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Abstract

Pre-release guide

Owlboard jr

Assembly and programming



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# Introduction

The owlboard JR is based on the reference design and source code used in the ‘DIY ChipKit board’. It is programmable

<http://chipkit.net/diy-chipkit-board>

Features:

* Uses 32-bit PIC microcontroller PIC32MX250F128B in SPDIP-28 package with preprogrammed bootloader.
* USB connector built into PCB for easy programmability (Detected as a stk500 programmer.
* Increased PCB thickness for USB connector (2.0mm)
* 19 GPIO pins

# 

# Warning

In order to build the OwlBoard Jr, you will be using soldering equipment, solder, and flux. Soldering equipment will be extremely hot. Solder and flux may contain hazardous substances such as lead.

It is advised that the participant:

* Exercise caution when soldering
* Wear personal protective equipment (PPE) such as safety glasses
* Use fume extractors to reduce participant exposure to solder fumes

**Oregon Institute of Technology and affiliated parties disclaim all liability from injuries, whether emotional or physical, caused by participation in this workshop.**

**Due to continuous improvement, the shape and components of the OwlBoard Jr may change. Functionality may also change.**

# OwlBoard Jr. 3D Views

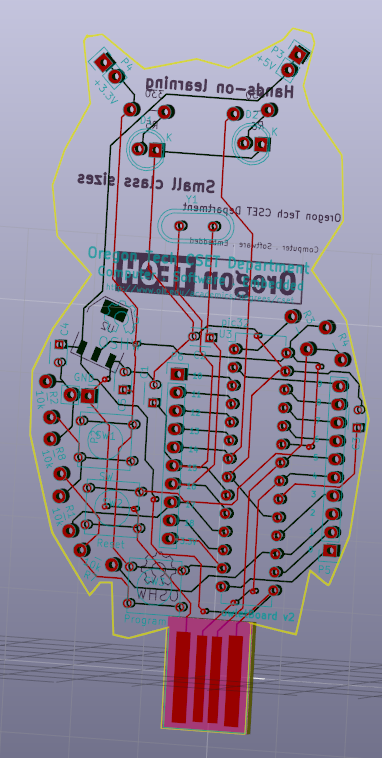
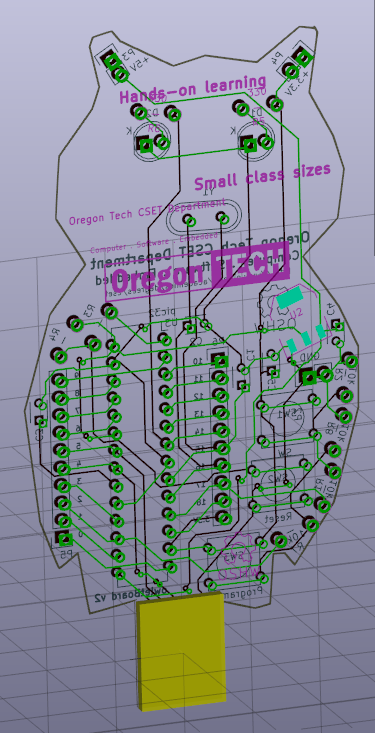
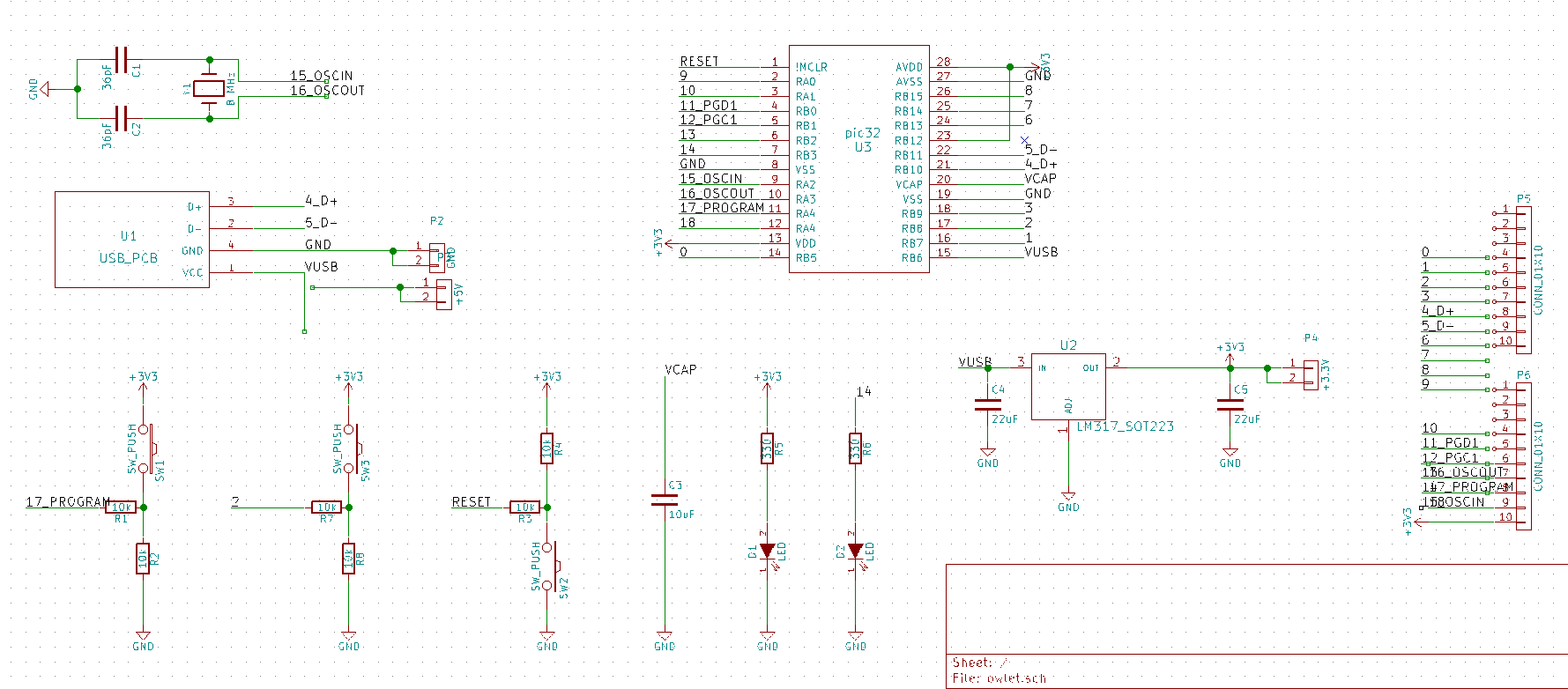
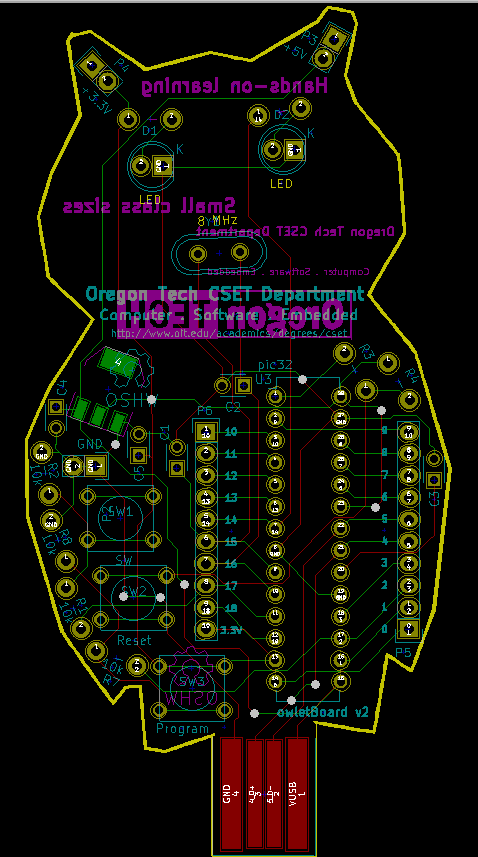


