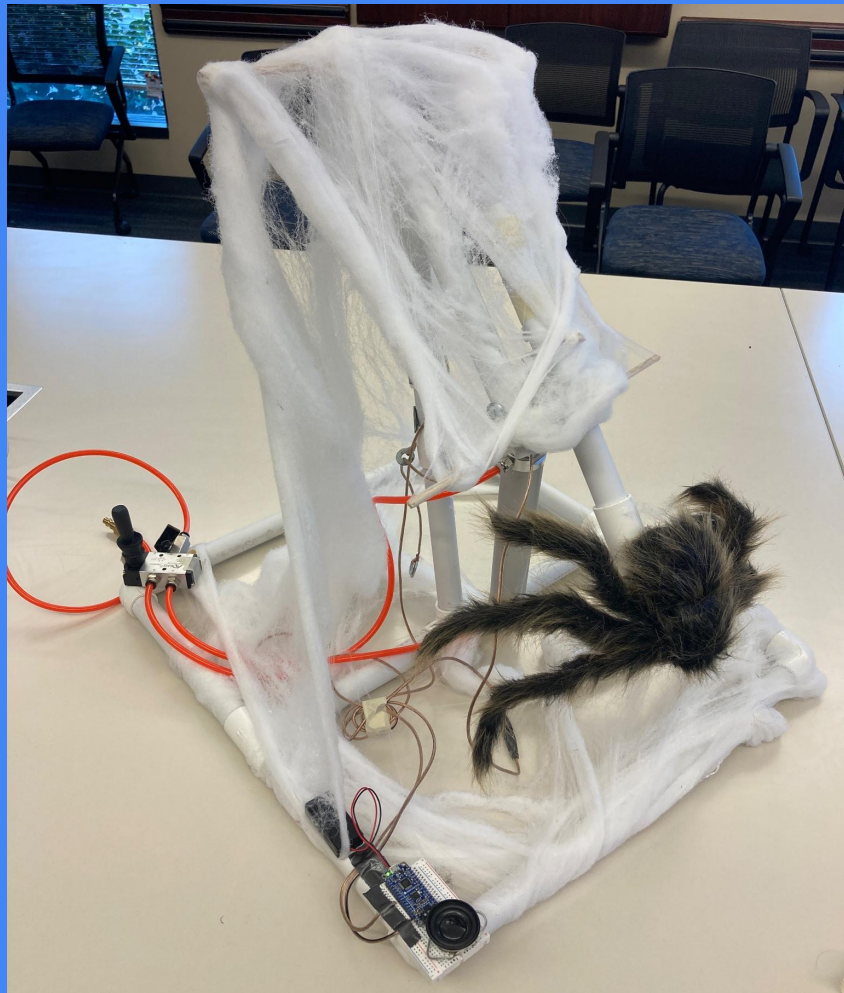


# **Jumpscare Mechatronics**



Meadowcreek High School, Gwinnett County  
Pneumatic Project



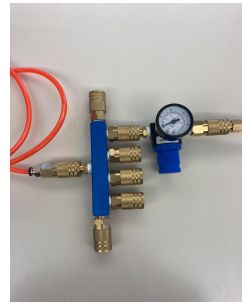
# Jumpscare ANIMATRONICS

This project will combine Mechatronics and Music Technology to create an Animatronic Spider puppet.

The Pneumatic system will provide movement for the spider puppet and a small audio player fitted with a speaker will provide spooky sounds.

