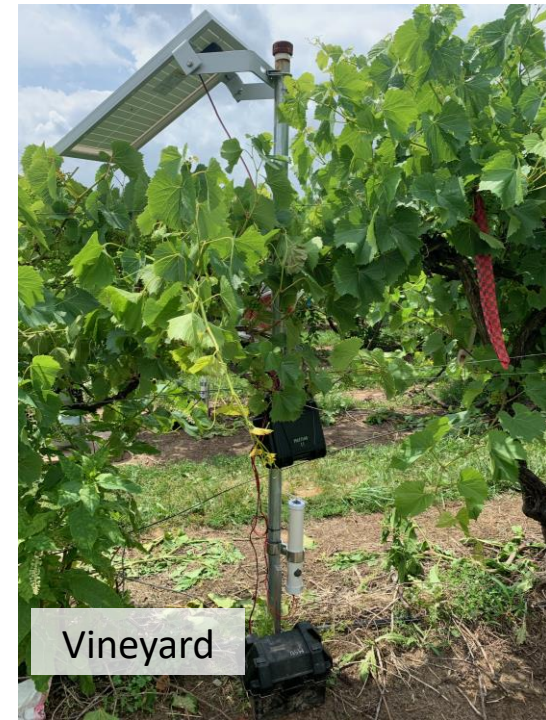


☞ Capturing the wind ☞ a guided session on low-cost airborne inoculum sampler construction and use

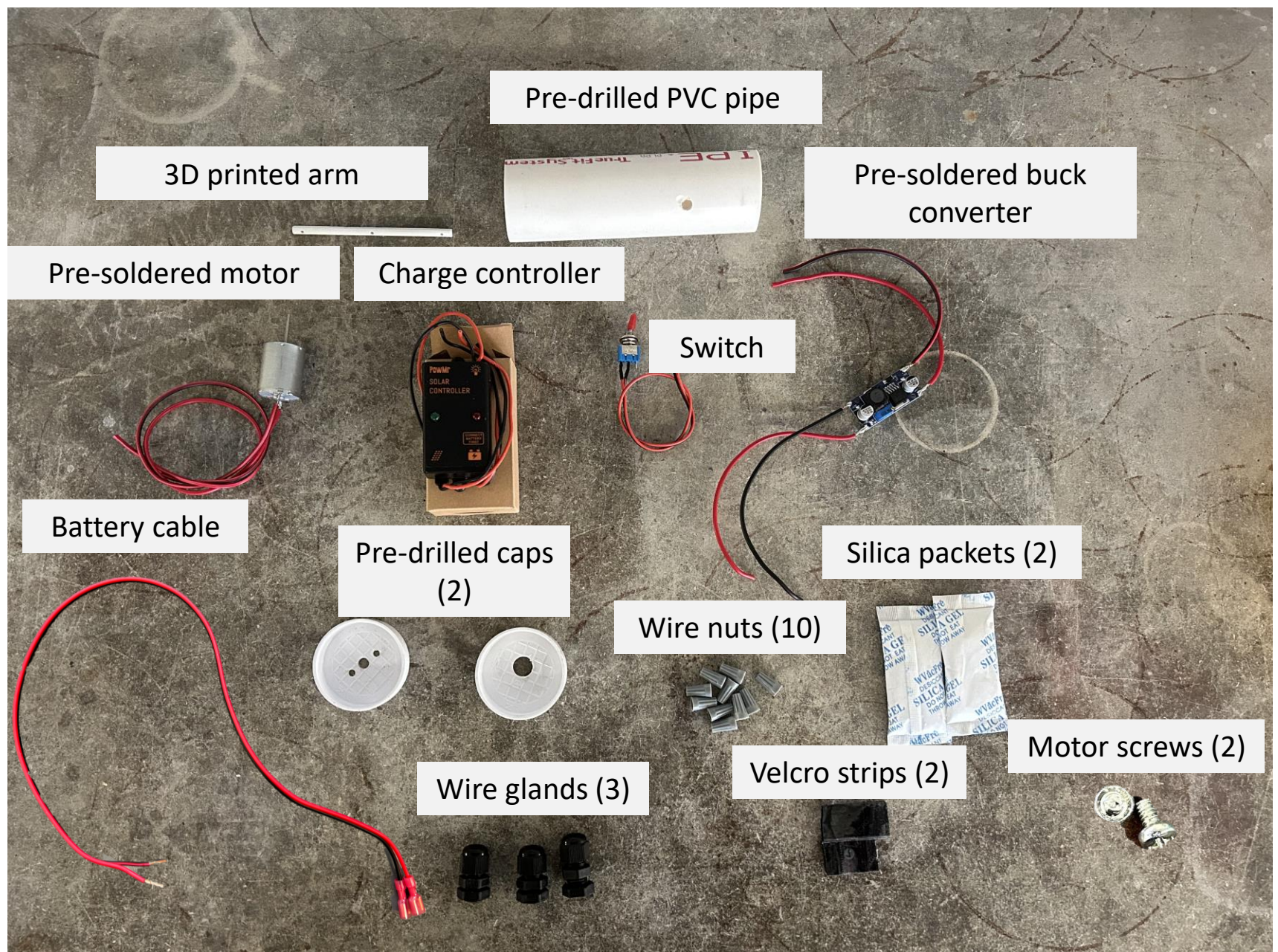
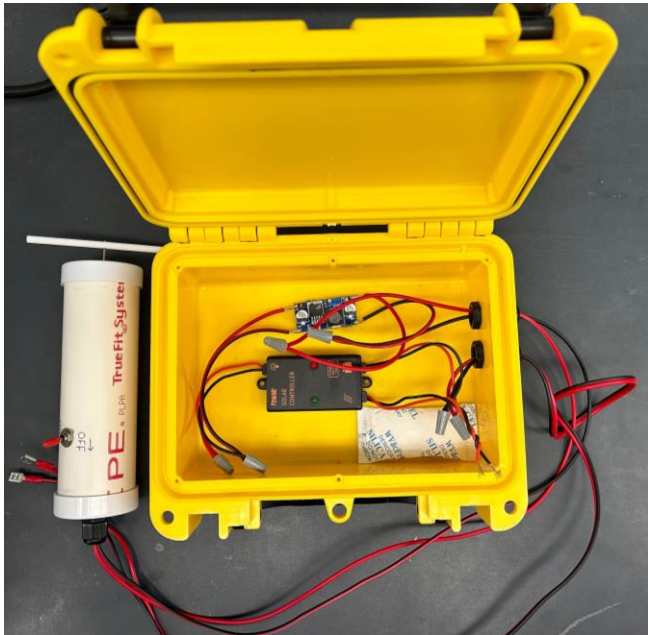


