A.L.I.S.H.A. (MKE Walsh MK85 Version)

***A**rduino nano **L**ED & **I**ntegrated **S**ervo **H**elmet **A**ctuator* version MKE is a simple to install ESP32-C3 shield module that allows DIY people to easily motorize and light up their favorite 3D printed Iron Man helmet or any other helmets (i.e. Batman, Spiderman, Gray Fox, etc.).

!!! BEFORE INSTALLING YOUR ELECTRONICS IN YOUR HELMET, WE STRONGLY RECOMMEND TESTING EVERYTHING ON YOUR WORKBENCH OR DESK FIRST !!!

The board has the following ports available for a variety of helmet and suit features:

- USB Power In (power only, no data)
- Power In
- Power Out
- Aux Power In
- Input Switch
- 3 Servo
- 2 LED eyes
- 2 NeoPixel Ports
- SUE expansion
- Gyroscope Port

*****DO NOT USE "AA" OR "AAA" BATTERY PACK, THEY CAN DAMAGE THE BOARD. Recommended operating voltage between 5v-6v (*not to exceed 6v due to MG90S servos.*) We recommend the use of a 5v (2.4A) or 5v (3A) USB power bank*****

Each LED port has a 100Ω (ohm) current limiting resistor.

Full documentation and instructions can be found on the ***Thingiverse Crash Works 3D page*** & ***Crash Works 3D GitHub Page***.

Board size:
MKE - 42mm x 45mm

Includes:

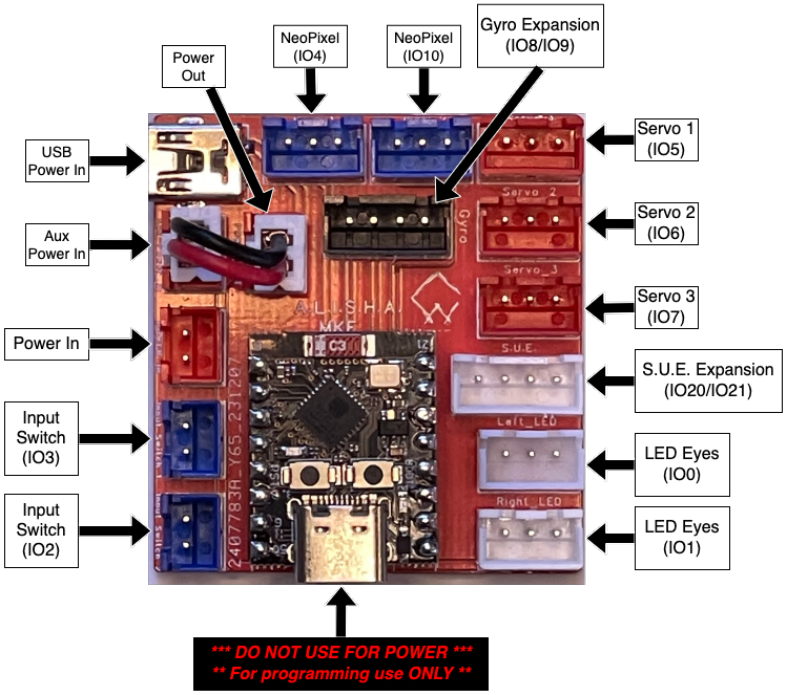
- ESP32-C3 Supermini
- MKE board with JST-XH female pin headers for easy jumper wire connection
- 2 - JST 3-pin headers for easy jumper wire connection to Servos
- 1 - JST 2-pin headers for easy jumper wire connection to Power In & Power Out Ports
- 4 - JST 2-pin headers for easy jumper wire connection to LEDs and Input Switch
- 1 - JST 2-pin power jumper cable

Cable descriptions:

- Two 3-pin wired connectors for your servos; they are color coded (**Black = Ground / Red = + / Yellow = S**). ***MG90s servos S = Orange***

***** Note: If you ordered the Walsh MK85 helmet version there will be 3 servo cables******

- One 2-pin wired connector for your power input & power output. (Red = + / Black = Ground)
- One 2-pin wired connector for your switch input (Either **Green wire** set or a **Blue wire** set) **** Switch input is not polarity sensitive****
- Two 2-pin wired connectors for your LEDs (Red = + / Black = Ground)



Single USB Power Bank Operation

During normal operation with a single USB Power Bank, ***DO NOT REMOVE*** the **power jumper wire that is connected to the "AUX Power" and "Power Out" ports.**

The board can be powered with a mini-USB connected to the top-left side of the board **–or-** using the "Power-in" connection on the top-left side of the board with the included 2-pin wired connector. *If using the "PENELOPE" board with the ALISHA board, connect the "Power out" from "PENELOPE" to the 2-pin "Power In" on the board.*

****** Do not power the board by plugging a USB cable directly into the ESP-C3 ******

Dual USB Power Bank Operation

If a second USB power bank is used, to support powering higher voltage servos and/or a large number of NeoPixels. You need to remove the jumper wire that connects to the "AUX Power'' and "Power Out" port. Then connect a second USB Power bank to the "Aux Power" port, this allows the second USB power bank to power to the Servo and NeoPixel Ports. The "Power-out" port on the top middle of the board can be used to power something externally if you choose, it will output the same amount of power as provided by the USB power bank connected to either the "USB Power In" or "Power In'' port on the board. When using the "Power-out" port, use the included 2-pin wired connector.

LED Connections

The LED outputs are separated into "Left" and "Right". You can connect to these using the included 2-pin wired connector, the Red wire connects to the positive of your LED and the Black wire connects to the negative/ground of your LED.