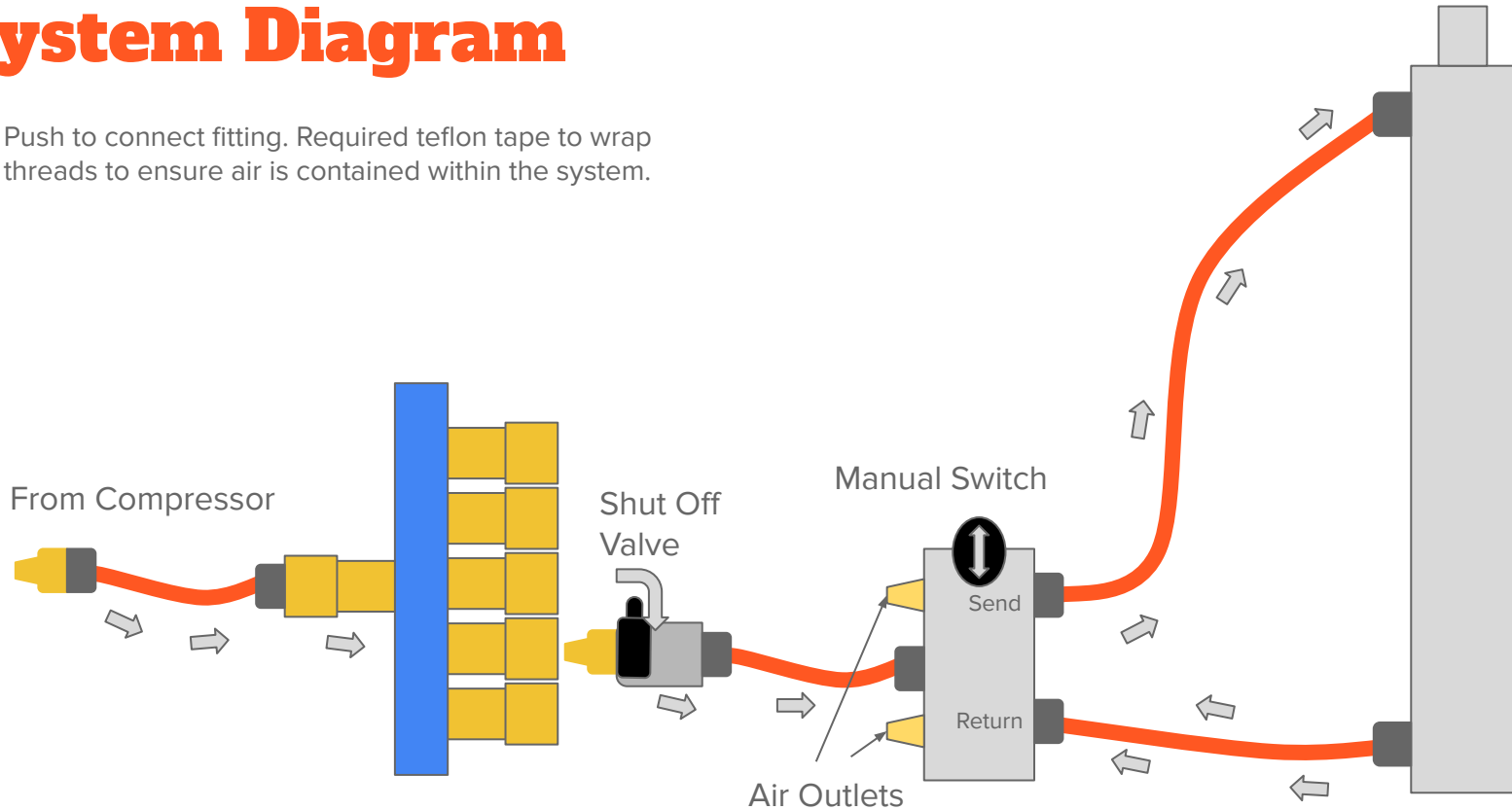
# Pneumatics Lesson

Students were instructed to create their own spooky halloween style animatronic project using their Pneumatic cylinder.



# Basic Pneumatic System Diagram

■ Push to connect fitting. Required teflon tape to wrap threads to ensure air is contained within the system.



# Adding thread tape to threads

This step is required for all threaded connections in a pneumatic system.

**Step 1:** The first step is to clean your pipe and connecting piece, making sure to remove any dirt or dust. Do not use a pipe dope compound. When combined with plumbers tape, pipe dope compounds can overload the threads.

**Step 2:** Next, pay attention to the direction of the pipe's threading. When the pipe is turned into the fitting, the friction from the threads should cause the tape to tighten. You will want to apply the tape in the opposite direction of the twist of the connecting pipe. When the pipe is facing you, this will be a clockwise application.

**Step 3:** Once you have determined the direction for your application, peel the tape from the spool and line it up to the second line of the threading. By lining it up here — instead of at the top of the pipe — it will be easier for your connecting piece to lock into your pipe. Make sure the tape is lying flat and not bunched up.