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Guided construction

What's in the box?



Mounting the motor (1)

- **Test the motor**—Touch the wire ends from the soldered motor to a charged battery (**positive** to **positive** and **negative** to **negative**) to make sure the motor is functional
- Using the screws (2) and a small flat-head screwdriver, secure the motor to the pre-drilled PVC end cap
 - Touch the motor wire ends to the battery to check that the screws are not preventing the motor from spinning

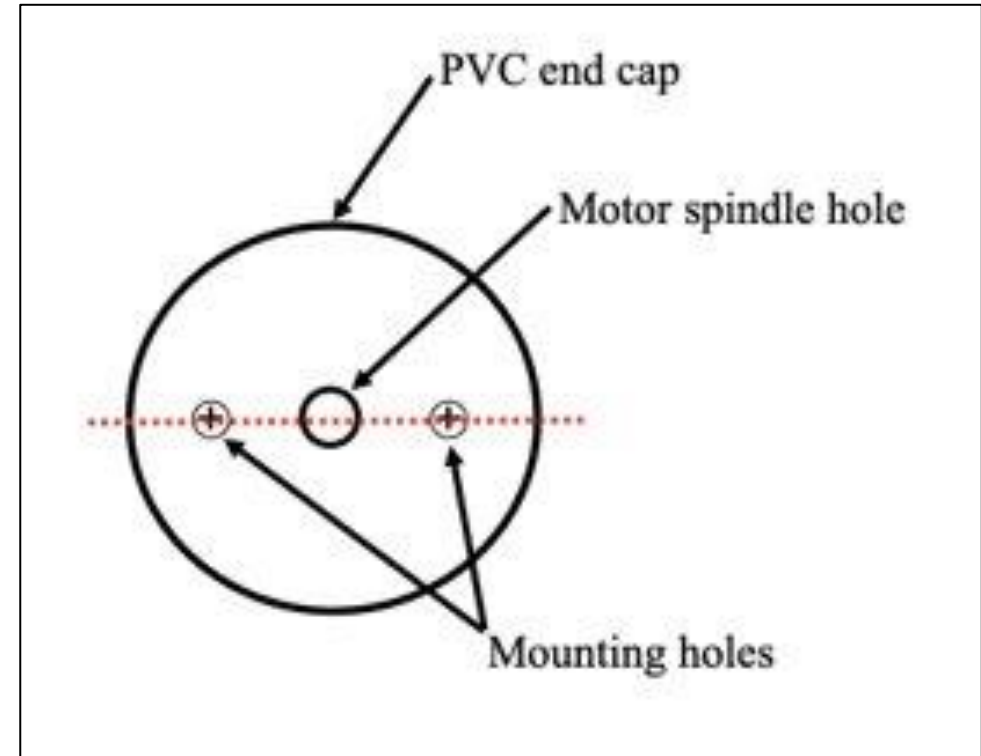
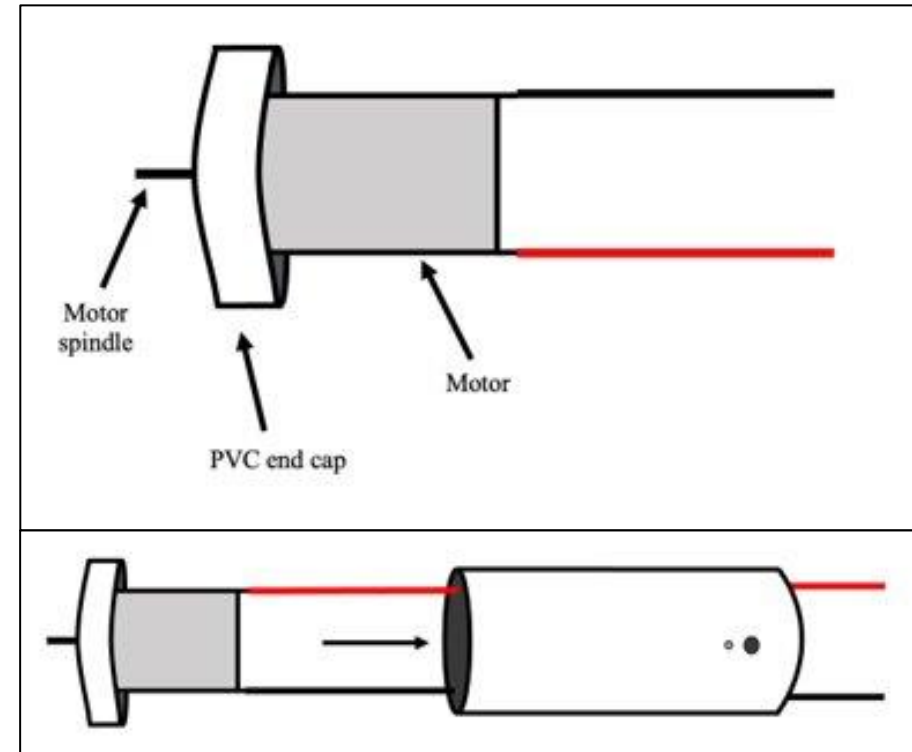


