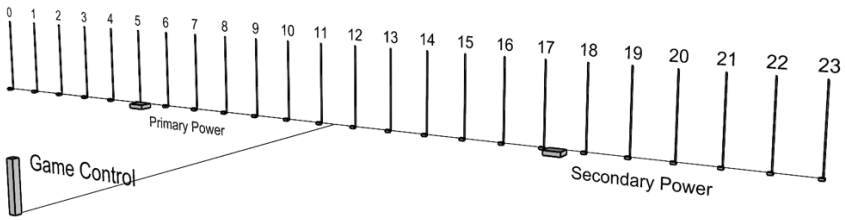
Turtle Whips

Technical Reference Manual
Summer 2026
Future Turtles

OVERVIEW



The project consists of **24 whips**, spaced 32” apart in a straight line.

There is a single Game Control button which should be mounted in the middle, about 30’ in front of the whips.

There are two power supply boxes, one between whip 5 and 6, the other between whip 17 and 18. They are permanently connected to cable harnesses which provide power and signal to each whip.

Here is what a power supply box looks like:

Set Up the Whips

Pull a straight string about 70’ long so all the whips are lined up perfectly. Measure 32” exactly between each whip.

Each whip fits into a mounting cup:

The mounting cup screws into a tripod:

Each tripod is drilled into the playa with 3 lag screws (14” long, same as we use for shade structures).

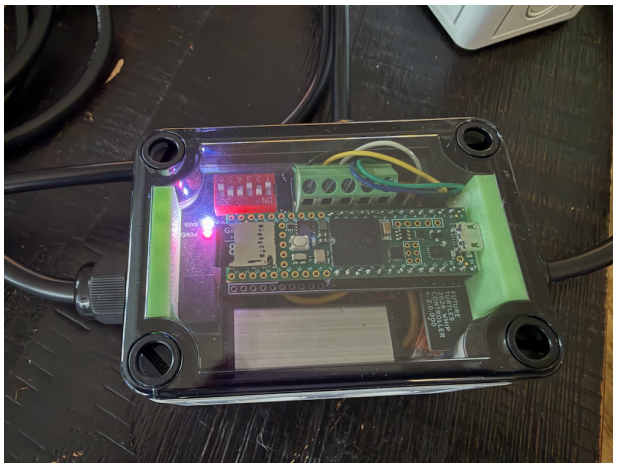
Adjust the screw tightness of the three arms of the tripod so that each whip is perfectly upright and aligned with the other whips. Have a friend stand at one end with one eye closed to make sure the whips line up straight.

Game Control

Use two lag screws to drill the game control stand into the playa. Place the box on top and ziptie the wire behind one of the legs. Then bury the wire an inch below the surface of the playa.

Connect Power

There are two big black power supply boxes. Each one provides power to half of the whips. Carefully untangle the wire and you'll find 12 small controllers that look like this:



The controllers have numbers 0-23 written on them and need to be laid out in order with 0 controlling the leftmost whip, 23 controlling the rightmost whip.

In between whip 11 and whip 12, the wires need to be plugged together to provide a data connection between the left and right whips.

Each small controller has a female XLR plug. Snap that into the corresponding whip's male plug.

Using extension cords, provide 120 volt AC power to both power supply boxes. The whips should light up.

Use the orange waterproof box to protect the power cable:

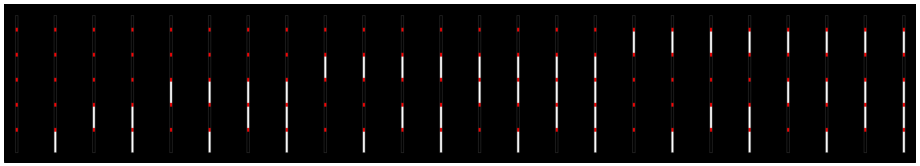
Connect the game control button to the first controller using a supplied 50’-long stereo phone jack. Bury this in playa so it is not a tripping hazard.

Initial Test

Open the primary power box and find the remote control. Point this remote control at the small, internal electronics box that is inside.

Click the **Red, Green, Blue, and White** buttons on the remote control, and ensure that every whip is showing the appropriate solid colors.

Click the **FLASH** button. This causes each whip to display its position number, in binary. The bottom segment means 1, the next segment means 2, then 4, 8, and 16. It should look exactly like this:



If the binary display for any whip is not correct, open that whip’s small controller box with a screwdriver, and adjust the red and white DIP switch (see DIP Switch Adjustment, at right).

Click the **Play** button on the remote control to start displaying patterns. Wait until night and then adjust the brightness with the brightness up/down buttons until it looks great. Take some pictures for posterity.

Go to the **game** button, which should now be lit up. Click the button once. A bouncing yellow bird should appear on whip #4. Click the button again to play the video game. When you lose, your score, probably zero, will scroll from right to left, and you can then play again. If you don’t click the game button for a few seconds, the whips will resume showing patterns.

