

```
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, 0x02 };
15: IPAddress ip(192, 168, 10, 177); //<< ENTER ARDUINO IP ADDRESS HERE <<
16:
17: IPAddress displayIP(192,168,10,244); //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: // *****
```

```
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. it listens for an HTML client
109: //when it gets input from the client it builds a string from the client's input
110: //it parses the input and if it finds a valid command in the input, it uses
111: //that command to set each of 16 sensors (BANDS) ON or OFF or to START or
112: //STOP the measurement process altogether
113: //it reports the command received to the serial monitor and
114: //it calls the function sendReply which reads the Power/SDR values
115: //and reports them via UDP to C# client running on another 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
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:   Serial.print(Udp.remoteIP());
147:   Serial.print(", port ");
148:   Serial.println(Udp.remotePort());
149:
150: // read the packet into packetBuffer
151: Udp.read(packetBuffer, UDP_TX_PACKET_MAX_SIZE);
152: Serial.println("Contents:");
153: Serial.println(packetBuffer);
154:
155:   commandInputString = (String)packetBuffer;
156:   int stringStart = commandInputString.indexOf('~');
157:   int stringEnd = commandInputString.indexOf('$');
158:   String commandOut = commandInputString.substring(1 + stringStart,
159:     stringEnd);
160:   if (commandOut == "START") {
161:     String HTMLString = "START MEASUREMENT";
162:     Serial.println(HTMLString);
163:     MeterOn = "ON";
164:   }
165:   else if (commandOut == "STOP") {
166:     String HTMLString = "STOP MEASUREMENT";
167:     Serial.println(HTMLString);
168:     MeterOn = "OFF";
169:   }
170:   else if (commandOut == "BANDA0ON") {
171:     String HTMLString = "BAND A0 is ON";
172:     Serial.println(HTMLString);
173:     BANDA0 = "ON";
174:   }
175:   else if (commandOut == "BANDA0OFF") {
176:     String HTMLString = "BAND A0 is OFF";
177:     Serial.println(HTMLString);
178:     BANDA0 = "OFF";
179:   }
180:   else if (commandOut == "BANDA1ON") {
181:     String HTMLString = "BAND A1 is ON";
182:     Serial.println(HTMLString);
183:     BANDA1 = "ON";
184:   }
185:   else if (commandOut == "BANDA1OFF") {
186:     String HTMLString = "BAND A1 is OFF";
187:     Serial.println(HTMLString);
188:     BANDA1 = "OFF";
189:   }
190:   else if (commandOut == "BANDA2ON") {
191:     String HTMLString = "BAND A2 is ON";
192:     Serial.println(HTMLString);
193:     BANDA2 = "ON";
194:   }
195:   else if (commandOut == "BANDA2OFF") {
```

```
198:         String HTMLString = "BAND A2 is OFF";
199:         Serial.println(HTMLString);
200:         BANDA2 = "OFF";
201:     }
202:
203:     else if (commandOut == "BANDA3ON") {
204:         String HTMLString = "BAND A3 is ON";
205:         Serial.println(HTMLString);
206:         BANDA3 = "ON";
207:     }
208:     else if (commandOut == "BANDA3OFF") {
209:         String HTMLString = "BAND A3 is OFF";
210:         Serial.println(HTMLString);
211:         BANDA3 = "OFF";
212:     }
213:
214:     else if (commandOut == "BANDA4ON") {
215:         String HTMLString = "BAND A4 is ON";
216:         Serial.println(HTMLString);
217:         BANDA4 = "ON";
218:     }
219:     else if (commandOut == "BANDA4OFF") {
220:         String HTMLString = "BAND A4 is OFF";
221:         Serial.println(HTMLString);
222:         BANDA4 = "OFF";
223:     }
224:
225:     else if (commandOut == "BANDA5ON") {
226:         String HTMLString = "BAND A5 is ON";
227:         Serial.println(HTMLString);
228:         BANDA5 = "ON";
229:     }
230:     else if (commandOut == "BANDA5OFF") {
231:         String HTMLString = "BAND A5 is OFF";
232:         Serial.println(HTMLString);
233:         BANDA5 = "OFF";
234:     }
235:
236:     else if (commandOut == "BANDA6ON") {
237:         String HTMLString = "BAND A6 is ON";
238:         Serial.println(HTMLString);
239:         BANDA6 = "ON";
240:     }
241:     else if (commandOut == "BANDA6OFF") {
242:         String HTMLString = "BAND A6 is OFF";
243:         Serial.println(HTMLString);
244:         BANDA6 = "OFF";
245:     }
246:
247:     else if (commandOut == "BANDA7ON") {
248:         String HTMLString = "BAND A7 is ON";
249:         Serial.println(HTMLString);
250:         BANDA7 = "ON";
251:     }
252:     else if (commandOut == "BANDA7OFF") {
253:         String HTMLString = "BAND A7 is OFF";
254:         Serial.println(HTMLString);
255:         BANDA7 = "OFF";
256:     }
257:
258:     else if (commandOut == "BANDA8ON") {
259:         String HTMLString = "BAND A8 is ON";
260:         Serial.println(HTMLString);
