**[RTClib](http://github.com/adafruit/RTClib/tree/master)** / RTClib.cpp

100644 186 lines (155 sloc) 5.277 kb

* [raw](http://github.com/adafruit/RTClib/raw/master/RTClib.cpp)
* [normal view](http://github.com/adafruit/RTClib/blob/master/RTClib.cpp)
* [history](http://github.com/adafruit/RTClib/commits/master/RTClib.cpp)

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| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 1 | // Code by JeeLabs http://news.jeelabs.org/code/ |
|  | 2 | // Released to the public domain! Enjoy! |
|  | 3 |  |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 4 | #include <Wire.h> |
|  | 5 | #include <avr/pgmspace.h> |
|  | 6 | #include "RTClib.h" |
|  | 7 | #include <WProgram.h> |
|  | 8 |  |
|  | 9 | #define DS1307\_ADDRESS 0x68 |
|  | 10 | #define SECONDS\_PER\_DAY 86400L |
|  | 11 |  |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 12 | #define SECONDS\_FROM\_1970\_TO\_2000 946684800 |
|  | 13 |  |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 14 | //////////////////////////////////////////////////////////////////////////////// |
|  | 15 | // utility code, some of this could be exposed in the DateTime API if needed |
|  | 16 |  |
|  | 17 | static uint8\_t daysInMonth [] PROGMEM = { 31,28,31,30,31,30,31,31,30,31,30,31 }; |
|  | 18 |  |
|  | 19 | // number of days since 2000/01/01, valid for 2001..2099 |
|  | 20 | static uint16\_t date2days(uint16\_t y, uint8\_t m, uint8\_t d) { |
|  | 21 | if (y >= 2000) |
|  | 22 | y -= 2000; |
|  | 23 | uint16\_t days = d; |
|  | 24 | for (uint8\_t i = 1; i < m; ++i) |
|  | 25 | days += pgm\_read\_byte(daysInMonth + i - 1); |
|  | 26 | if (m > 2 && y % 4 == 0) |
|  | 27 | ++days; |
|  | 28 | return days + 365 \* y + (y + 3) / 4 - 1; |
|  | 29 | } |
|  | 30 |  |
|  | 31 | static long time2long(uint16\_t days, uint8\_t h, uint8\_t m, uint8\_t s) { |
|  | 32 | return ((days \* 24L + h) \* 60 + m) \* 60 + s; |
|  | 33 | } |
|  | 34 |  |
|  | 35 | //////////////////////////////////////////////////////////////////////////////// |
|  | 36 | // DateTime implementation - ignores time zones and DST changes |
|  | 37 | // NOTE: also ignores leap seconds, see http://en.wikipedia.org/wiki/Leap\_second |
|  | 38 |  |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 39 | DateTime::DateTime (uint32\_t t) { |
|  | 40 | t -= SECONDS\_FROM\_1970\_TO\_2000; // bring to 2000 timestamp from 1970 |
|  | 41 |  |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 42 | ss = t % 60; |
|  | 43 | t /= 60; |
|  | 44 | mm = t % 60; |
|  | 45 | t /= 60; |
|  | 46 | hh = t % 24; |
|  | 47 | uint16\_t days = t / 24; |
|  | 48 | uint8\_t leap; |
|  | 49 | for (yOff = 0; ; ++yOff) { |
|  | 50 | leap = yOff % 4 == 0; |
|  | 51 | if (days < 365 + leap) |
|  | 52 | break; |
|  | 53 | days -= 365 + leap; |
|  | 54 | } |
|  | 55 | for (m = 1; ; ++m) { |
|  | 56 | uint8\_t daysPerMonth = pgm\_read\_byte(daysInMonth + m - 1); |
|  | 57 | if (leap && m == 2) |
|  | 58 | ++daysPerMonth; |
|  | 59 | if (days < daysPerMonth) |
|  | 60 | break; |
|  | 61 | days -= daysPerMonth; |
|  | 62 | } |
|  | 63 | d = days + 1; |
|  | 64 | } |
|  | 65 |  |
|  | 66 | DateTime::DateTime (uint16\_t year, uint8\_t month, uint8\_t day, uint8\_t hour, uint8\_t min, uint8\_t sec) { |
|  | 67 | if (year >= 2000) |
|  | 68 | year -= 2000; |
|  | 69 | yOff = year; |
|  | 70 | m = month; |
|  | 71 | d = day; |
|  | 72 | hh = hour; |
|  | 73 | mm = min; |
|  | 74 | ss = sec; |
|  | 75 | } |
|  | 76 |  |
|  | 77 | static uint8\_t conv2d(const char\* p) { |
|  | 78 | uint8\_t v = 0; |
|  | 79 | if ('0' <= \*p && \*p <= '9') |
|  | 80 | v = \*p - '0'; |
|  | 81 | return 10 \* v + \*++p - '0'; |
|  | 82 | } |
|  | 83 |  |
|  | 84 | // A convenient constructor for using "the compiler's time": |
|  | 85 | // DateTime now (\_\_DATE\_\_, \_\_TIME\_\_); |
|  | 86 | // NOTE: using PSTR would further reduce the RAM footprint |
|  | 87 | DateTime::DateTime (const char\* date, const char\* time) { |
|  | 88 | // sample input: date = "Dec 26 2009", time = "12:34:56" |
|  | 89 | yOff = conv2d(date + 9); |
|  | 90 | // Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  |
|  | 91 | switch (date[0]) { |
|  | 92 | case 'J': m = date[1] == 'a' ? 1 : m = date[2] == 'n' ? 6 : 7; break; |
|  | 93 | case 'F': m = 2; break; |
|  | 94 | case 'A': m = date[2] == 'r' ? 4 : 8; break; |
|  | 95 | case 'M': m = date[2] == 'r' ? 3 : 5; break; |
|  | 96 | case 'S': m = 9; break; |
|  | 97 | case 'O': m = 10; break; |
|  | 98 | case 'N': m = 11; break; |