Figure Front & back 3D view

# Owlboard Jr. Schematics



# Owlboard Jr. Layout



# Owlboard Jr. Bill of Materials (BOM)

Table Bill of Materials for OwlBoard Jr

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Bill of Materials (BOM) for Owlboard Jr | |  |  |  |
| Line Item | Description | Footprint | Reference | Quantity |
| 1 | Button | through hole | SW1,SW2,SW3 | 3 |
| 2 | Resistor 10k | through hole | R1,R2,R3,R4,R7,R8 | 6 |
| 3 | Resistor 330 | through hole | R5, R6 | 2 |
| 4 | 3mm or 5mm LED | through hole | D1,D2 | 2 |
| 5 | Crystal Oscillator 8 MHz | HC-49 | Y1 | 1 |
| 6 | Capacitor 1uF (105) | through hole | C4,C5 | 2 |
| 7 | Capacitor 3.6pF | through hole | C1,C2 | None required |
| 8 | Capacitor 10uF (106) | through hole | C3 | 1 |
| 9 | PIC32 PIC32MX250F128B | 28-pin DIP | U3 | 1 |
| 10 | 3.3V linear regulator | SOT-223 | U2 | 1 |
| 11 | 10x1 0.1" header | through hole | P5,P6 | 2 |

# Component descriptions

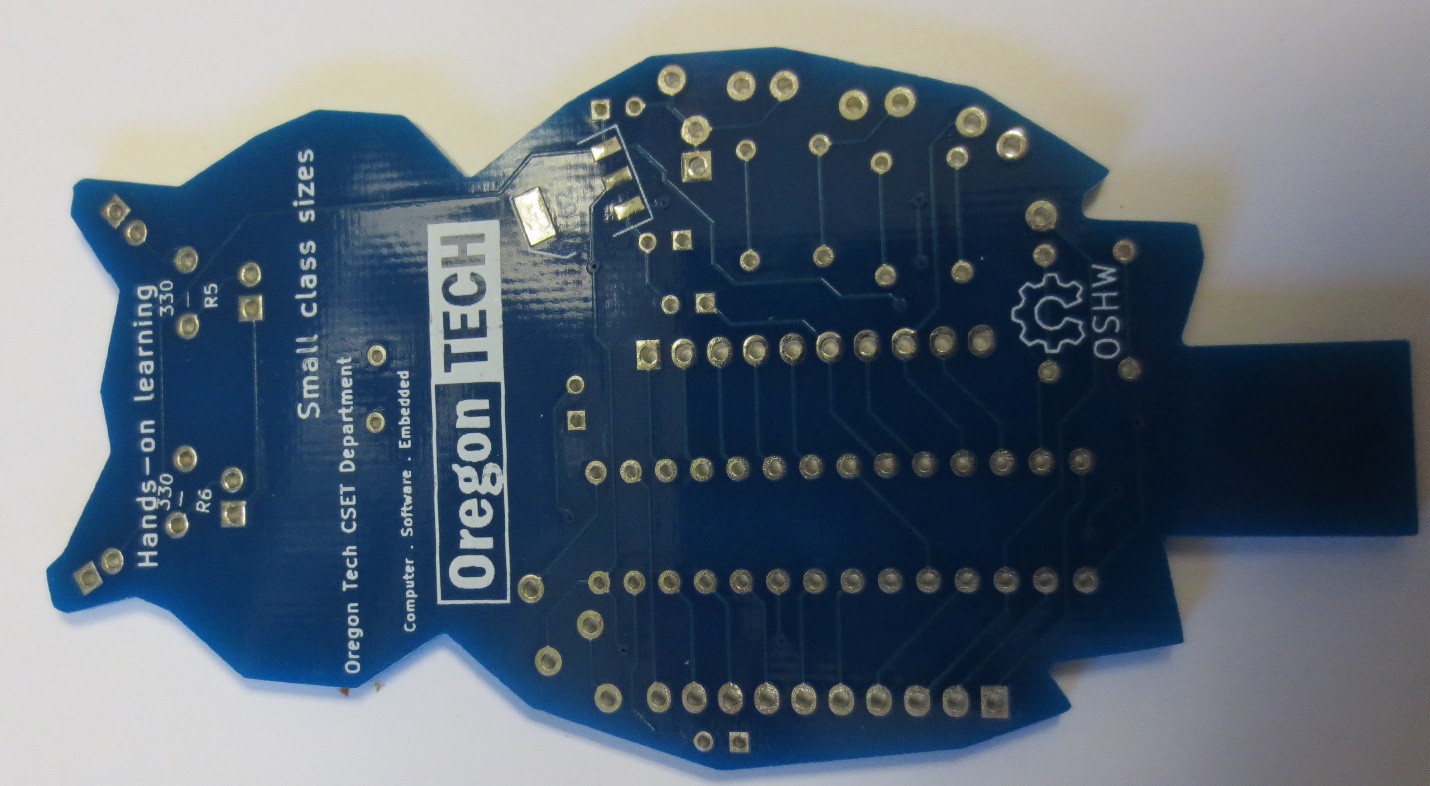
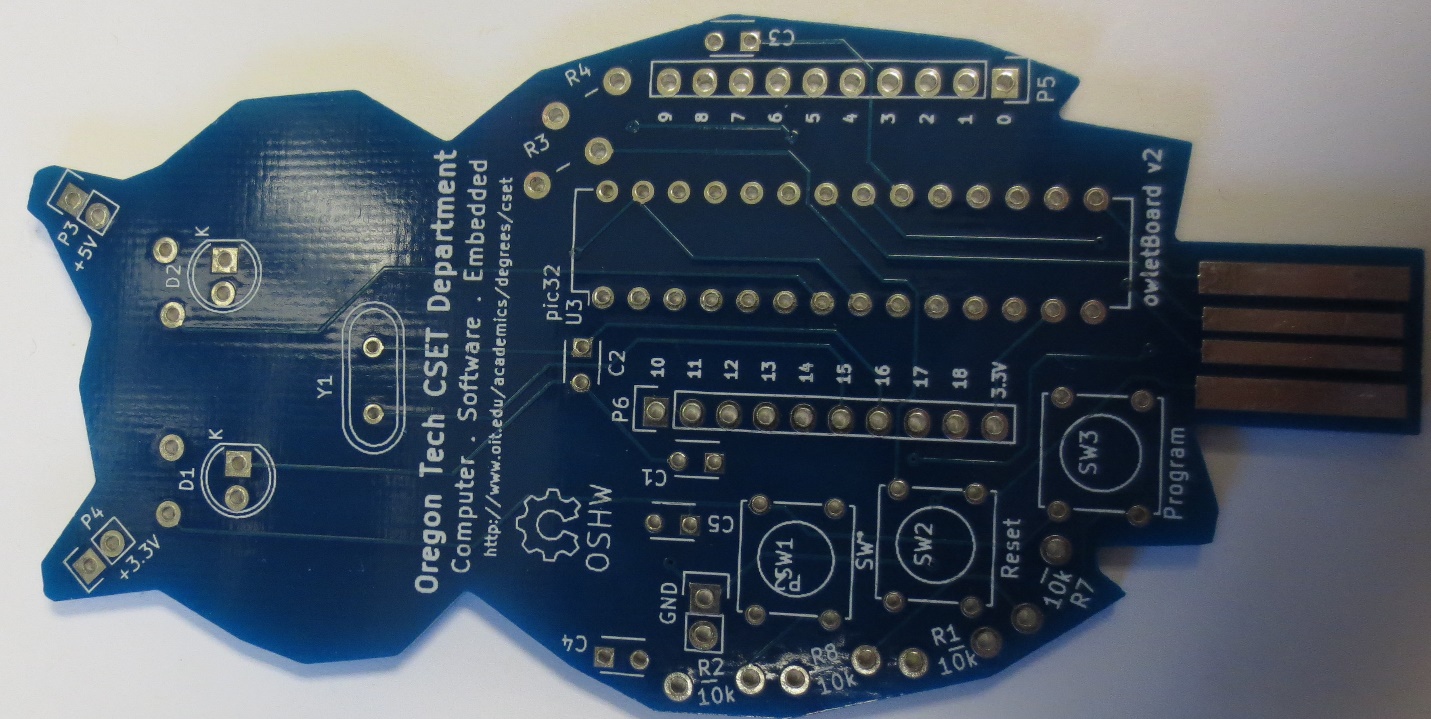


