MEMSDuino System Element Abstracts

**Rack Mount Wood Board**

This is a wood board slightly more than 2u high for a 19 inch standard instrument rack. Large holes are drilled in the edges so that there is some margin of error for the fit. The basis of the board is a cheap plank of white oak 4 inches wide and 24 inches long, cut to size. This is useful for rapid prototyping of rack mount devices, as unlike in custom metal front panels, the part can be easily modified after the fact with no special tools to any given use case. A set of knurled brass thumb screws are used to hold it in the rack. The Custom Metal Box is bolted to the board by means of through hole screws which thread into the metal box. All other parts are attached to the board by means of 3d printed mounting brackets and #4 wood screws.

**Custom Metal Box**

This is a custom metal box which contains the relay board that connects 90 volts to selected pins on a Dsub connector in the lid. The base of the box is attached to a wood board by 4 screws, and the 90 volt boost board is attached to the inside by means of a bracket screwed to the box. This box fully encloses the 90 volts at room temperature for safety.

**3d printed parts**

3d printed brackets and heat pressed brass thread inserts are used to create adapter brackets from both our custom electronics and the Arduino and the Wood Board. There is also a 3d printed bracket with thread inserts which mounts the DC DC converter which steps up to high voltage into the inside of the Custom Metal Box

**5 V to 90 V boost**  
 This system consists of a pair of off the shelf DC DC converters which are modified and combined to step voltage up from 5 volts to 12 volts and then from 12 volts to 90 volts, allowing the 90 volt lines to all be supplied power from the USB power supply to the Arduino UNO.

**Arduino Shield Circuit Board**

This board adapts between the Arduino UNO and the rest of the system. It has a digital output which drives the programmable LED array, and an analog input which senses all of the input buttons. It also has digital output lines which go to the DB 25 Relay Power Board and control the electromechanical relays in that board, which in turn controls the 90 volt lines to the MEMS switches.

**DB 25 Relay Board**

This board uses electromechanical relays to connect the 90 volt line with any of 20 pins on a DB25 (25 pin DSUB) board mount connector which is in the lid of the custom metal box. In the 9 way switch, 16 of these lines are actually used.

**Control Panel Circuit Board**

This board

**SP6T control system**

This is an adaption of the MEMSDuino system to control the off the shelf SP6T switches available from Cryo-Elec.

SP8T + E-Cal system

Micro D to Header Cryogenic Adapter Board

Cryogenic mounting Hardware

SP9T Switch Board

Calibration Circuit Boards