



Agricultural Water
Quality Program

WS Cercospora Sensor Building Instructions

By the Colorado State University Agricultural Water
Quality Program

Important Note!

Always make sure battery is disconnected when building or making any changes to the sensor or sensor parts!

Step 1: Prepare Enclosure

Materials

- Waterproof Enclosure
- Drill and cone drill bit
- PG-7 gland w/ nut

- Using a cone drill bit, we will make a $\frac{1}{2}$ " wide hole into the Waterproof Enclosure for the PG-7 gland
- Drill hole 1" from the right of the bottom of the enclosure
- Insert PG-7 gland and secure inside enclosure with nut



Step 2: Velcro Mount for Battery

Materials

- 1 Sheet Metal Screw (#6 x ½")
- Fastening Cable Ties Reusable
- Battery
- Tape



- Using a #6 x 1/2" Sheet Metal screw, secure the Velcro strap to the top of the inner mesh.
- Cover screw head with piece of tape to prevent wear on the battery
- Secure battery with Velcro strap with battery wire on the top right side

Step 3: Wiring the SHT-31 Sensor

Materials

- SHT-31 sensor
- Gauge 4 Conductor (4C) Wire
- Solder Seal Wire Connectors AWG26-24 (x4)
- 4C Waterproof connector (male end w/ rubber gasket and screw cap)
- $\frac{1}{4}$ " Heat Shrink
- Heat gun or lighter
- (Recommended) Magnetic alligator clips

- Cut Gauge 4 Conductor Wire Extend the sensor cable by 3 ft, strip cable sheath back about 2" and strip wires back about $\frac{1}{4}$ "
- Cut 2 Heat Shrink pieces (long enough to cover solder connections, about 5") and slide both toward center of 4C wire **BEFORE** any soldering
- Cut off SHT-31 wire end and strip the 4 wires about $\frac{1}{4}$ "
- Use heat gun or lighter to connect wires using solder seal wire connectors
- Connect SHT-31 cable to the 4C wire matching the colors. (*Green = white)
- Connect 4C wire to male end of waterproof connector (**side with rubber gasket & screw cap**) while matching colors
- Slide Heat Shrink over solder connections and use heat gun/lighter to secure
- Set aside until Step 7

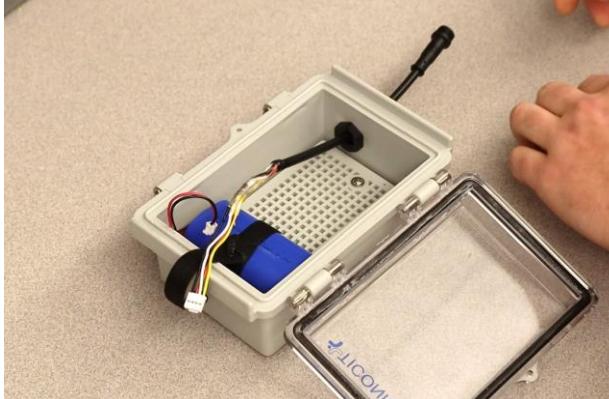
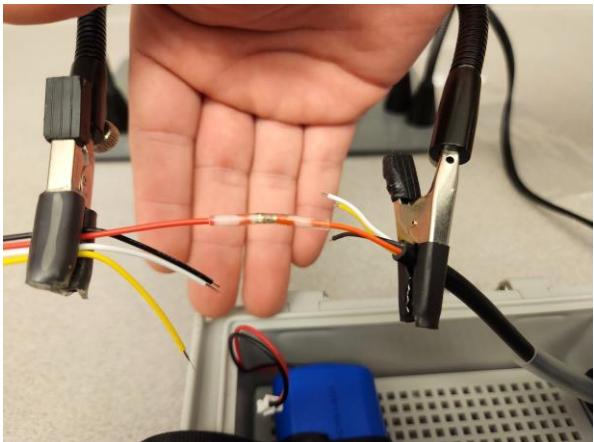


Step 4: Wiring SHT-31 Sensor (cont.)

Materials

- Waterproof Enclosure
- Grove Connector
- 4C Waterproof Connector (female end)
- Solder Seal Wire Connectors AWG26-24 (x4)
- $\frac{1}{4}$ " Heat Shrink
- Heat gun or lighter

- Cut Grove connector in half
- Cut $\frac{1}{4}$ " heat shrink about 3"
- Slide the heat shrink onto the 4C Waterproof Connector
- Insert the waterproof connector into the PG7 gland on the waterproof enclosure
- **Make sure the waterproof connector is in the PG7 gland on the enclosure BEFORE soldering!**
- Use heat gun or lighter to connect grove connector to the **female end** of 4C Waterproof connector using solder seal wire connectors, matching all the colors.
- Slide heat shrink over solder seal connections and secure with heat gun or lighter.