Diagram of the pre-drilled PVC end cap used for mounting the motor; cap should be flush with the motor

Mounting the motor into the PVC (2)

- Gently thread the wires from the motor **through** the PVC pipe
- Snap the PVC end cap with the motor onto the pipe. The motor should be placed at the end of the PVC pipe, **opposite** where the switch hole was pre-drilled



Top: PVC cap with motor secured and wires soldered

Bottom: Placement of motor into PVC pipe casing

Connecting the power switch (1)

- Cut the **positive** wire 8 cm (3.15 in) beyond the bottom of the PVC pipe
- **Strip the end of the wire.** Set aside excess wire for use later
- Using a **wire nut**, connect the positive wire from the motor to the **positive** wire of the switch. Gently tug on each cable used in the connection to make sure it is secure

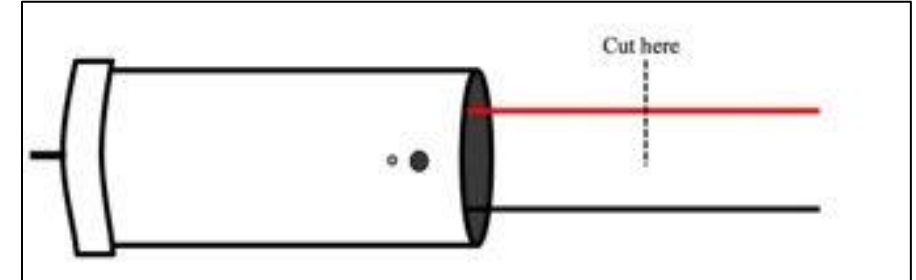
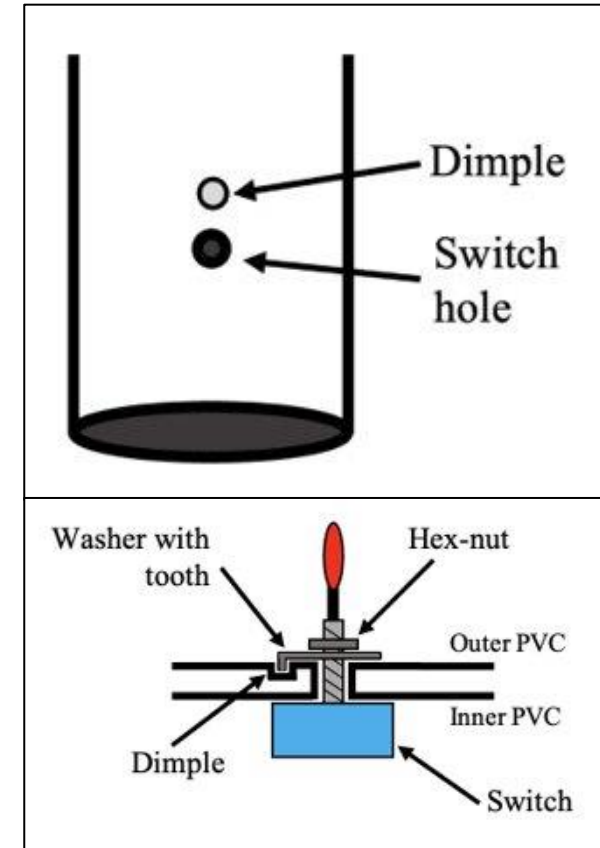


Diagram of motor inside PVC pipe casing and wire that will be cut (for the switch) after being pulled through the bottom of the PVC pipe.

