

CHiLL

Operations and Maintenance Manual
Venice Biennale 2016

Software I

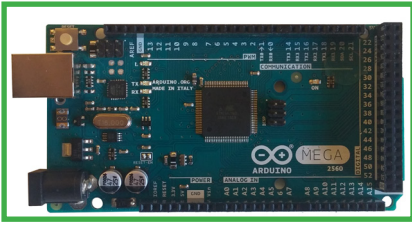
The main software running CHiLL is Grasshopper, the parametric plugin for Rhinoceros, and Firefly, a plugin for Grasshopper allowing for interactive programming. The coding has already been written, so maintenance on the code itself should not be necessary. If there is an issue, there are some things that you need to know.

The general setup requires the main computer to have Grasshopper and a sketch file called Firefly Firmata in Arduino IDE version 1.6.5.

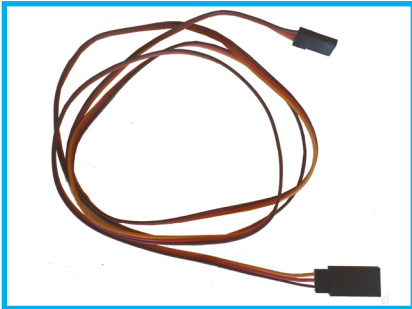
The Kinect sensor perceives the visual data of a person, and that data goes to the computer through Firefly in Grasshopper and through the computational method designed by Alex or a student. It is turned into streams of numeric data ranging from 0-180°(Servo turning degrees). This is then sent to the Servo and the mechanic flower through Megawrite in Firefly and a sketch file in Arduino IDE called "Firefly Firmata Var" (Alex modified the original Firefly Firmata). The Kinect sensor has its own power and USB; make sure it is connected to the computer prior to opening Grasshopper to ensure the computer reads it.



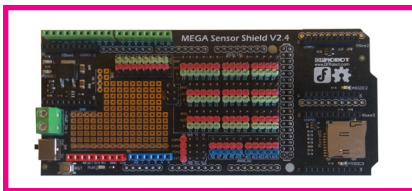
The **USB hub** should have eight **USB cables** connected to it; the hub itself needs to be connected to the fastest USB port in the computer to support the power.



The **Arduino board** needs Firefly Firmata running through Arduino IDE version 1.6.5 to function. Keep track of the board numbers to match it to its zone number; the computer will naturally recognize a previously assigned board when it is plugged in.



The **servo extension wires** connect to the Servo based on color. The yellow wire matches to the green pin while the brown wire matches to the black pin.



Because of the power output of the **Arduino boards**, it is connected to a **sensor shield** set to the "pwr" setting. An **adapter wire** is used to connect the shield to the **voltage adapter**.



The **adapter wire** is screwed into the green box on the **sensor shield** with a **screwdriver**. Make sure the positive and negative wires are in their correct respective port.



COMPUTER

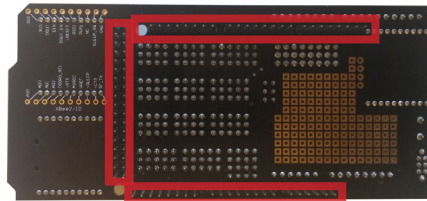
POWER STRIP / OUTLET



USB HUB



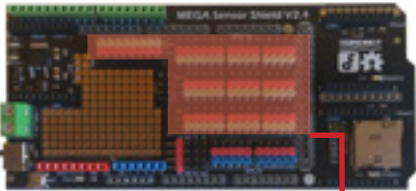
USB CABLE



SENSOR SHIELD (BACK)



ARDUINO BOARD



SENSOR SHIELD (FRONT)



ADAPTER



ADAPTER CABLE

POWER STRIP / OUTLET



SENSOR EXTENSION CABLE



MODULE



Hardware I

If any issues are to occur, they will most likely be hardware related. Based on the problem, there is a process of steps to take to correct the issue and get the construct back to 100% working order.

One or Two Flower Malfunction I

AI Check the mechanics

Check if the servo cable is too tight, or the mylar is not creased enough. Also test if the electricity is flowing to the Servo by placing your fingers on the Servo. Try to give the Servo shaft a push. If you feel resistance, it is on the grid. If not, proceed to B.

BI Check the [Servo Extension Cable](#)

Because there could be a problem within the cable itself, try replacing it with another to solve the problem.

CI Check the connection to the [Sensor Shield](#)

Make sure the [extension cable](#) is plugged in with the right pins (yellow to green, brown to black) and that it is not mis-plugged or loose.

DI Check the Servo itself

Although rare, the Servo itself may be broken. Replace with another, keeping the correct wiring order, and the problem should be solved.

Entire Zone Malfunctions I

Overheating I

If you know the software is fine and there is live data being sent through the Megawrite, proceed to the steps below.

AI Check the power

1- Check if the power is on, and the **USB cable** is plugged into the **sensor shield** and **Arduino board**. The light should be on.

2- The green light on **the adapter** should be ON. If not, power the adapter on.

3- The main blue light on the **USB hub** should be ON. If not, power the hub on. Make sure all **USB cables** are plugged into the **hub**.

BI Check that the switch on the **sensor shield** is set to "PWR."

CI Load the IDE Troubleshoot program to the **Arduino Board**.

Disconnect **the board**, load the program onto it, and reconnect the board to the **sensor shield**.