Figure OwlBoard Jr front and rear PCB

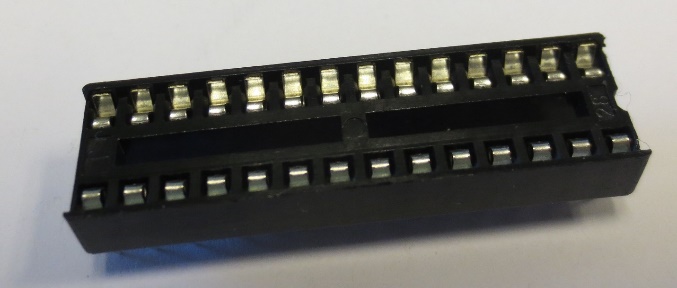


Figure DIP 28 socket for microprocessor

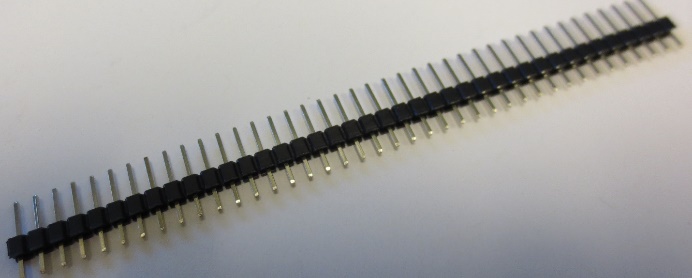


Figure Breakaway 0.1" male headers



Figure 3mm LEDs

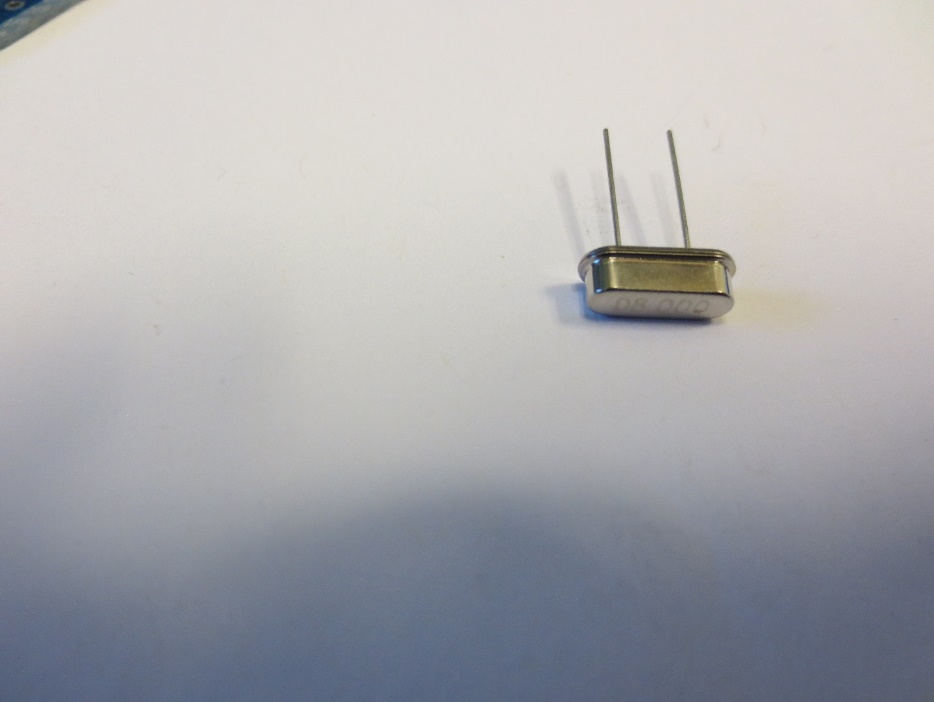


Figure 8 MHz crystal oscillator



Figure push button



Figure PIC32 MX250F128B in DIP-28 package

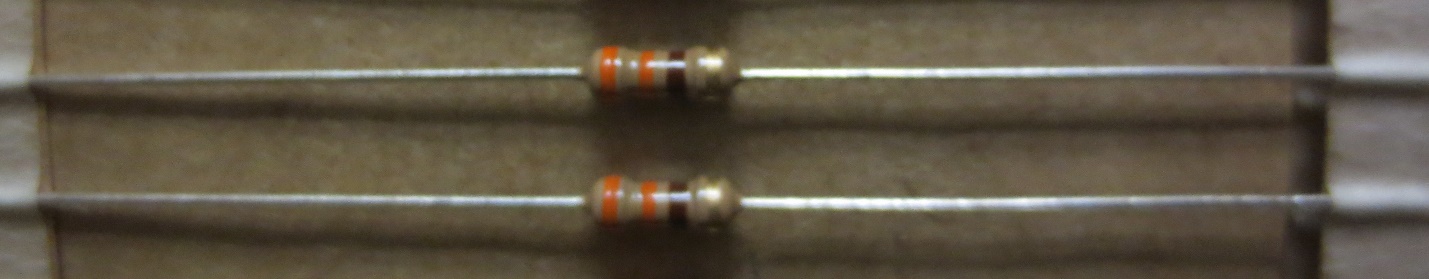


Figure 330 Ohm resistor

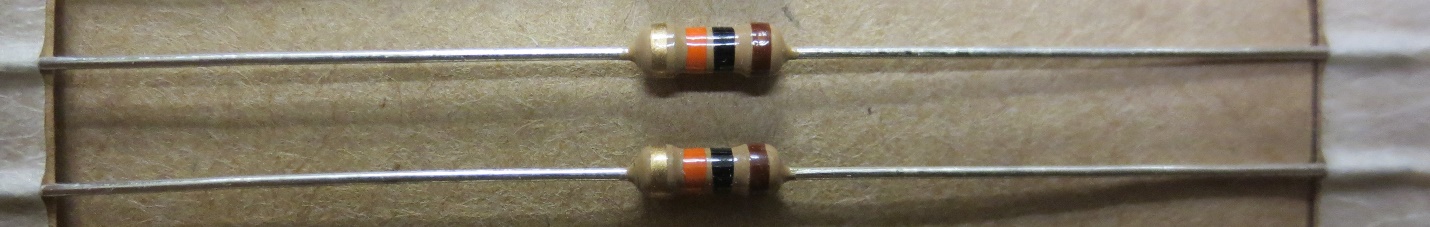


Figure 10k ohm resistor



Figure AMS1117 3.3V linear regulator



Figure 1uF tantalum capacitor



Figure 10uF tantalum capacitor

# Assembly Notes

Resistors, capacitors, connectors, sockets on this design are non-polarized. You may insert them in any direction.