|  | 99 | case 'D': m = 12; break; |
|  | 100 | } |
|  | 101 | d = conv2d(date + 4); |
|  | 102 | hh = conv2d(time); |
|  | 103 | mm = conv2d(time + 3); |
|  | 104 | ss = conv2d(time + 6); |
|  | 105 | } |
|  | 106 |  |
|  | 107 | uint8\_t DateTime::dayOfWeek() const {  |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 108 | uint16\_t day = secondstime() / SECONDS\_PER\_DAY; |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 109 | return (day + 6) % 7; // Jan 1, 2000 is a Saturday, i.e. returns 6 |
|  | 110 | } |
|  | 111 |  |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 112 | uint32\_t DateTime::unixtime(void) const { |
|  | 113 | uint32\_t t; |
|  | 114 | uint16\_t days = date2days(yOff, m, d); |
|  | 115 | t = time2long(days, hh, mm, ss); |
|  | 116 | t += SECONDS\_FROM\_1970\_TO\_2000; // seconds from 1970 to 2000 |
|  | 117 |  |
|  | 118 | return t; |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 119 | } |
|  | 120 |  |
|  | 121 | //////////////////////////////////////////////////////////////////////////////// |
|  | 122 | // RTC\_DS1307 implementation |
|  | 123 |  |
|  | 124 | static uint8\_t bcd2bin (uint8\_t val) { return val - 6 \* (val >> 4); } |
|  | 125 | static uint8\_t bin2bcd (uint8\_t val) { return val + 6 \* (val / 10); } |
|  | 126 |  |
|  | 127 | uint8\_t RTC\_DS1307::begin(void) { |
|  | 128 | return 1; |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 129 | } |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 130 |  |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 131 | uint8\_t RTC\_DS1307::isrunning(void) { |
|  | 132 | Wire.beginTransmission(DS1307\_ADDRESS); |
|  | 133 | Wire.send(0);  |
|  | 134 | Wire.endTransmission(); |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 135 |  |
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|  | 137 | uint8\_t ss = Wire.receive(); |
|  | 138 | return !(ss>>7); |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 139 | } |
|  | 140 |  |
|  | 141 | void RTC\_DS1307::adjust(const DateTime& dt) { |
|  | 142 | Wire.beginTransmission(DS1307\_ADDRESS); |
|  | 143 | Wire.send(0); |
|  | 144 | Wire.send(bin2bcd(dt.second())); |
|  | 145 | Wire.send(bin2bcd(dt.minute())); |
|  | 146 | Wire.send(bin2bcd(dt.hour())); |
|  | 147 | Wire.send(bin2bcd(0)); |
|  | 148 | Wire.send(bin2bcd(dt.day())); |
|  | 149 | Wire.send(bin2bcd(dt.month())); |
|  | 150 | Wire.send(bin2bcd(dt.year() - 2000)); |
|  | 151 | Wire.send(0); |
|  | 152 | Wire.endTransmission(); |
|  | 153 | } |
|  | 154 |  |
|  | 155 | DateTime RTC\_DS1307::now() { |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 156 | Wire.beginTransmission(DS1307\_ADDRESS); |
|  | 157 | Wire.send(0);  |
|  | 158 | Wire.endTransmission(); |
|  | 159 |  |
|  | 160 | Wire.requestFrom(DS1307\_ADDRESS, 7); |
|  | 161 | uint8\_t ss = bcd2bin(Wire.receive() & 0x7F); |
|  | 162 | uint8\_t mm = bcd2bin(Wire.receive()); |
|  | 163 | uint8\_t hh = bcd2bin(Wire.receive()); |
|  | 164 | Wire.receive(); |
|  | 165 | uint8\_t d = bcd2bin(Wire.receive()); |
|  | 166 | uint8\_t m = bcd2bin(Wire.receive()); |
|  | 167 | uint16\_t y = bcd2bin(Wire.receive()) + 2000; |
|  | 168 |  |
|  | 169 | return DateTime (y, m, d, hh, mm, ss); |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 170 | } |
|  | 171 |  |
|  | 172 | //////////////////////////////////////////////////////////////////////////////// |
|  | 173 | // RTC\_Millis implementation |
|  | 174 |  |
|  | 175 | long RTC\_Millis::offset = 0; |
|  | 176 |  |
|  | 177 | void RTC\_Millis::adjust(const DateTime& dt) { |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 178 | offset = dt.secondstime() - millis() / 1000; |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 179 | } |
|  | 180 |  |
|  | 181 | DateTime RTC\_Millis::now() { |
| [1d04f0fd](http://github.com/adafruit/RTClib/commit/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb) [»](http://github.com/adafruit/RTClib/blame/1d04f0fdedc365d164bb11fae6cbf8b653bca8eb/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-05-14 now with zip file  | 182 | return (uint32\_t)(offset + millis() / 1000); |
| [f8a1ab0d](http://github.com/adafruit/RTClib/commit/f8a1ab0d65f84a18c42ff398da2520c3a63230b7) [»](http://github.com/adafruit/RTClib/blame/f8a1ab0d65f84a18c42ff398da2520c3a63230b7/RTClib.cpp) [adafruit](http://github.com/adafruit) 2010-03-11 First commit  | 183 | } |
|  | 184 |  |
|  | 185 | //////////////////////////////////////////////////////////////////////////////// |