DI Check that the **adapter cable** is properly connected

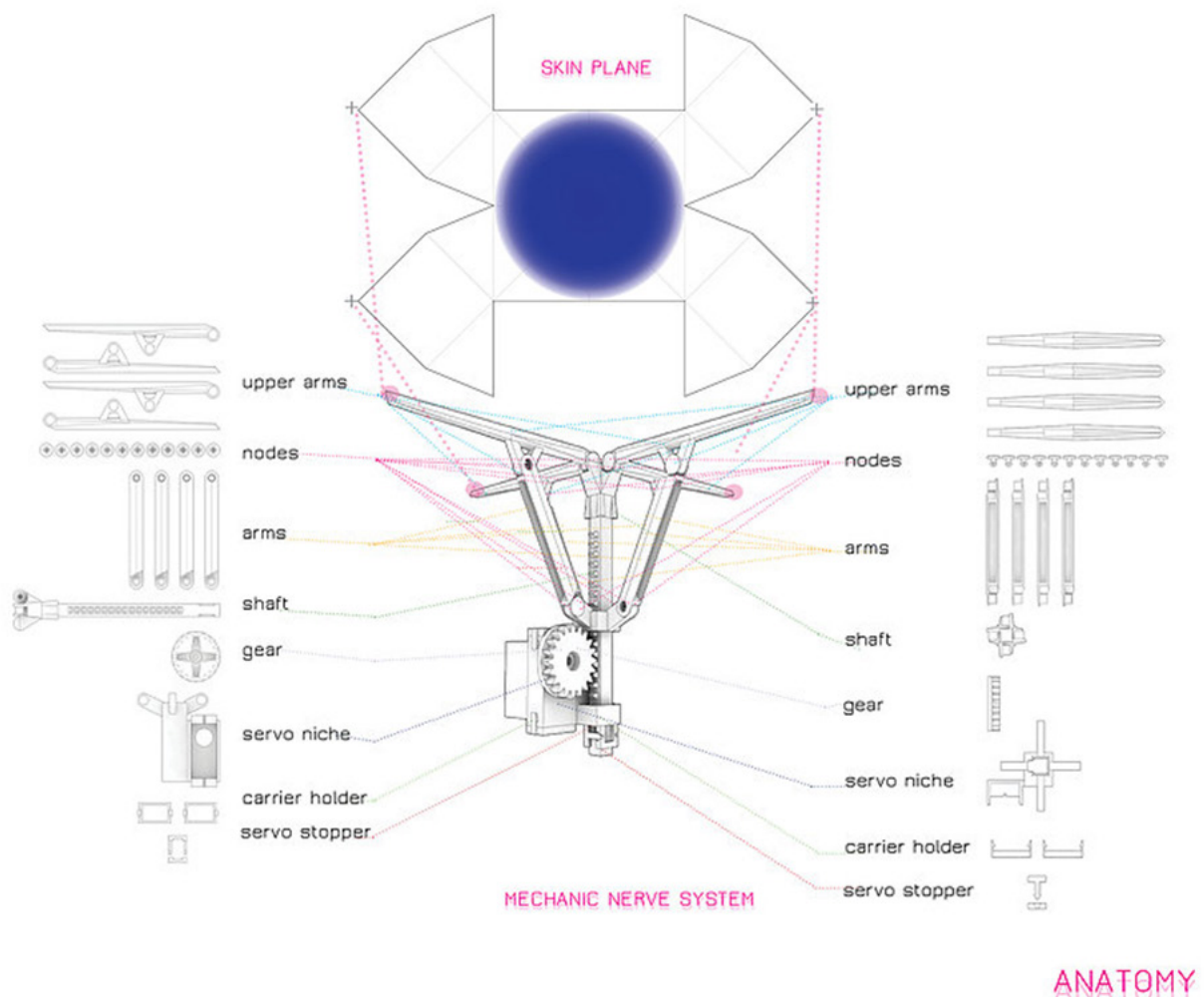
To check the cable's connection to the **sensor shield**, unscrew it, rescrew it, and if it is still not working, replace **the adapter**.

EI Replace the **sensor shield** and/or the **Arduino board**

If none of the above has worked, replace either the **sensor shield** and/or the **Arduino board** to correct the problem.

Flower Hardware Broken/Missing I

Often a piece of the 3D printed mechanic nerve system may come loose, break, or be missing. A number of things related to this could cause a flower to not move. There is a process to fix this.



AI Lube the Gear and Shaft

Using some silicone spray lube (clear) on the gear and shaft could release a piece that is stuck.

BI Check for a missing gear

If a gear is missing, first be sure the cross arm is still there. When it's connected to the motor, rotate it clockwise until it cannot move anymore, then turn it back a couple notches. Slip the gear overtop with the teeth interlocking on the shaft and the Servo cross arm fitting easily into the gear's back (if an end does not fit easily, rotate the gear 90°!). Screw the gear into place to secure it and test the system movement.

CI Check if a motor is broken

If a motor is broken, remove the screw, gear, and Servo cross arm from the contraption. Detach the small buckle from the bottom of the motor and take out the motor. Place the new motor in and secure with the buckle. Reattach the gear using the process outlined in B.

In case a board starts overheating, it may smoke or catch on fire. Immediately unplug the power to the [USB hub](#) and air out the area. Replace [the board](#) and reconnect.

If there are any questions or concerns, refer to the contact information below.

Alex Jiang - Managing Programmer
alex@lm-arch.com
917-902-9470