PIC32 microprocessor must be oriented as shown in Figure 17 Fully assembled Owlboard Jr. The yellow dot must be oriented towards D1.

Buttons will only fit in one direction. Do not attempt to force the button into the other orientation.

Linear regulator must be oriented such that you are able to read the text ‘AMS1117’ when it is placed onto the back of the owlBoard Jr. Assure that you can also see ‘3.3’ on the regulator.

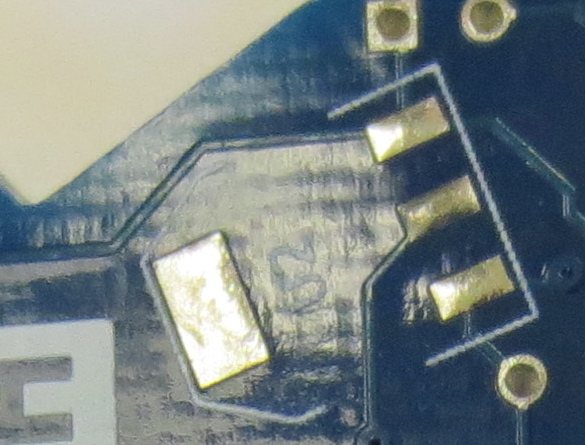


Figure Linear regulator location

Verify that the crystal oscillator is an 8 MHz crystal oscillator before placing onto the board



Figure Crystal Oscillator

LEDs are polarized. Please make sure to insert the flat side of the LED to match the flat side of the silkscreen on the board as indicated in Figure 16 LED silkscreen polarity.

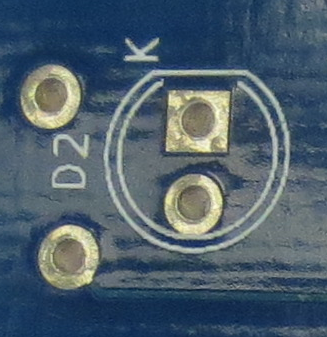


Figure LED silkscreen polarity

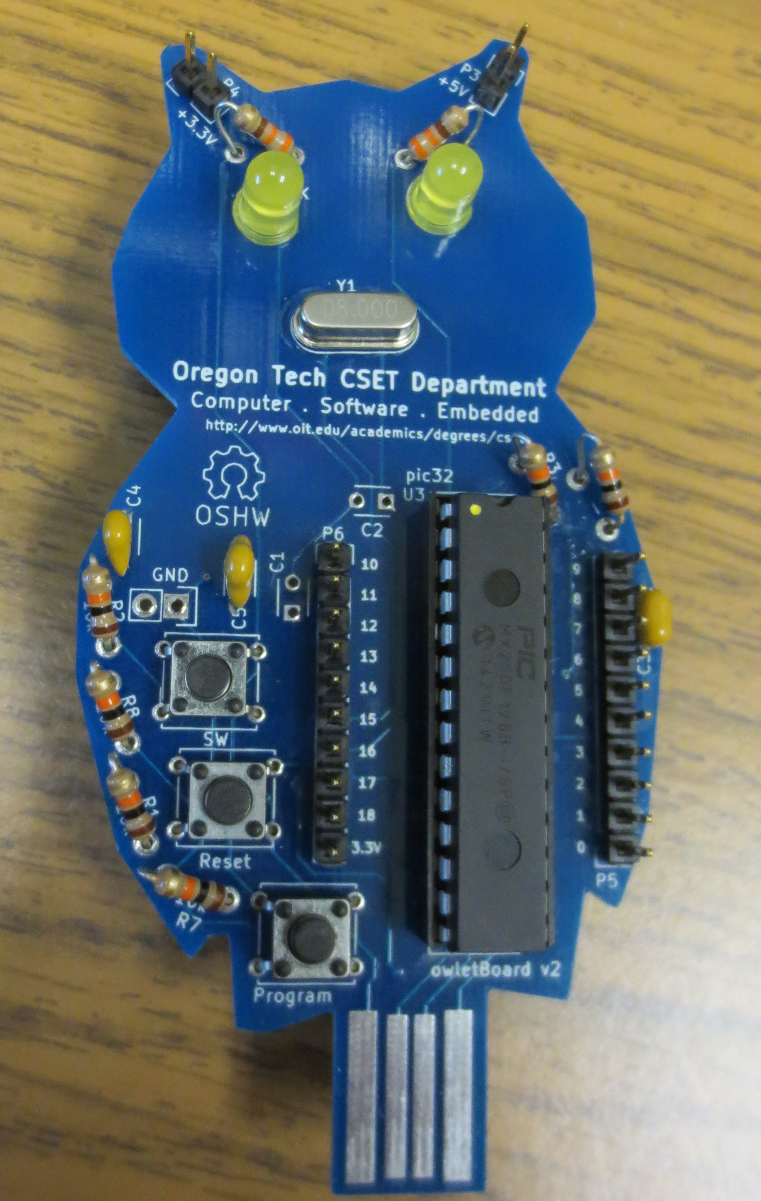


Figure Fully assembled Owlboard Jr.

