";
276:     }
277:
278:     else if (commandOut == "BANDA8ON") {
279:         String HTMLString = "BAND A8 is ON";
280:         Serial.println(HTMLString);
281:         BANDA8 = "ON";
282:     }
283:     else if (commandOut == "BANDA8OFF") {
284:         String HTMLString = "BAND A8 is OFF";
285:         Serial.println(HTMLString);
286:         BANDA8 = "OFF";
287:     }
288:
289:     else if (commandOut == "BANDA9ON") {
290:         String HTMLString = "BAND A9 is ON";
291:         Serial.println(HTMLString);
292:         BANDA9 = "ON";
293:     }
294:     else if (commandOut == "BANDA9OFF") {
295:         String HTMLString = "BAND A9 is OFF";
296:         Serial.println(HTMLString);
297:         BANDA9 = "OFF";
298:     }
299:
300:     else if (commandOut == "BANDA10ON") {
301:         String HTMLString = "BAND A10 is ON";
302:         Serial.println(HTMLString);
303:         BANDA10 = "ON";
304:     }
305:     else if (commandOut == "BANDA10OFF") {
306:         String HTMLString = "BAND A10 is OFF";
307:         Serial.println(HTMLString);
308:         BANDA10 = "OFF";
309:     }
310:
311:     else if (commandOut == "BANDA11ON") {
312:         String HTMLString = "BAND A11 is ON";
313:         Serial.println(HTMLString);
314:         BANDA11 = "ON";
315:     }
316:     else if (commandOut == "BANDA11OFF") {
317:         String HTMLString = "BAND A11 is OFF";
318:         Serial.println(HTMLString);
319:         BANDA11 = "OFF";
320:     }
321:
322:     else if (commandOut == "BANDA12ON") {
323:         String HTMLString = "BAND A12 is ON";
324:         Serial.println(HTMLString);
325:         BANDA12 = "ON";
326:     }
327:     else if (commandOut == "BANDA12OFF") {
328:         String HTMLString = "BAND A12 is OFF";
329:         Serial.println(HTMLString);
330:         BANDA12 = "OFF";
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331:         }
332:
333:         else if (commandOut == "BANDA13ON") {
334:             String HTMLString = "BAND A13 is ON";
335:             Serial.println(HTMLString);
336:             BANDA13 = "ON";
337:         }
338:         else if (commandOut == "BANDA13OFF") {
339:             String HTMLString = "BAND A13 is OFF";
340:             Serial.println(HTMLString);
341:             BANDA13 = "OFF";
342:         }
343:
344:         else if (commandOut == "BANDA14ON") {
345:             String HTMLString = "BAND A14 is ON";
346:             Serial.println(HTMLString);
347:             BANDA14 = "ON";
348:         }
349:         else if (commandOut == "BANDA14OFF") {
350:             String HTMLString = "BAND A14 is OFF";
351:             Serial.println(HTMLString);
352:             BANDA14 = "OFF";
353:         }
354:
355:         else if (commandOut == "BANDA15ON") {
356:             String HTMLString = "BAND A15 is ON";
357:             Serial.println(HTMLString);
358:             BANDA15 = "ON";
359:         }
360:         else if (commandOut == "BANDA15OFF") {
361:             String HTMLString = "BAND A15 is OFF";
362:             Serial.println(HTMLString);
363:             BANDA15 = "OFF";
364:         }
365:         commandInputString = "";
366:     } // end if UDP data received
367:
368:     //send Sensor Data
369:     String data = "DATA";
370:
371:     if(BANDA0 == "ON") {
372:         data = data + ",A0=" +String(VoltA0);
373:     }
374:     if(BANDA1 == "ON") {
375:         data = data + ",A01=" +String(VoltA1);
376:     }
377:     if(BANDA2 == "ON") {
378:         data = data + ",A02=" +String(VoltA2);
379:     }
380:     if(BANDA3 == "ON") {
381:         data = data + ",A03=" +String(VoltA3);
382:     }
383:     if(BANDA4 == "ON") {
384:         data = data + ",A04=" +String(VoltA4);
385:     }
386:     if(BANDA5 == "ON") {
387:         data = data + ",A05=" +String(VoltA5);
388:     }
389:     if(BANDA6 == "ON") {
390:         data = data + ",A06=" +String(VoltA6);
391:     }
392:     if(BANDA7 == "ON") {
393:         data = data + ",A07=" +String(VoltA7);
394:     }
395:     if(BANDA8 == "ON") {
396:         data = data + ",A08=" +String(VoltA8);
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397:     }
398:     if(BANDA9 == "ON"){
399:         data = data + ",A09=" +String(VoltA9);
400:     }
401:     if(BANDA10 == "ON"){
402:         data = data + ",A10=" +String(VoltA10);
403:     }
404:     if(BANDA11 == "ON"){
405:         data = data + ",A11=" +String(VoltA11);
406:     }
407:     if(BANDA12 == "ON"){
408:         data = data + ",A12=" +String(VoltA12);
409:     }
410:     if(BANDA13 == "ON"){
411:         data = data + ",A13=" +String(VoltA13);
412:     }
413:     if(BANDA14 == "ON"){
414:         data = data + ",A14=" +String(VoltA14);
415:     }
416:     if(BANDA15 == "ON"){
417:         data = data + ",A15=" +String(VoltA15);
418:     }
419:
420:     if(MeterOn == "ON")
421:     {
422:         int datalength = 1 + data.length();
423:         char databuf[datalength];
424:         data.toCharArray(databuf, datalength);
425:         // send a reply to the IP address and port that sent us the packet we received
426:         Udp.beginPacket(displayIP, dataPort);
427:         Udp.write(databuf);
428:         Udp.endPacket();
429:     }
430:     delay(50);
431: } //end loop
432:
```