List of changes in Rev 1.2.

**Panel controller**

1. Fixed bugs in Rev1.1
2. ADC output error when the input voltage from 5V-10V
3. Jitter issue in the first couple of frames when sending “start” command in mode 4 (internal position function mode)
4. Command Sync\_SD\_info failed to work in matlab 2011a
5. Solve the time delay issue in the mode 4. When we set function update frequency to a specific value, the actual update frequency was lower than the set value.
6. DAC
7. Change DAC output ranges from +/-5v to +/-10V
8. change DAC resolution from 12 bits to 16 bits based on chip change
9. ADC
10. Change input range for ADC0 and ADC1 from 0-10V to -5V-5V.
11. Keep the input ranges for ADC2 to 7 unchanged (0-10V).
12. Add a more flexible laser map.

The old user-input laser pattern originated from the quadrant-type learning pattern. It assumed the maximum pattern number is 96. The new implementation increases the maximum value to 1000.

1. Reassign the functionalities of ADC0-ADC3.
2. ADC0 is connected to L-R of X
3. ADC1 is connected to L-R of Y
4. ADC2 is connected as the ADC input of x in mode 3
5. ADC3 is connected as the ADC input of y in mode 3
6. Int0 is used to output the digital signal specified by the pattern map
7. Modified the algorithm in mode 3
8. Increase the dynamic range of the ADC inputs by removing the “devided ADC inputs by 2”
9. The index of x or y changes with ADC input linearly. For example, when the ADC2 changes from 1/x\_num to 10V, index\_x changes from 1 to maximum value x\_num if we suppose the maximum ADC2 value is 10V.
10. User can also set the maximum input value of ADC2 and ADC3.
11. Int3 is used for accepting external trigger to start display
12. Use Panel\_com('enable\_extern\_trig') to enable the external trigger mode. External trigger mode is disabled by default.
13. Use Panel\_com('disable\_extern\_trig') to disable the external trigger mode. It is recommended to disable external trigger because sometimes noise from Int3 can trigger the start by mistake.
14. The controller freezes if you type Panel\_com('enable\_extern\_trig') and leaves the int3 pin float.

**Matlab**

1. Removed the feature of prompting an exit popup windows when moving a mouse over the exit button
2. Initialize the gain values of x and y from 10 to zero in PControl
3. Add an update button in PControl GUI to update current gain, offset, position, and mode.
4. Modified panel\_control\_paths.m and saved it as initialize\_Pcontrol\_paths.m. This file generates Pcontrol\_paths.mat file which saves default paths.
5. Add a GUI, choose\_path.m, for users to change default paths of function, pattern, configuration, etc.
6. Modified displayOnGui.m to solve the Sync\_SD\_info problem in Matlab 2011a
7. Added new commands in Panel\_com.m.

Panel\_com('set\_max\_adc23', maxval); % set the maximum input value of ADC2 and ADC3

Panel\_com(‘'update\_gui\_info'); % to update current gain, offset, position, and mode in GUI

The ranges of the parameters of the following two commands are changed

Panel\_com(‘set\_ao’, chan, val); % val ranges from (-32767,32767) instead of (0,2047)

Panel\_com(‘send\_laser\_pattern’, pattern); %pattern is binary vector with length from 1 to 1000

1. Remove the dependency of SD.mat to launch PControl. If SD.mat is nonexistent, PControl gives a warning and continues loading GUI. If SD.mat is corrected, it also gives a warning and continues loading.
2. Removed \*.mat files from repository and deleted the experiment\_scripts folder

**Known issues**

1. When users use Panel\_com commands to change the experimental parameters, such as gain, offset, position, etc., the commands should be done after the stop command (Panel\_com(‘stop’) to stop updating pattern. The system might hang up if users change the parameters when the controller is updating the pattern. There is no such a problem if users GUI to change the parameters.
2. When the update frequency of the functions is higher than 400Hz, we found jitter issue in mode 4. Currently, no users use such a high frequency. We will solve the problem with double buffer in rev1.3.