CS7.2 MPU - 1.4 (draft)

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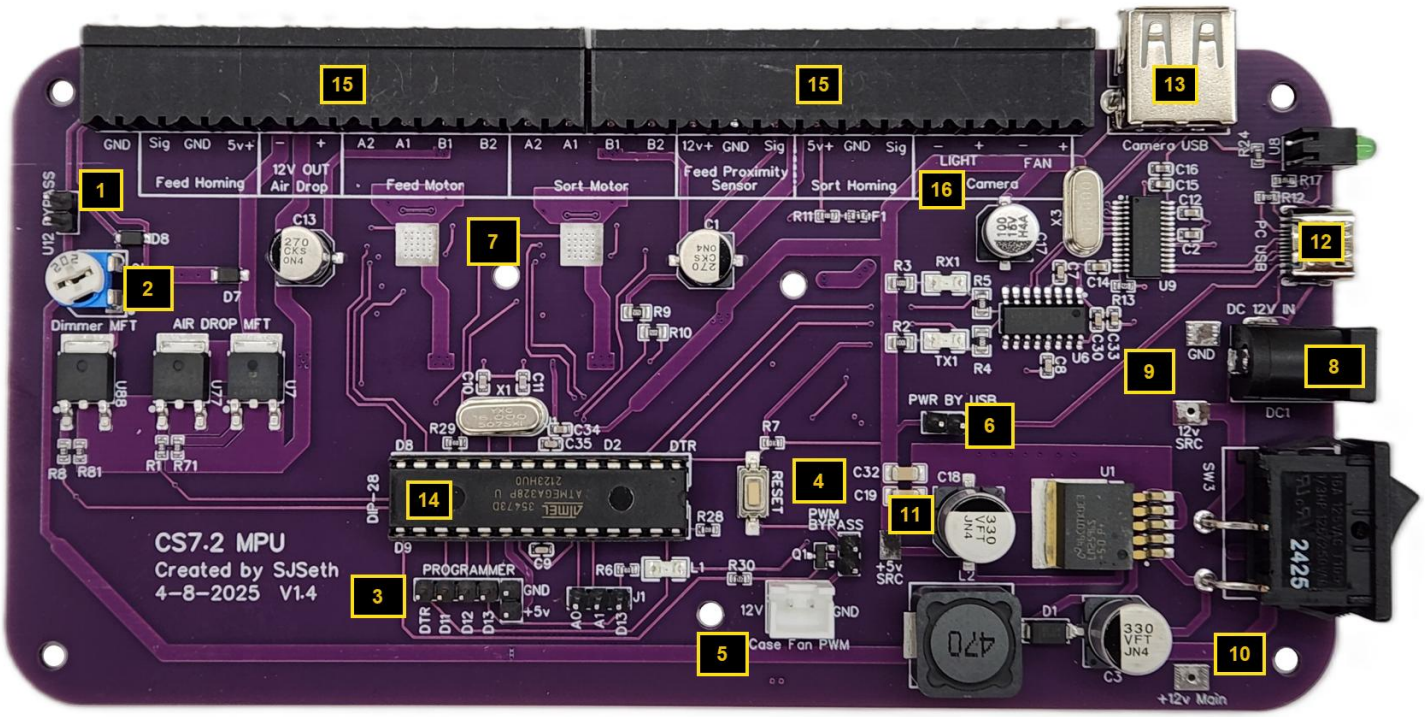
Introduction

This board is designed to be used with the CS7.2 Case Sorter project located at (https://github.com/sjseth/AI-Case-Sorter-CS7.2).

Key Features

- Integrated TMC2209 motor controllers
- USB Hub for single point connection to MPU and Camera
- Ultra clean 5v power supply with short circuit protection
- ATMEGA328P-U in DIP28 Socket for easy replacement/repair
- Integrated software dimmer for Camera Light
- Integrated MOSFET 12V relay for external air solenoid control
- Spring Clamp Terminals for easy install of wires and/or ferrules.
- Integrated power input and switch.

Description of Components



1. **Light Control Variable Resister Bypass** – In the event of a failure of the variable resistor or in the case that you want to send maximum power to the camera lighting; you can place a jumper on these pins to bypass the resistor completely.

2. **Light Control Variable Resister (2kohm)** – The variable resistor should be preset when shipped but can be adjusted to provide additional dimming (counterclockwise) if necessary.