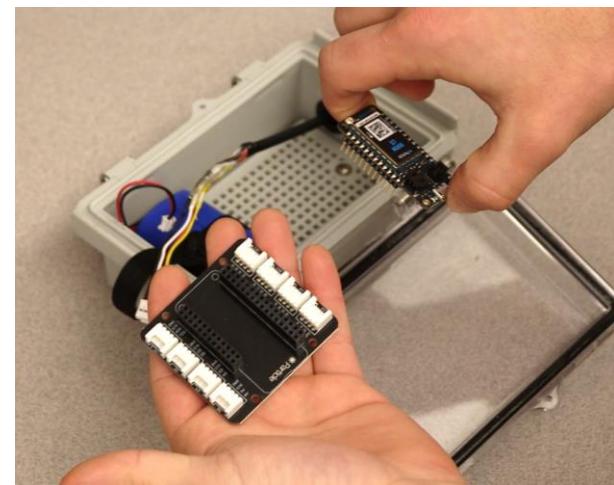


Step 5: Mounting Boron Cellular Device

Materials

- Boron w/ small antenna
- Grove Shield FeatherWing
- Waterproof Enclosure
- 2x Sheet Metal Screw (#6 x $\frac{1}{2}$ ")

- Match the 12 and 16 male pins on the bottom of the boron with the Grove shields 12 and 16 female pins
- Insert the boron onto the grove shield until all the pins are fully inserted
- Plug waterproof connector into the **I2C_1 Port** on grove shield **before** securing grove shield to enclosure
- Screw grove shield below the battery using the sheet metal screws. Ensure orientation matches photo
- Attach small antenna to gold connector on top of boron and lay anywhere in enclosure



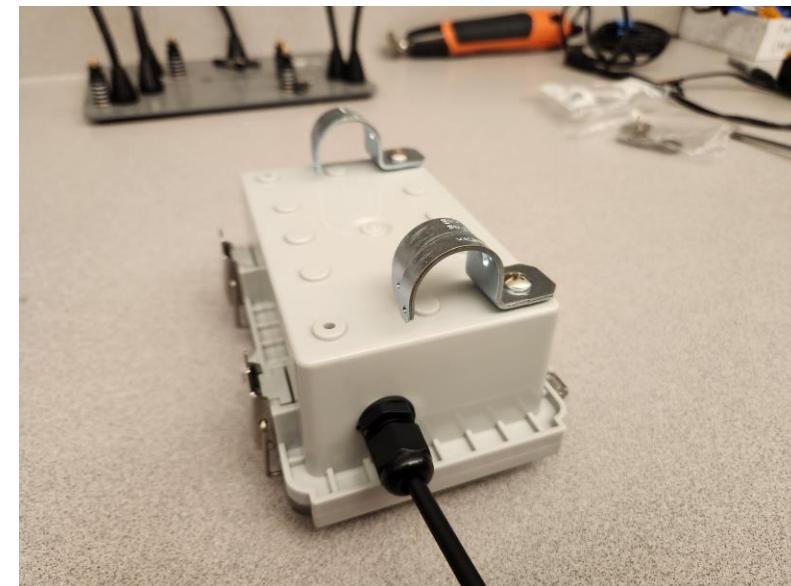
Step 6: Screw on Mounting Brackets

Materials

- 2x $\frac{3}{4}$ " 1-Hole Strap
- Waterproof Enclosure
- Mounting screws that came with the waterproof enclosure
- Screwdriver



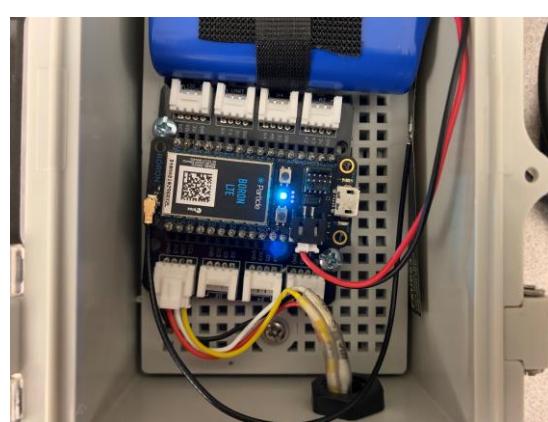
- Screw the $\frac{3}{4}$ " 1-hole strap to the back of the waterproof enclosure with the screwdriver
- Make sure brackets are on the same side of enclosure



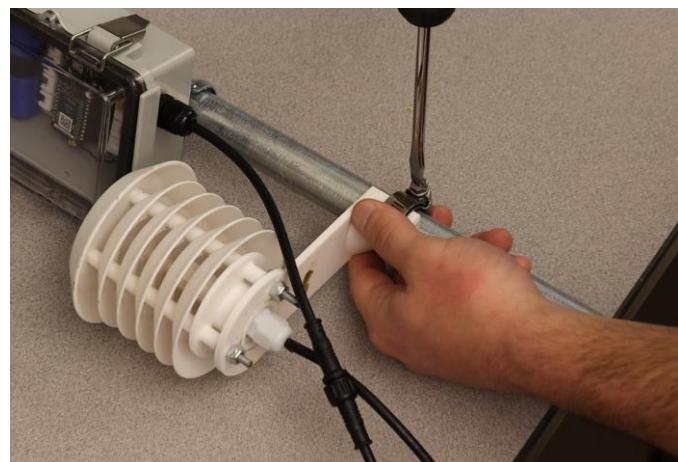
Step 7: Finishing/Deploying the Sensor

Materials

- ¾" EMT Pole
- Finished Enclosure
- Finished SHT-31 Sensor String
- (Optional) Radiation Shield
- (Optional) Pipe Clamp & Flathead Screwdriver



- Connect SHT-31 sensor string to other side of waterproof connector and secure using screw cap, and ensure grove connector is secured onto grove shield using the **I2C_1 Port**
- Secure enclosure to EMT pole using brackets on the back (will slide onto pole with a little resistance) and place EMT pole in desired location. Face sensor toward the north for less sun exposure.
- (Optional) Mount SHT-31 sensor into radiation shield for cercospora sensing and mount radiation shield to EMT pole using pipe clamp and flathead screwdriver
- Plug battery into boron and wait until boron LED light is 'breathing' the color cyan (LED will cycle between flashing green and flashing cyan before 'breathing', may take up to two minutes)
- **Sensor is now complete and is recording data!**



All finished!

For any questions, please contact:

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