261:         BANDA8 = "ON";
262:     }
263:     else if (commandOut == "BANDA8OFF") {
```

```
264:         String HTMLString = "BAND A8 is OFF";
265:         Serial.println(HTMLString);
266:         BANDA8 = "OFF";
267:     }
268:
269:     else if (commandOut == "BANDA9ON") {
270:         String HTMLString = "BAND A9 is ON";
271:         Serial.println(HTMLString);
272:         BANDA9 = "ON";
273:     }
274:     else if (commandOut == "BANDA9OFF") {
275:         String HTMLString = "BAND A9 is OFF";
276:         Serial.println(HTMLString);
277:         BANDA9 = "OFF";
278:     }
279:
280:     else if (commandOut == "BANDA10ON") {
281:         String HTMLString = "BAND A10 is ON";
282:         Serial.println(HTMLString);
283:         BANDA10 = "ON";
284:     }
285:     else if (commandOut == "BANDA10OFF") {
286:         String HTMLString = "BAND A10 is OFF";
287:         Serial.println(HTMLString);
288:         BANDA10 = "OFF";
289:     }
290:
291:     else if (commandOut == "BANDA11ON") {
292:         String HTMLString = "BAND A11 is ON";
293:         Serial.println(HTMLString);
294:         BANDA11 = "ON";
295:     }
296:     else if (commandOut == "BANDA11OFF") {
297:         String HTMLString = "BAND A11 is OFF";
298:         Serial.println(HTMLString);
299:         BANDA11 = "OFF";
300:     }
301:
302:     else if (commandOut == "BANDA12ON") {
303:         String HTMLString = "BAND A12 is ON";
304:         Serial.println(HTMLString);
305:         BANDA12 = "ON";
306:     }
307:     else if (commandOut == "BANDA12OFF") {
308:         String HTMLString = "BAND A12 is OFF";
309:         Serial.println(HTMLString);
310:         BANDA12 = "OFF";
311:     }
312:
313:     else if (commandOut == "BANDA13ON") {
314:         String HTMLString = "BAND A13 is ON";
315:         Serial.println(HTMLString);
316:         BANDA13 = "ON";
317:     }
318:     else if (commandOut == "BANDA13OFF") {
319:         String HTMLString = "BAND A13 is OFF";
320:         Serial.println(HTMLString);
321:         BANDA13 = "OFF";
322:     }
323:
324:     else if (commandOut == "BANDA14ON") {
325:         String HTMLString = "BAND A14 is ON";
326:         Serial.println(HTMLString);
327:         BANDA14 = "ON";
328:     }
329:     else if (commandOut == "BANDA14OFF") {
```

```
330:         String HTMLString = "BAND A14 is OFF";
331:         Serial.println(HTMLString);
332:         BANDA14 = "OFF";
333:     }
334:
335:     else if (commandOut == "BANDA15ON") {
336:         String HTMLString = "BAND A15 is ON";
337:         Serial.println(HTMLString);
338:         BANDA15 = "ON";
339:     }
340:     else if (commandOut == "BANDA15OFF") {
341:         String HTMLString = "BAND A15 is OFF";
342:         Serial.println(HTMLString);
343:         BANDA15 = "OFF";
344:     }
345:     commandInputString = "";
346: } // end if UDP data received
347:
348: //send Sensor Data
349: String data = "DATA";
350:
351: if(BANDA0 == "ON"){
352:     data = data + ",A00=" +String(VoltA0);
353: }
354: if(BANDA1 == "ON"){
355:     data = data + ",A01=" +String(VoltA1);
356: }
357: if(BANDA2 == "ON"){
358:     data = data + ",A02=" +String(VoltA2);
359: }
360: if(BANDA3 == "ON"){
361:     data = data + ",A03=" +String(VoltA3);
362: }
363: if(BANDA4 == "ON"){
364:     data = data + ",A04=" +String(VoltA4);
365: }
366: if(BANDA5 == "ON"){
367:     data = data + ",A05=" +String(VoltA5);
368: }
369: if(BANDA6 == "ON"){
370:     data = data + ",A06=" +String(VoltA6);
371: }
372: if(BANDA7 == "ON"){
373:     data = data + ",A07=" +String(VoltA7);
374: }
375: if(BANDA8 == "ON"){
376:     data = data + ",A08=" +String(VoltA8);
377: }
378: if(BANDA9 == "ON"){
379:     data = data + ",A09=" +String(VoltA9);
380: }
381: if(BANDA10 == "ON"){
382:     data = data + ",A10=" +String(VoltA10);
383: }
384: if(BANDA11 == "ON"){
385:     data = data + ",A11=" +String(VoltA11);
386: }
387: if(BANDA12 == "ON"){
388:     data = data + ",A12=" +String(VoltA12);
389: }
390: if(BANDA13 == "ON"){
391:     data = data + ",A13=" +String(VoltA13);
392: }
393: if(BANDA14 == "ON"){
394:     data = data + ",A14=" +String(VoltA14);
395: }
```

```
396:     if(BANDA15 == "ON"){
397:         data = data + ",A15=" +String(VoltA15);
398:     }
399:
400:     if(MeterOn == "ON")
401:     {
402:         int datalength = 1 + data.length();
403:         char databuf[datalength];
404:         data.toCharArray(databuf, datalength);
405:         // send a reply to the IP address and port that sent us the packet we
           received
406:         Udp.beginPacket(displayIP, dataPort);
407:         Udp.write(databuf);
408:         Udp.endPacket();
409:     }
410:     delay(50);
411: } //end loop
412:
413:
414:
```