******Note the "Left" & "Right" LEDs are PWM controlled, and through coding can have their intensity adjusted as well as the option to have them blink.***

Input Switch Connection

The Input is triggered by a momentary "Normally Open" type switch, which you provide. You can use the provided 2-pin wired (either **Green wire** set or **Blue wire** set) connector to add your switch for controlling board operation.

****** You cannot use a "Normally Closed" Type Switch. If using a Limit switch, you must wire to the "C" (common) and "NO" (Normally Open) terminals on the switch. ******

Board Operation

The ESP32-C3 is already pre-flashed with the Crashworks 3D code. Once you have correctly wired your board to your Servos and LEDs, upon initial power up the LEDs will blink and the servos will move to their home position. Upon the 1st input (button press from switch) it will let the system know you are ready for operation. Every button press after this will trigger a function to either open the helmet (turn the LEDs off) –or- close the helmet (turn the LEDs on). If you "**Double Tap**" the Button it will adjust the LED eyes "**Off / Low / Medium / High**".

******Note the USB port on the ESP32-C3 is only used for programming; you should never power the board by connecting your power supply (USB Power bank, battery, etc.) directly to the USB Port on the ESP32-C3. Also, when uploading new code to the ESP32-C3 it is recommended that you disconnect the attached Servos, to prevent them from drawing power from the computer. The servos can be reconnected once you are done uploading the new code, and have disconnected from both the computer and the ESP32-C3's USB port******

Pixel Setup and Operation

Basic Pixel operation for an 8x8 matrix is enabled by default. To use this feature, connect your 8x8 pixel matrix to Pixel Port 1 (next to the USB connector). The pixels can be controlled with a momentary "Normally Open" type switch, connected to "Input Switch 2".

- Single button press turns the pixels on -or- off
- Double tap of the button will cycle between "Blue" and "Red" pixel light color

*** Additional Components (Not included) ***

- MG90S Servos (Recommended: Tower Pro 180 degree)
- LED Eyes (Search online for "cosplay led eyes")
- Momentary Switch (NO - "Normally Open" type)
- Charging rated USB-Mini cable (i.e. GPS, cell phone charging)
- Power bank (Recommended: 5V 2A or 5V 3A)

****** Note: We do not recommend or support powering the board using AA or AAA batteries ******

*****Resources*****

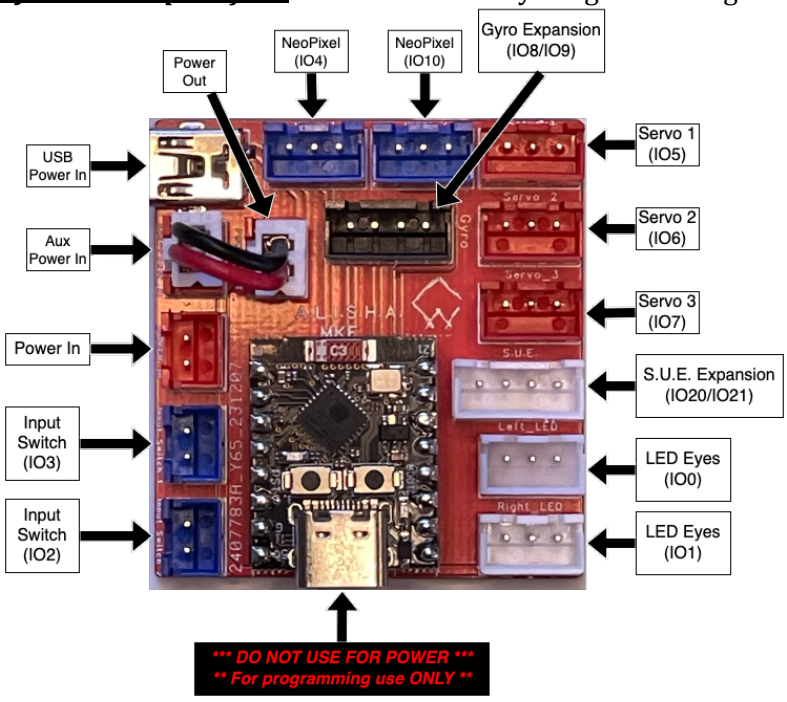
If you are looking for 3D printable file kits for Iron Man helmet motorization, you can visit the Crash Works 3D Thingiverse page, which contains kits and documentation for the Iron Man MK7, Iron Man MK46, and Iron Man MK85 helmets:
https://www.thingiverse.com/crashworks3d/designs

We're grateful for your excitement and support! We wish you all the success in your project! We have a big community to help you in any way on Frankly Built's discord: https://discord.com/invite/franklybuilt. We have a #crashworks3d-questions channel. See you there!

Thank you for your purchase, we hope you enjoy using our system and wish you the best with your project.

Walsh 85 - Additional Instructions

If you selected "MKE (W85)" when purchasing, the board has been pre-programmed to operate 3 servos. Two servos operate the faceplate, and a third servo operates the chin. The following information will aid you in getting everything properly installed and working. Prior to installation in your helmet, ***it is strongly recommended you stage all of the components in your workspace first*** to make sure everything is working as expected.



Along with the board shipped there will be a 3rd servo cable to connect to the Jaw/Chin Servo. Plug the cable into the "Servo 3 Walsh MK85 Chin (Servo 3)" port on the board as depicted in the above image. The board has been pre-loaded with the code to properly operate the Walsh version of helmets, enabling the chin to open and close along with the faceplate.