Connecting the power switch (2)

- Remove the washer and nut from the switch and set them aside
- Insert the switch through the hole drilled into the PVC pipe

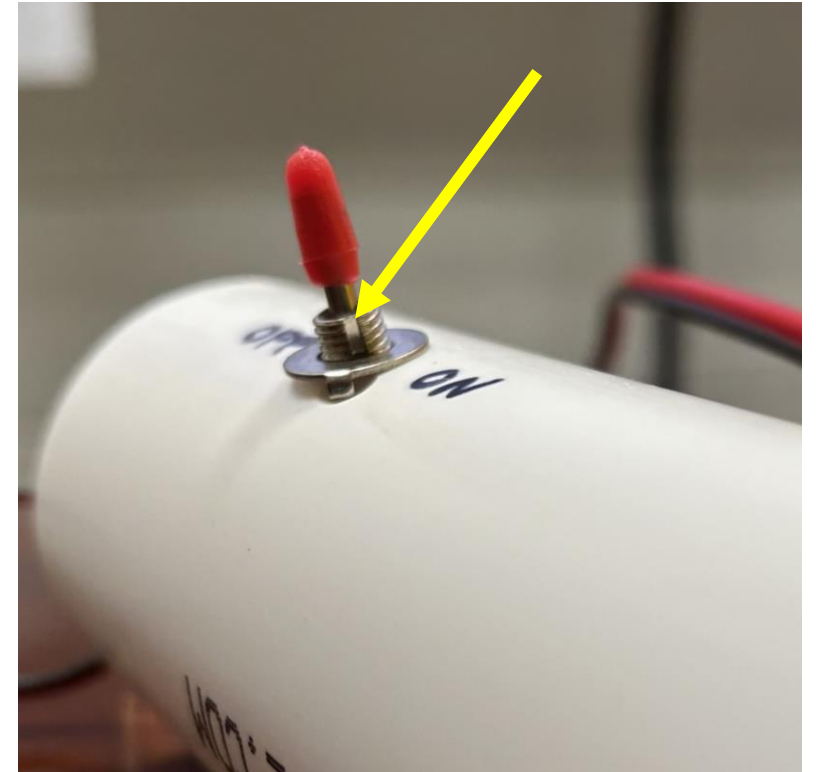


Top: Diagram of the front of the pre-drilled PVC pipe where the switch will be added. **Bottom:** Layout of the switch from profile view of the pipe.

Connecting the power switch (3)

- While **holding the switch from the inside the pipe**, seat **the washer tooth** in the dimple above the switch hole on the PVC pipe
- **Screw** the small hex-nut on top of the washer
- Use the excess **positive** wire from the motor and use a wire nut to attach it to the **negative** wire of the switch

Note: the area around the switch can be sealed with duct seal to prevent water damage



Finishing the PVC pipe enclosure (1)

- Remove the hex nut from the wire gland and screw the gland into the threaded hole in the **bottom PVC end cap**; the sealing nut of the wire gland needs to be on the outside (smooth) of the end cap
- Loosen the sealing nut of the wire gland and thread the wires **through**



Orientation of wire gland in the bottom end cap;
description of wire gland pieces

Finishing the PVC pipe enclosure (2)

- Add 1 silica gel pack **inside** the PVC pipe
- Gently push the wires and wire nuts connecting the switch to the rest of the circuit into the PVC pipe
- **Tighten** the sealing nut on the wire gland
- **Snap** the cap onto bottom of the PVC pipe

Note: the end caps should be waterproof using silicone caulk before deploying



Inside of PVC pipe at this step; silica gel pack and wires with nuts placed inside the pipe, remaining wires leading out of PVC pipe.

Finishing the PVC pipe enclosure (3)

- Using the battery, touch the wires that are threaded through the PVC end cap (**positive** to **positive** and **negative** to **negative**). Ensure the motor and switch are functioning properly.
- Use a sharpie to label on the PVC pipe the ON and OFF switch positions.