Diagnostics

Inside the small controllers at the base of every whip are two tiny LEDs.

- The RED LED indicates power.
- The WHITE, BLINKING LED indicates data.

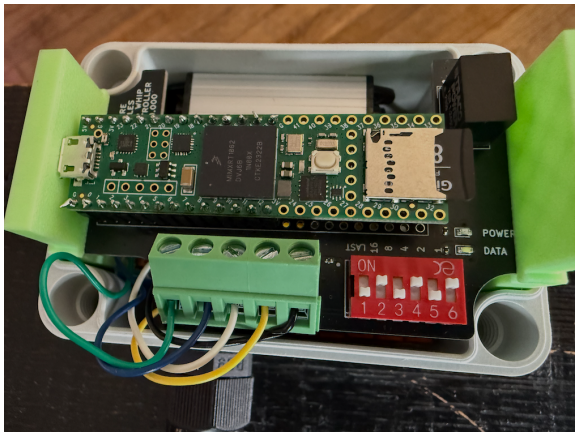
If a controller has power but no data arrives for a while, it will display a bouncing orange sine wave pattern.

That should give you enough information to diagnose most wiring problems.

DIP Switch Adjustments

It is crucial for each whip to know its address, from 0 to 23, so that it displays the correct column of pixels. The DIP switches should already be set up correctly, but you can confirm this by clicking the **FLASH** button which tells each whip to display what address it thinks it is at in binary, where the bottom position is 1, the next position up is 2, the next position up is 4, etc., as shown in the image at left.

If you replace a faulty controller or rewire something, you may have to change these DIP switches.



Notice the red switches. They are numbered 1-6 on the switch, but ignore that: look at the numbers printed on the circuit board itself, where you can see 1, 2, 4, 8, 16, and LAST.

In this photograph, switches 16, 4, and 1 are on. 16+4+1 = 21 so this whip's address will be 21.

There is also a switch marked **LAST**. **LAST** is a special switch that tells the controller that it is responsible for either **0** or **23**. For every other position, it should be off.

*(Turning on **LAST** adds a 100-ohm terminating resistor to the communications channel to eliminate ringing from the end of the line leading to data corruption.)*

Spare Controller

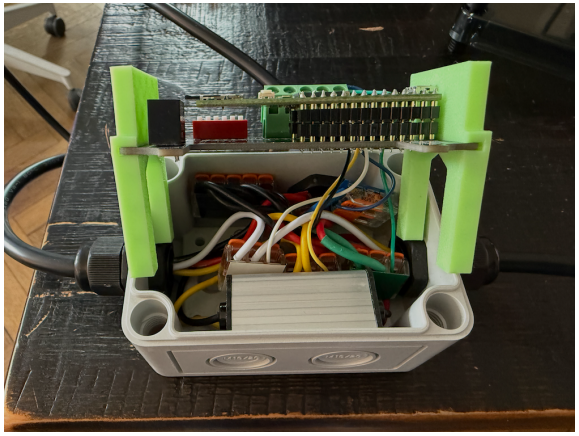
The small electronics box inside the primary power box is what controls the patterns and games for all 24 whips. If anything goes wrong with this controller, try turning it off and on again (look for a green on-off switch inside the power box).

If this doesn't fix the problem, there is a spare, backup controller ready to take over in the other power box. Turn off the green power switch leading to the primary controller, open the other power box (the one between whips 17 and 18), and turn on the green power switch inside there. Then plug the game button into the new power box.

Note: Each power box has a big, silver transformer which converts 120 volts AC into the 24 volts DC for the 12 whips closest to it.

Wiring Inside the Small Controllers

The wiring inside the small controller boxes can be delicate and feel like spaghetti.



Don't panic! There is a color code so you know what to connect to what:

Color	Purpose	
RED	+24 V	Power from main transformers
BLACK	GND	DC Ground
WHITE	Comm A	Communication between controllers
YELLOW	Comm B	Communication between controllers
GREEN	+12 V	Lower voltage used for whips and circuit boards. There is a silver 24vdc to12vdc stepdown transformer inside every controller.
BLUE	Neopixel signal	WS2812 data from circuit board to whip

Wiring Inside the Power Boxes

The wiring inside the power boxes is even easier, because every cable is labeled. You'll see:

120 V Hot and Neutral – coming in from the 120 V power cord and connecting to the input of the big transformer

24 V DC (with a fuse) – coming out of the big transformer and distributed to the whips

5 V DC (with a switch) – provides power for the electronics in the small box and also lights up the game button. (There is a small 24V to 5V transformer that steps down the 24V from the big transformer)

A (white) and B (yellow) – communications signal coming out of the electronics and distributed to the whips

GAME – a wire connecting the game button back to the electronics

GND – provides DC ground for both 5V and 24V.

Also in each the power box, there is a fuse on the 24 V line. If this fuse blows, check for a short on the 24 volt DC power side.