# A.L.I.S.H.A. (MKE-D Version) w/ Audio

***A**rduino **L**ED & **I**ntegrated **S**ervo **H**elmet **A**ctuator* version MK X-D 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.).

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

- USB Power In *
- Power In
- Power Out
- Aux Power

(*power only, no data)

- 2 Input Switches
- 3 Servo
- 2 LED eyes
- 2 NeoPixel

- Speaker
- Audio Jack
- Gyroscope

*****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 100 ohm (Ω) current limiting resistor.

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

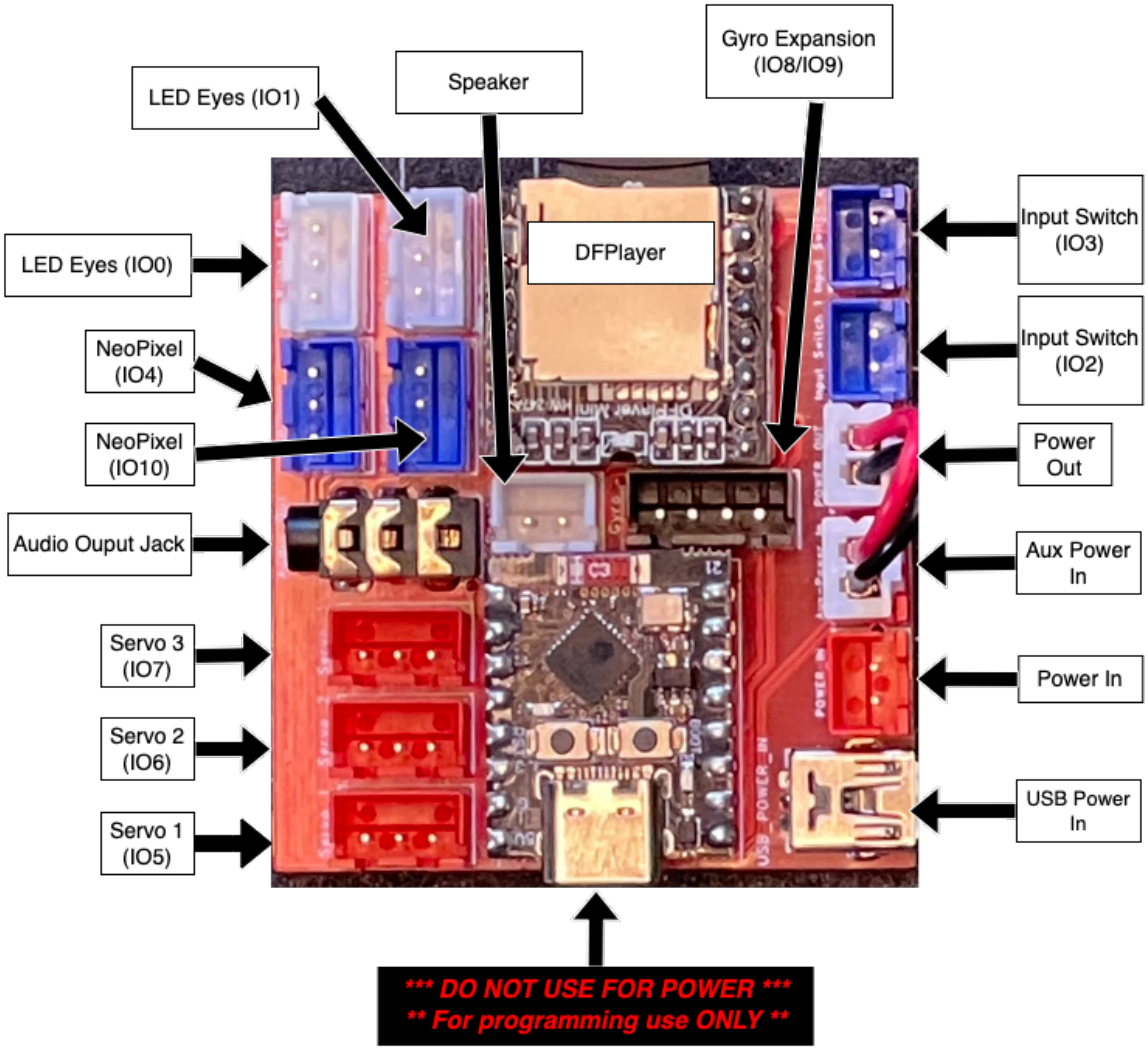
**Board size:**
MKE-D - 47mm x 50mm

**Includes:**

- ESP32-C3
- MKE-D board with JST-XH female pin headers for easy connection
- 2 - JST 3-pin headers for easy connection to Servos
- 1 - JST 2-pin headers for easy connection to Power In & Power Out Ports
- 2 - JST 3-pin headers for easy connection to LEDs
- 2 - JST 2-pin headers for easy connection to Input Switches
- 1 - JST 2-pin header for easy connection to a speaker
- 1 - JST 2-pin power jumper cable
- 1 - JST 4-pin header for easy connection to SDA/SCL device

***Included are pre-wired connectors to make connection to your components easier.***

- Two 3-pin wired connectors for your servos; they are color coded (**Black = Ground / Red = + / Yellow = S**). ***MG90s servos S = Orange***
- One 2-pin wired connector for your optional power input & power output. (**Red(+) / Black[Ground**])
- One 2-pin wired connector for your switch input (Either **Green wire** set or **Blue wire** set) **** Switch input is not polarity sensitive****
- Two 2-pin wired connectors for your LEDs (**Red(+) / Black [Ground**])
- One 2-pin wired connector for your speaker (Either a **Black & Green** wire set or **Black & Blue** wire set)




## ***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 Arduino Nano******

## ***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. ******

## ***Sound Setup and Connection***

The Audio output is via the speaker connector; use the provided 2-pin wired connector (either a **Black & Green** wire set or **Black & Blue** wire set) to connect to a speaker, which you provide. The recommended speaker is an 8Ω (ohm) / 3 Watt maximum. Or you can use a powered speaker connected to the Audio Out Port, which uses a 3.5mm Stereo Jack.

The Micro-SD Card Audio slot can support up to a 8gb card (Maximum), which you provide, and needs to be formatted as FAT32. ***(See Attached Document on SD Card Formatting)***

## ***Board Operation***

The board is 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 with blink and the servos will move to their home position, and you will hear the JARVIS Audio/Helmet Close Sound. 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 & Helmet open sound) –or- close the helmet (turn the LEDs on & Helmet Close Sound). If you "**Double Tap**" the Button it will turn "**Off / On"** the LED eyes.

******Note the USB port on the ESP32-C3 module 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 module. Also when uploading new code to the ESP32-C3 module 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 module's USB port******

***** 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 5 Volt 2A ((Recommended: 5 Volt 3A)
- Speaker 8Ω (ohm) / 3 Watt maximum

****** 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.