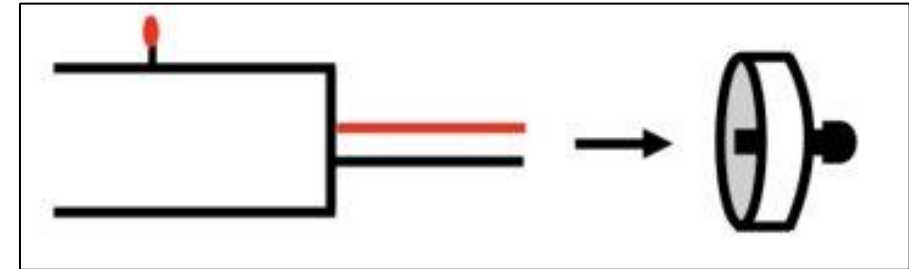
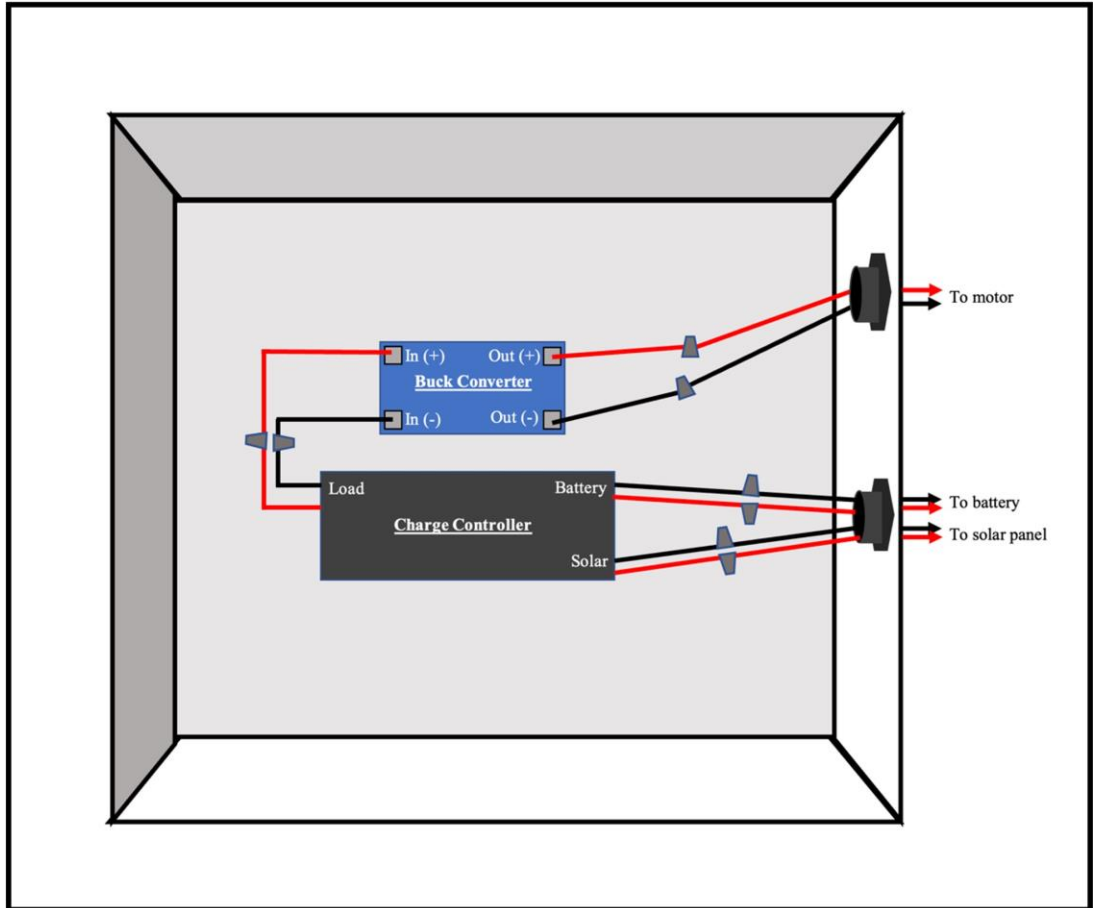


Diagram of the motor enclosure PVC pipe with the wire gland-threaded PVC cap

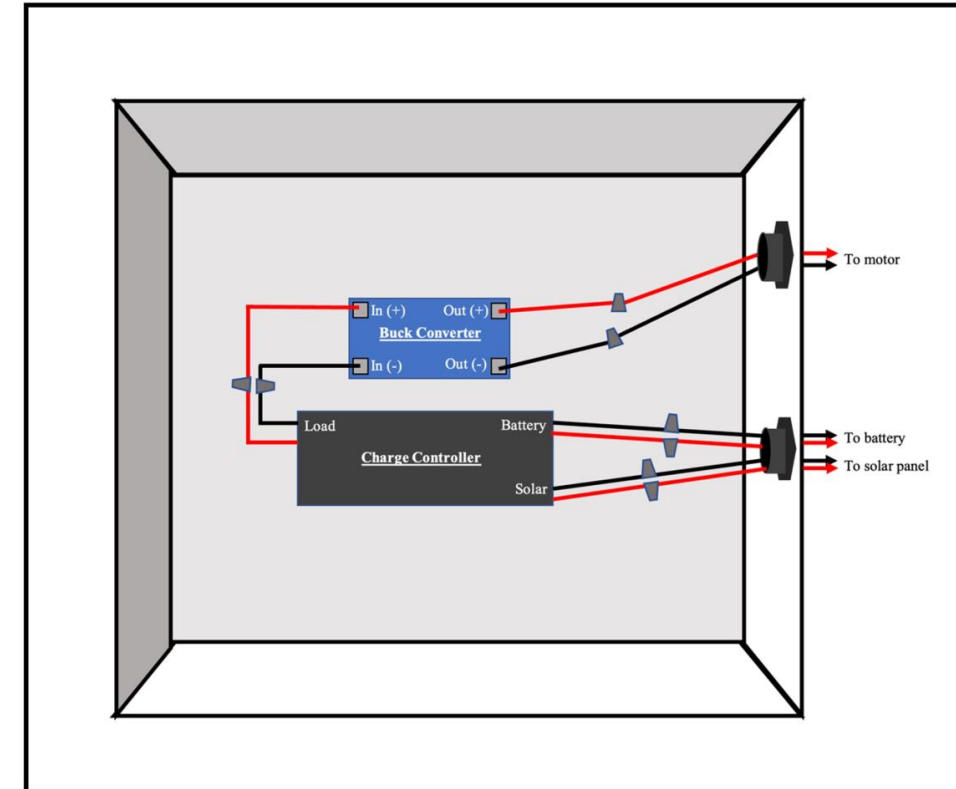
Circuitry – preparing the enclosure (1)