# Software and Programming

## Development environment installation

We will use the Arduino compatible development environment designed for Microchip PIC32 products. Download MPIDE for Windows, MAC, or Linux.

Download the software and install it by navigating to this link and installing the MPIDE for your operating system.

<http://chipkit.net/started/install-chipkit-software>

Extract it to a location of your choice. Note that the driver for the owlBoard Jr. is located in the drivers folder of the zip file.

## Board driver installation

**Warning! Before plugging in your board, ensure that there are no shorts or bridges.**

When plugging in your board, D2 should start rapidly blinking, and your computer should detect something similar to the window below. It should indicate a stk500v2 compatible device. If it does not find a driver, please install the driver from the drivers folder of MPIDE.

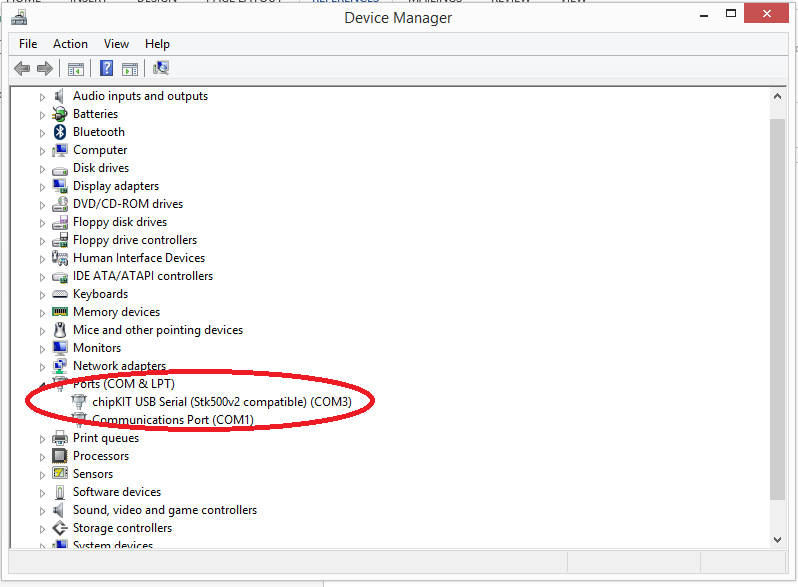


Figure Device Manager Stk500v2

## Launch MPIDE

Navigate to the extracted folder and launch MPIDE.

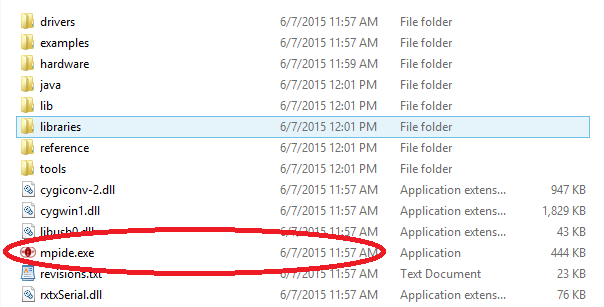


Figure Launch MPIDE

Verify that the DP32 board is selected. This board most closely matches the owlBoard Jr.

