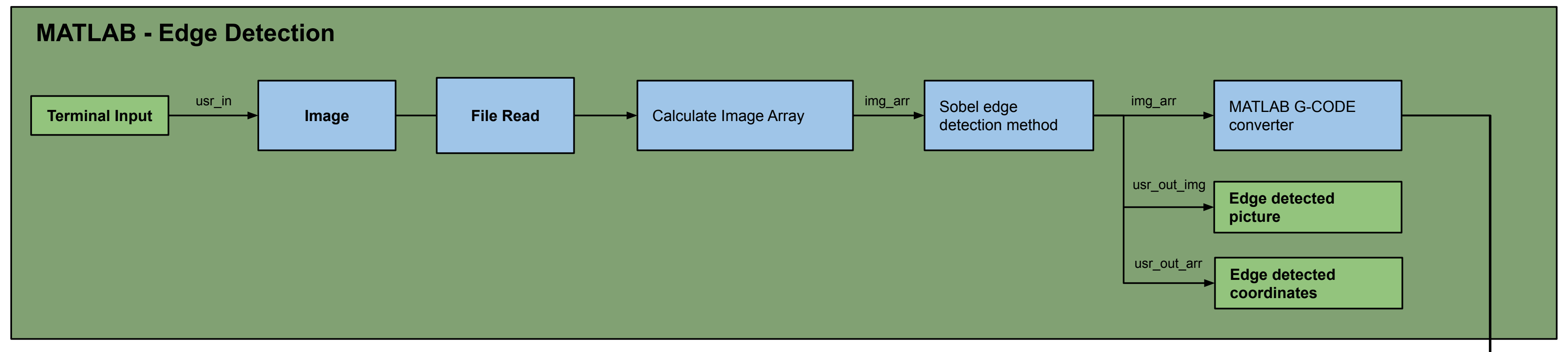
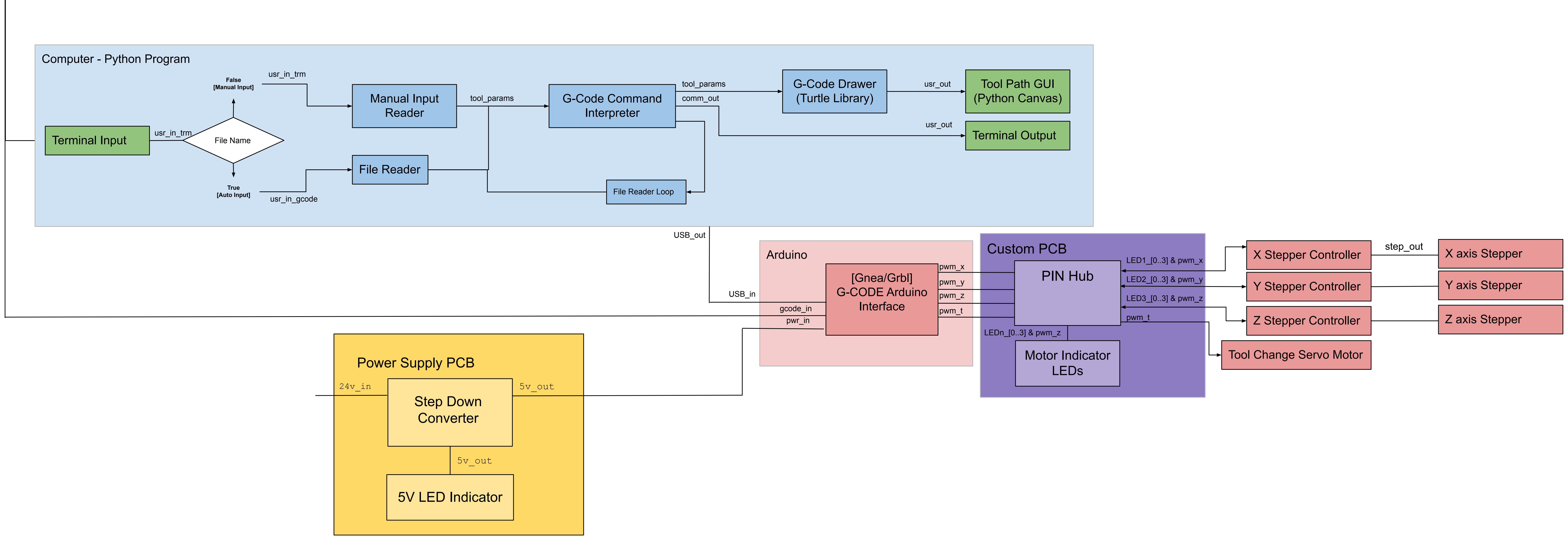


Interface Definition Table

Name	Type	Value	Description
`usr_in_img`	User input	Image path	Receive Inputs: • Image • File path to an image
`usr_in_gcode`	User input	G-CODE file path	Receive inputs: • G-CODE file
`usr_in_trm`	User input	Terminal input	Receive inputs: • Terminal inputs • Manual G-CODE commands
`usr_out_img`	User output	Image	Display: • Edge detection image • 2D array
`usr_out_arr`	User Output	Array	Output: • Edge detection values converted to an array
`img_arr`	Image array	2D array	• 2D array of values
`gcode`	G-CODE file	G-CODE	G-CODE file containing G-CODE commands. Output form MATLAB, and input to the G-CODE parser/GUI and Arduino.
`tool_params`	Python object: Tool parameters	Python object containing variables for the following values: • float X • float Y • float Feed rate • str Mode • str Units • int Current tool • int Next tool	• Target x-coordinate • Target y-coordinate • Target feed rate • Set tool movement to absolute or relative • Set units between inches and millimeters • Keep track of the current tool for switching tools • Set next tool
`comm_out`	Python variables: Tool commands	Float values for X, Y, Z, and T positions.	Instantaneous power state • X-axis motion • Y-axis motion • Z-axis motion • Tool switch rotation
`USB_in` `USB_out`	Signal and power over USB	Signals contained: • comm_in • comm_out • pwr_in	• Communication between host device and Arduino NANO • Power supply for the Arduino NANO
`pwr_in`	Power input	Voltage (5V)	• Arduino NANO regulated power supply
`pin_out`	Arduino PIN output		• Arduino output PINs
`step_out`	Stepper Output	A+, A-, B+, B-	Pulse voltages from motor controller to stepper motors
`pwm_x`	x-axis servo PWM	Integer [0, 255]	• Instantaneous feed rate of x-axis servo. Min 0, Max 255 = 6" per second.
`pwm_y`	y-axis servo PWM	Integer [0, 255]	• Instantaneous feed rate of y-axis servo. Min 0, Max 255 = 6" per second.
`pwm_z`	z-axis servo PWM	Integer [0, 255]	• Instantaneous feed rate of z-axis servo. Min 0, Max 255.
`LEDn_[0..3]`	LED indicators	4 sets of LEDs • LED1_[0..3] • LED2_[0..3] • LED3_[0..3] • LED4_[0..3]	4-LEDs for each motor controller. 16 total. LED indicators are wired in parallel with A+, A-, B+, B- for each controller. Wired to ground.
`24v_in`	24V input	Voltage(24V)	Takes 24V has an input
`5v_out`	5V output	Voltage(5V)	Output 5V • Giving the Arduino 5V • Checking the there is 5V being sent out by checking with a LED



KEY	
🟩	User Interface
🟦	Software
🟪	Custom PCB
🟥	Hardware
🟨	Power Supply