- Screw a wire gland **into each** pre-drilled (side) hole of the box with the sealing nut facing out and the hex-nut on the inside
- **Loosen** the sealing nut and **thread** the wires from the PVC pipe (motor) through the top wire gland



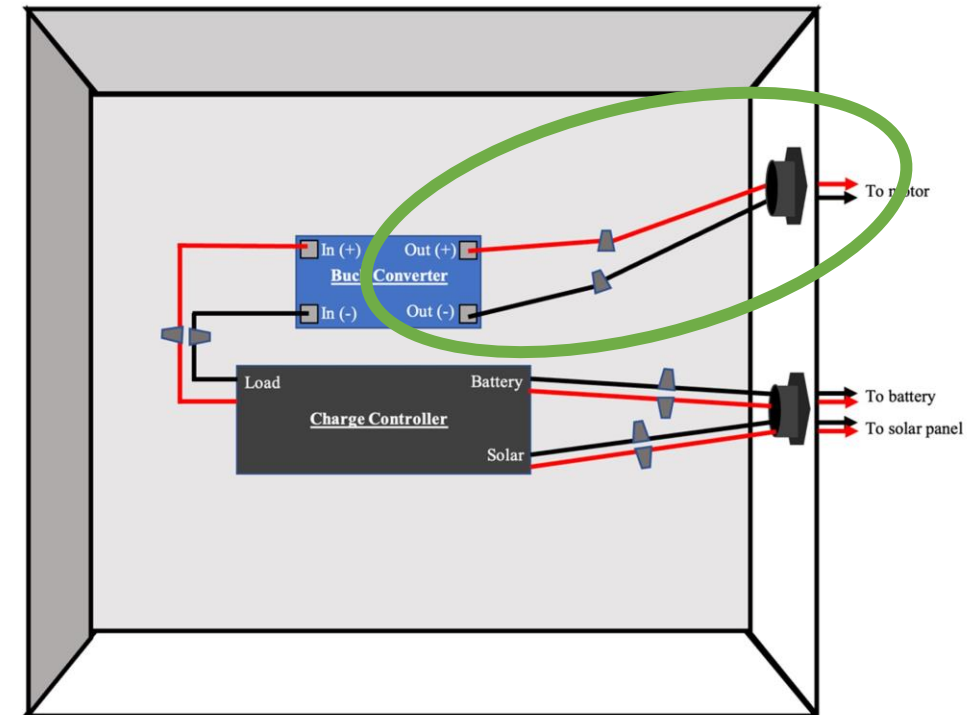
Circuitry – preparing the enclosure (2)

- Place the buck converter inside the enclosure with the **OUT** side oriented towards the wire gland.
- Place the charge controller inside the enclosure with the **LOAD** connections oriented away from the wire glands.
 - Use Velcro strips to secure the buck converter to the back wall of the enclosure
 - Use Velcro strips to secure the charge controller to the back wall of the enclosure