3. **Programmer for bootloader –** These pins are used to install the bootloader on the ATMEGA32PU chip. This is completed before the boards are shipped and should not be used unless you need to replace the ATMEGA32 chip.

4. **Case Fan Speed PWM Bypass –** The firmware for CS7.2 has an option to set the case fan speed. By default, it is set to 100%. If you want to bypass the case fan dimmer for max power, place a jumper on these pins.

5. **Case Fan Connector –** This is a 12V connector designed to be used with your case fan cooling solution and labels for both 12v and GND are found on either side of the connector to indicate the polarity.

6**. PWR by USB jumper** – Allows board to be powered by computers 5V over USB. Though it is not recommended to be set during normal use, it can be used if you want to program the board without connecting it to an external power supply.

7. **Ground Pads for motor Heat Sinks –** The boards typically come with the heat sinks preinstalled. The Trinamic TMC2209 Motor Controllers are located on the bottom side of the board and have ground pads with vias to help transport heat to the top of the board.

8. **12v DC Barrel Connector –** Tip Positive 

9. **Test Pads for 12v input –** Test pads can be used with meter to ensure power supply is providing 12v in correct polarity.

10. **12v+ main (post switch)** – Test padcan be used with meter to ensure power switch is working

11. **5v+ test pad** – Test pad used to test 5v power supply.

12. **USB-C connector** – This connects to your computer.

13. **USB-A connector** – This connects to your camera.

14. **DIP-28 Socket for ATMEGA32P-U –** This socket allows you to replace the ATMEGA32P-U chip in case of failure.

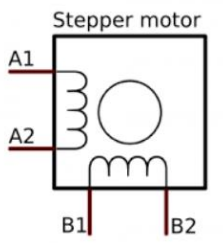
15. **Spring Terminal Clamp interface -** The spring terminals provide an easy way to connect the various sensors and motors to the board.

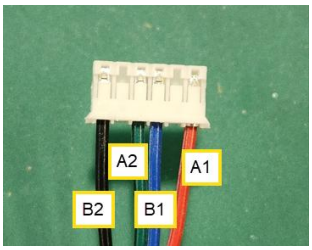
16. **Camera Light and Fan connectors –** The [FAN+] is 12v+. The [LIGHT+] is a variable 5V+ Max connector. This is controlled by a combination of the variable resistor (#2) and the PWM via software (D11).

Connecting Motors and UART Control

!Important! – Be sure you have powered off the board before connecting or disconnecting motor wires. Failure to do this may result in a damaged motor controller which causes the board to be useless.

The motor controllers are labeled using the typical motor coil labels of A1, A2, B1, B2 where A1 represents the positive side of the first coil and A2 is the negative side of the first coil. When connecting motors, it is important to ensure that the 1s and 2s are same polarity. If A1 is positive, B1 should also be positive.





In a typical Nema17 pinout, the pins will be oriented as seen in the connector above. If your motors shake or stagger when starting, you will need power off the board and reconnect the pins to the correct terminals so the coils are connected correctly. Here is a great video on the topic and covers how to verify your coils: https://www.youtube.com/watch?v=mPSPtvD8PiU

The CS7.2 Kit comes with the motor wires which already correspond to the colors on the labeling. If your motor wires connectors are wired differently than the image above, you cannot use the coloring on the kit labels unless you reposition the wires in the connector. Wires can be repositioned by slighting bending up the plastic clip on the connector and pulling the wire out.

Microprocessor (MPU) terminal pin map

ATMEGA32P-U Pin	**Interface**
1 (reset)	Reset Button
2 - D0 - (RX)	Connected to CH340
3 - D1 - (TX)	Connected to CH340
4 – D2	Sort Motor Pulse
5 – D3	Sort Motor DIR
6 – D4	Sort Motor EN
11 – D5	Sort Motor UART (RX)
12 – D6	Sort Motor UART (TX)
13 – D7	Feed Motor Pulse
14 – D8	Feed Motor DIR
15 – D9	Case Fan PWM
16 – D10	ST - Feed Proximity Sensor - SIG
17 – D11	Camera Light PWM
18 – D12	Airdrop MFT
19 – D13	D13 Pin, D13 LED
23 – A0	Feed Motor EN, A0 Pin
24 – A1	A1 Pin
25 – A2	ST – Sort Homing Sensor - SIG
26 – A3	ST - Feed Homing Sensor - SIG
27 – A4	Feed Motor UART (RX)
28 – A5	Feed Motor UART (TX)