

# Arduino, Zigbee and Embedded Development

A helpful blog designed to get beginners up and running with Arduino, Zigbee and general embedded development.

Wednesday, 28 April 2010

## Sleeping Arduino - Part 3 Wake Up Via the UART

## Overview

In the third part of this ["Sleeping Arduino"](#) series, we will be covering how to wake the Arduino via the USB UART (serial interface over USB). When the Arduino's ATMEGA microcontroller is not receiving any communications from the PC via the serial link, it will enter a sleep mode (the very efficient SLEEP\_MODE\_PWR\_DOWN, see [here](#) for more info on the power modes). Once serial data is sent from the PC to the Arduino board, it will wake for a period and re-enter sleep mode when no data is being received from the PC.

To wake the ATMEGA, we will be using the external interrupt INTO on digital Pin 2 of the ATMEGA (as covered in [Part 2](#) of this series), connected to the digital Pin 0 (which is the ATMEGA's UART receive line).

To do this we will use the following hardware:

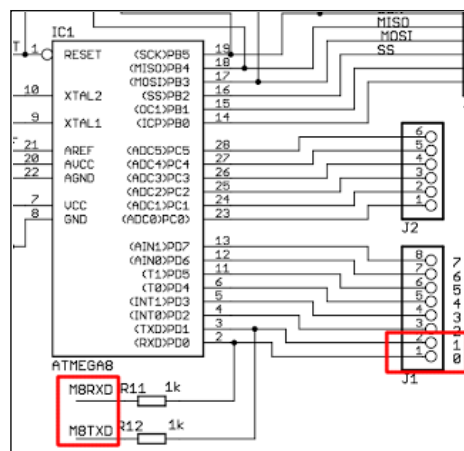
- Arduino Diecimila with usb cable (or a Freeduino, which is 100% Arduino Diecimila compatible)
- One 220 Ohm Resistor

If you don't want to use a resistor, you can use a less efficient power mode and wake the Arduino using the UART interrupt as specified in Ruben's blog entry [here](#).

## USB UART

The following schematics show two of the devices on the Arduino Board. The first is the ATMEGA8 (could also be ATMEGA168) microcontroller, the other is the FT232RL, which is the USB UART interface device.

Note the TXD and RXD pins of the FT232RL are connected to the RXD and TXD of the ATMEGA respectively. These pins are exposed on J1 as digital pins 0 and 1.



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## About Me



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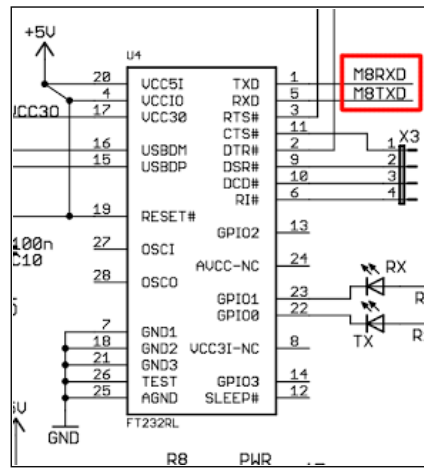
Senior embedded software engineer and team leader with experience in the

telecommunications and automotive industries. Android application developer during my spare time. This includes the continued development of 'My Migraine Log', which is an application for tracking a user's migraine attack history. And a similar app called 'My Headache Log'. Both are currently on sale on the Android market. Specialties o Embedded software development o Android application development o SCRUM o Real-Time Operating Systems o Linux software development (embedded & desktop) o Microchip PIC16/PIC24 firmware development o Bootloaders, including fault tolerant remote update of application software o Embedded RF system software o Automotive embedded software o CAN Gateways & networks o Hardware interfacing (I2C, SPI, CAN, Etc) o Zigbee o C, C++, JAVA, Perl, Python o QT o Team Leadership o Recruitment

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Site Map

## Site Map



When there is no data being transmitted on the serial TX and RX lines, they are pulled high at 5volts. Once data is transmitted the lines will change state with the data. We will use the initial state change to low to fire our external interrupt and wake the ATMEGA.

## Circuit

The circuit for this entry is very basic. On your Arduino board just connect one leg of the 220 Ohm resistor into digital pin 0 (RX) and the second leg into digital pin 2 (INT0) on connector J1.

## Source Code

The source code for this is exactly the same as the source code for [Part 2](#) of this series.

```
#include <avr/sleep.h>
#include <avr/power.h>

int pin2 = 2;

/*****
 * Name:      pin2Interrupt
 *
 * Returns:   Nothing.
 *
 * Parameters: None.
 *
 * Description: Service routine for pin2 interrupt
 *****/
void pin2Interrupt(void)
{
    /* This will bring us back from sleep. */

    /* We detach the interrupt to stop it from
     * continuously firing while the interrupt pin
     * is low.
     */
    detachInterrupt(0);
}

/*****
 * Name:      enterSleep
 *
 * Returns:   Nothing.
 *
 * Parameters: None.
 *
 * Description: Enters the arduino into sleep mode.
 *****/
void enterSleep(void)
{
    /* Setup pin2 as an interrupt and attach handler. */
    attachInterrupt(0, pin2Interrupt, LOW);
    delay(100);

    set_sleep_mode(SLEEP_MODE_PWR_DOWN);

    sleep_enable();

    sleep_mode();
}
```

```

/* The program will continue from here. */

/* First thing to do is disable sleep. */
sleep_disable();
}

/*****
* Name:      setup
*
* Returns:   Nothing.
*
* Parameters: None.
*
* Description: Setup for the Arduino.
*
*****/
void setup()
{
  Serial.begin(9600);

  /* Setup the pin direction. */
  pinMode(pin2, INPUT);

  Serial.println("Initialisation complete.");
}

/*****
* Name:      loop
*
* Returns:   Nothing.
*
* Parameters: None.
*
* Description: Main application loop.
*
*****/
int seconds=0;
void loop()
{
  delay(1000);
  seconds++;

  Serial.print("Awake for ");
  Serial.print(seconds, DEC);
  Serial.println(" second");

  if(seconds == 3)
  {
    Serial.println("Entering sleep");
    delay(200);
    seconds = 0;
    enterSleep();
  }
}

```

This source code can be downloaded [here](#).

All parts of this series:

- [Part 1 Overview Of Arduino Sleep Modes](#)
- [Part 2 Wake Up Via An External Interrupt](#)
- [Part 3 Wake Up Via the UART](#)
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- [Part 5 Wake Up Via The Watchdog Timer](#)

Posted by [Donal Morrissey](#) at [13:32](#)



## 2 comments:



**eatfrog** 16 February 2011 at 19:08

thanks a bunch for these sleeping arduino tutorials, they have been very helpful.

i hope you start writing again!

[Reply](#)



**yuliaRetno** 25 May 2013 at 11:11

I have tried this code, and this is works ! mm but If I want to awake arduino with serial data which I choose (ex: just send character "A" and then arduino wake up ) /not receiving any serial data ? I really2 confuse,, I start depressed because that, can you help me ?? plis T\_\_\_T

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