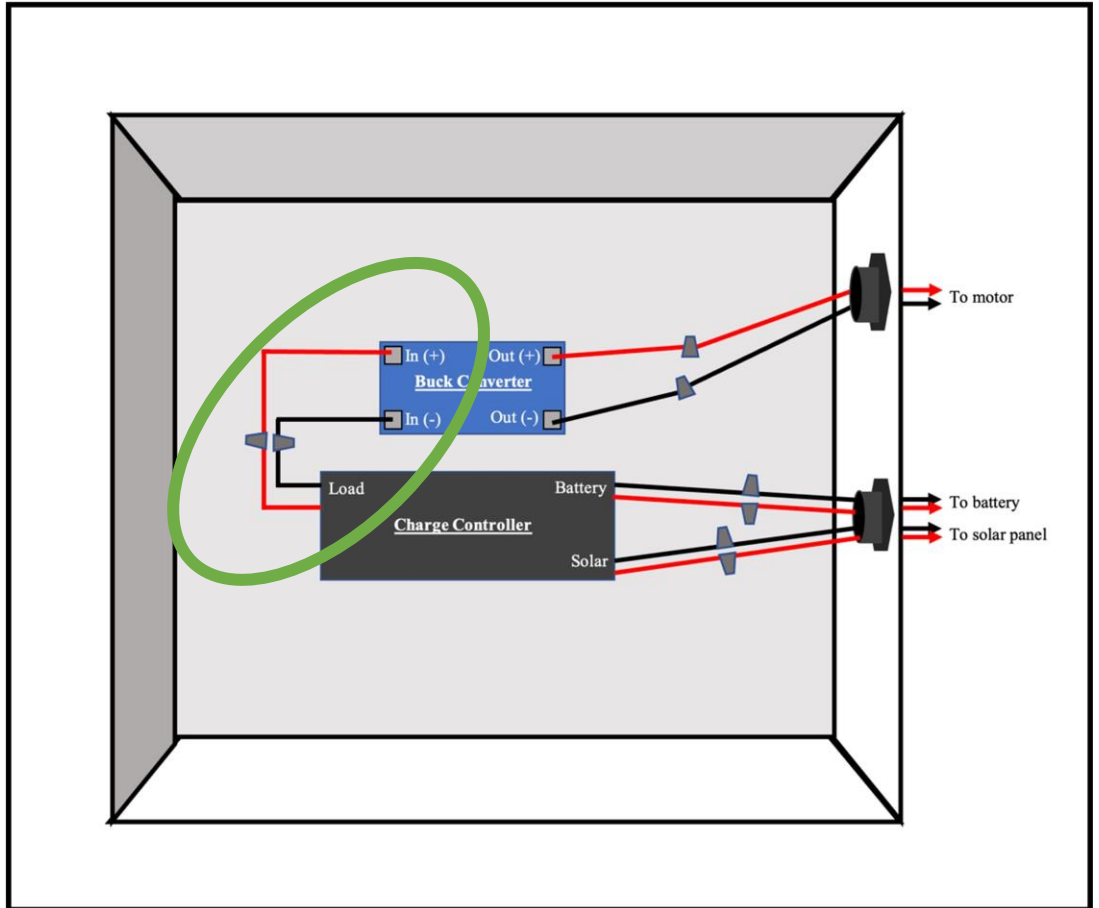
Circuitry – buck convertor

- Use wire nuts, connect the **positive** and **negative** wires coming from the PVC (motor and switch) to the **OUT** connection site of the buck convertor



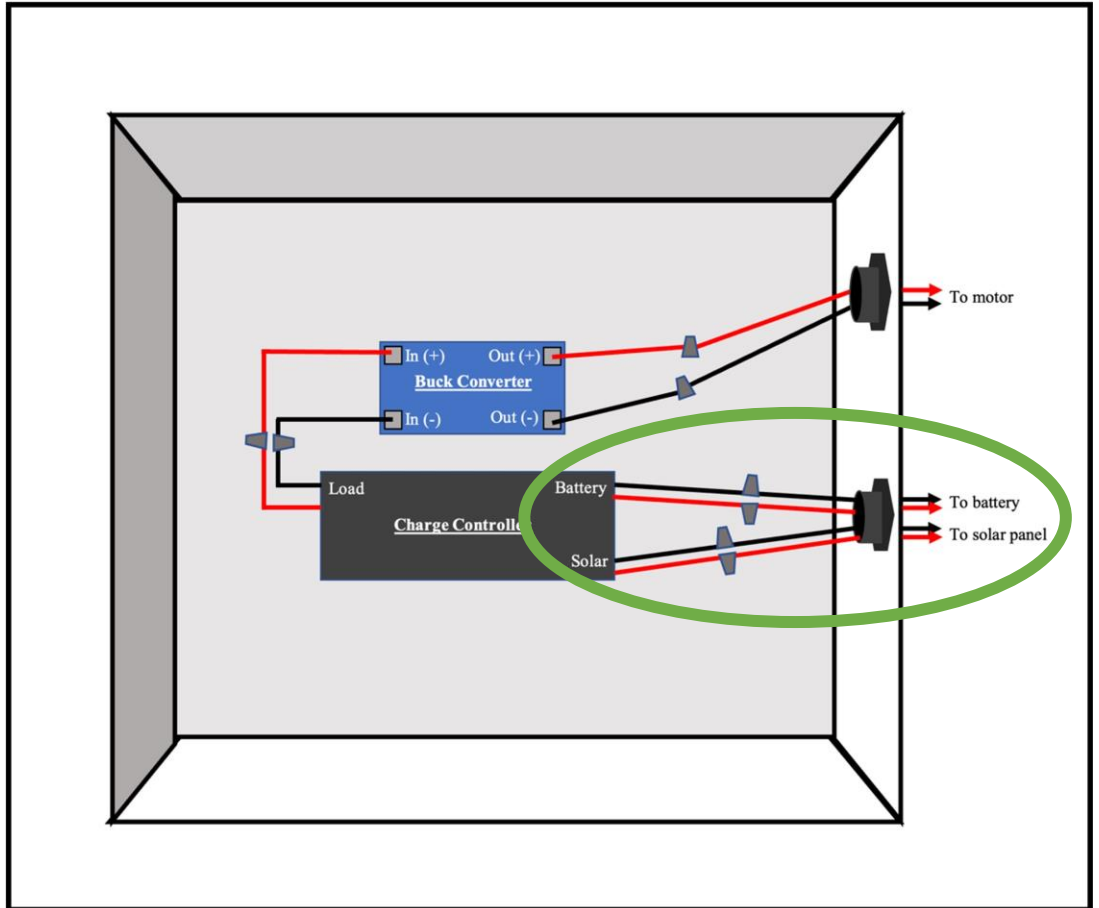
Circuitry - charge controller

- **Remove** the pre-cut insulation of **both** wires from the **LOAD** connection sites of the charge controller
- Use wire nuts to connect the **positive** and **negative** wires from the **IN** connection site of the buck convertor to the **LOAD** wires from the charge controller
- **Take a moment to ensure the buck convertor is wired in the correct orientation:** backwards connection to the battery and motor can cause failure when connected to a power source