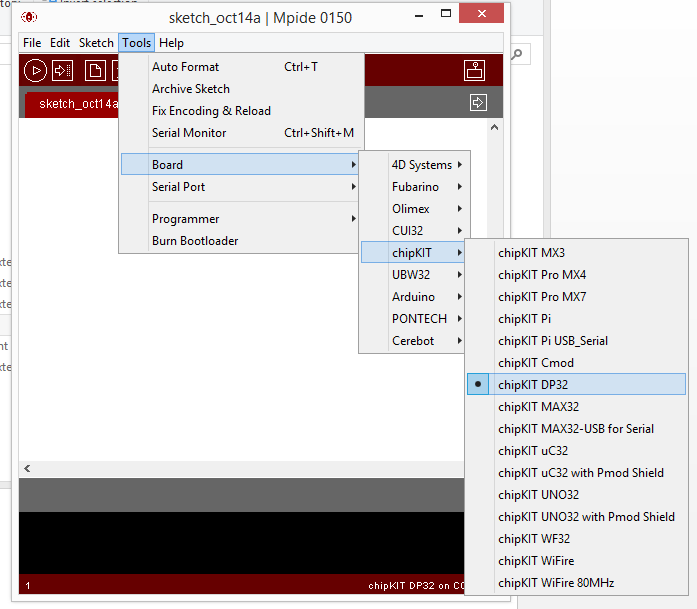
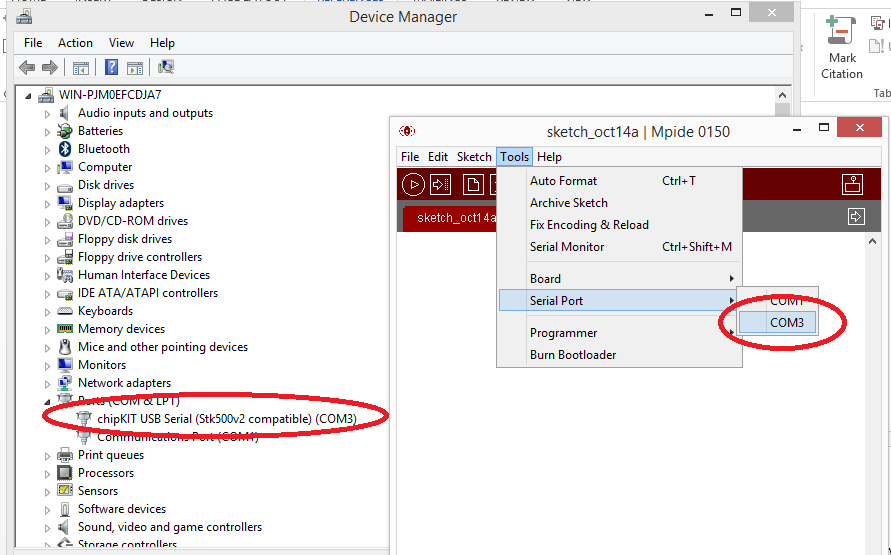
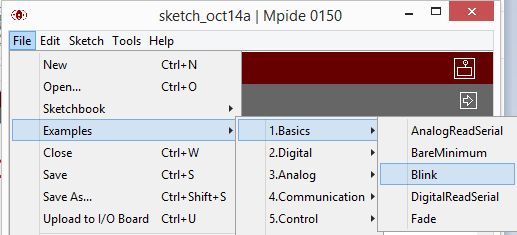


Figure Verify DP32 is selected

Verify that the correct COM port is selected.

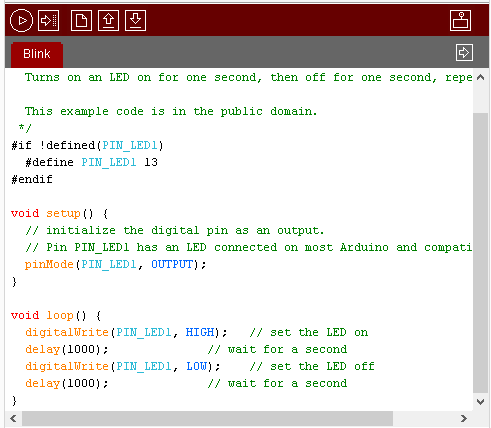


Open the Blink Example.



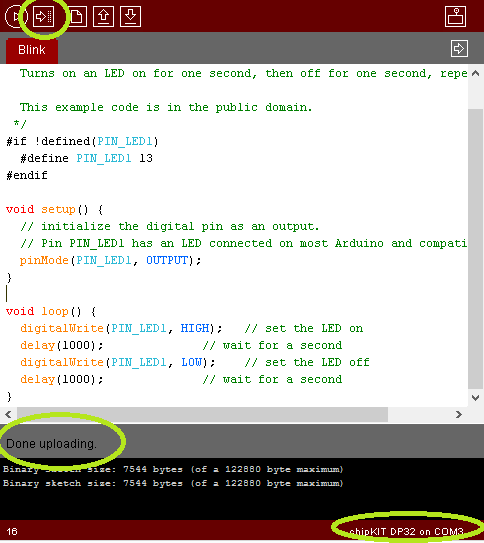
Figure

Modify the delay to change the blinking rate.



Figure

After modifying your code, Verify the correct board and COM port is selected. Click the arrow button. Once the upload is complete, the IDE window should indicate that it is done uploading.



Figure

Tutorial Complete

This is a preliminary draft copy.

Please send updates, comments, and suggestions to:kevin.pintong@oit.edu

Thank you for participating in the Oregon Tech owlBoard Jr. outreach project.

This project is sponsored by Microchip and the Oregon Tech Committee on College Teaching.