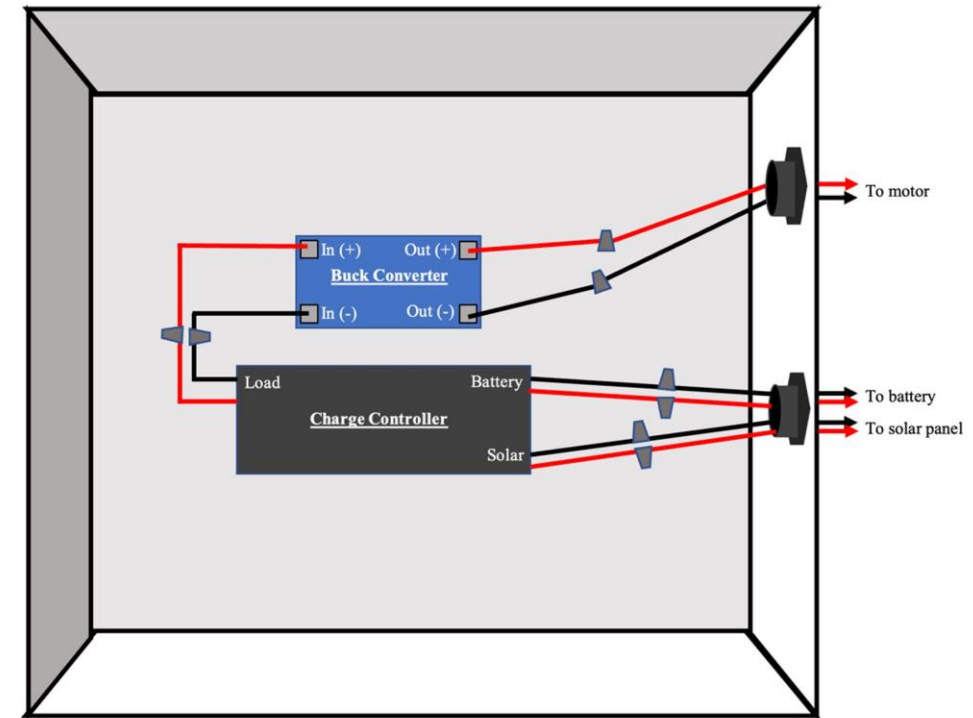
Circuitry - battery cable

- **Thread** the pre-crimped battery cable with spades into the enclosure with spades outside
- Using wire nuts, connect the **positive** and **negative** wires from the BATTERY connection site of the charge controller to the **positive** and **negative** wires of the battery cable
- **Tighten both wire glands on the outside of the enclosure**, making sure there is no tension on the wires and connections within the enclosure



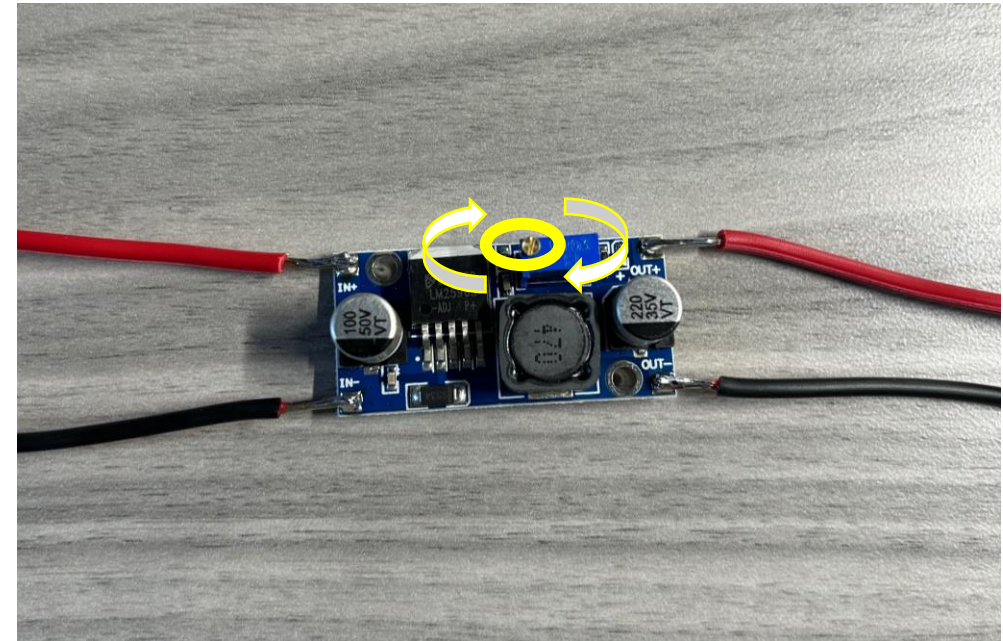
Circuitry - testing with a battery

- Ensure the switch on the PVC pipe is in the **OFF** position
- Connect the wire spades to the terminals of the battery (**positive** to **positive** and **negative** to **negative**)
- Holding the PVC pipe upright, flip the switch toggle to test the circuitry connections



Calibrating rotating-arm speed

- Place the rotating-arm onto the motor spindle (apply even pressure)
- While connected to the battery, **have a partner hold the PVC pipe** and turn ON the motor using the switch
- Use a **digital tachometer** to measure the spin of the rotating-arm
- Use a small flat head screwdriver to **adjust the speed** of the motor using the screw on the buck convertor. Recheck the motor speed using the tachometer. Repeat until the desired speed is achieved (try to aim for 4800 RPM)



Clockwise = speed up
Counter = slow down