**Step 4:** Tightly wrap the tape clockwise, but without pulling too hard such that the threads are strained. With each full rotation of the pipe, move the PTFE Teflon tape down so that it overlaps half of the previous layer.

**Step 5:** Wrap three full rotations and ensure the tape is flat to the surface without any gaps. It is important not to overwrap your pipe — too much thickness can prevent a tight seal — so stick with three full rotations to start.

**Step 6:** Rip or cut the tape when you are done and use your fingertips to smooth the edges of the tape firmly to the pipe.



<https://makezine.com/article/workshop/use-teflon-tape-pipe-threads/>

# Positive Tip with Negative Tap w/ Air Hose

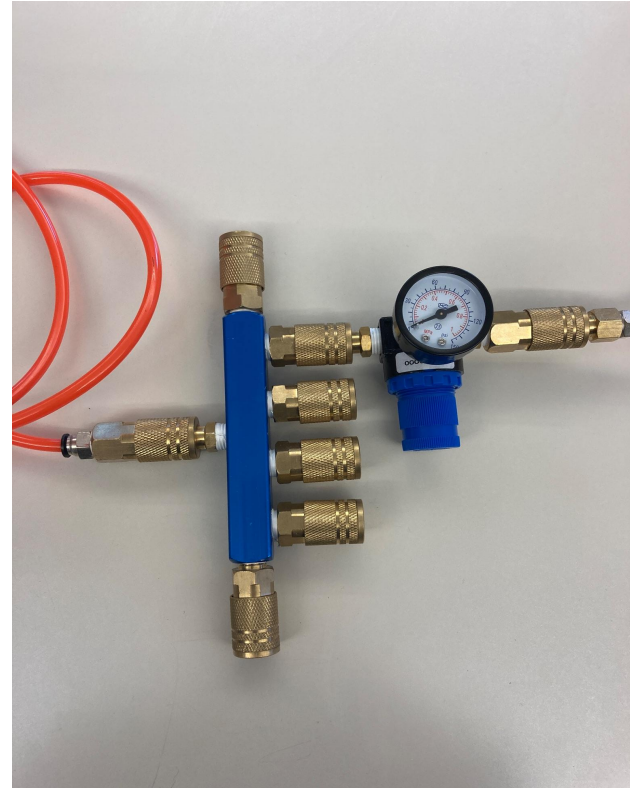
This is an example of a ¼” air hose with a Positive tip on one end and a negative tap on the other end.

This hose will connect the compressor. It's generally good practice to have hoses with opposing connectors on either end to help connect systems as they change over time.



# Pressure Gauge

This pressure gauge will give you a read out of the amount of pressure currently in the system. The blue knob provides a balance to allow just enough air through the system.



# 3-Way Splitter

Starting with the compressor, we will use a ¼” 3-way splitter to guide air to multiple channels.

Each Quick Connect will accept a positive pin. The Pin is connected via a ‘push to connect’ fittings.



3-way splitter

To Compressor



# Quick Connect - Positive Tip

This positive tip is threaded onto a 1/4" Push To Connect threaded nut. This nut will need to be wrapped with plumbers tape to help eliminate air leaking. Sometimes they come pre wrapped.

The 1/4" air hose is pushed into the 1/4" Push to Connect threaded nut.



1/4" air hose

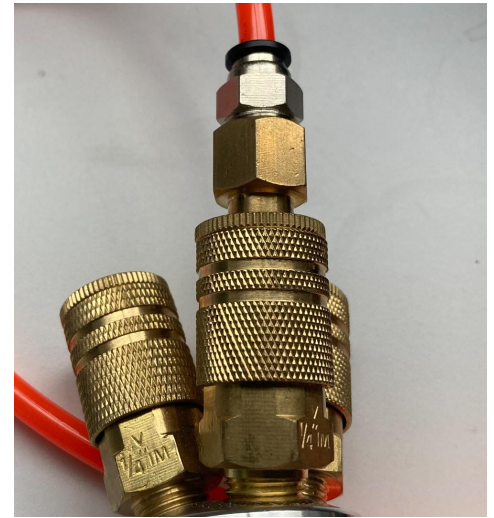
1/4" Push to Connect  
threaded nut

1/4" Positive Connect.  
Goes to Negative  
sleeve at compressor

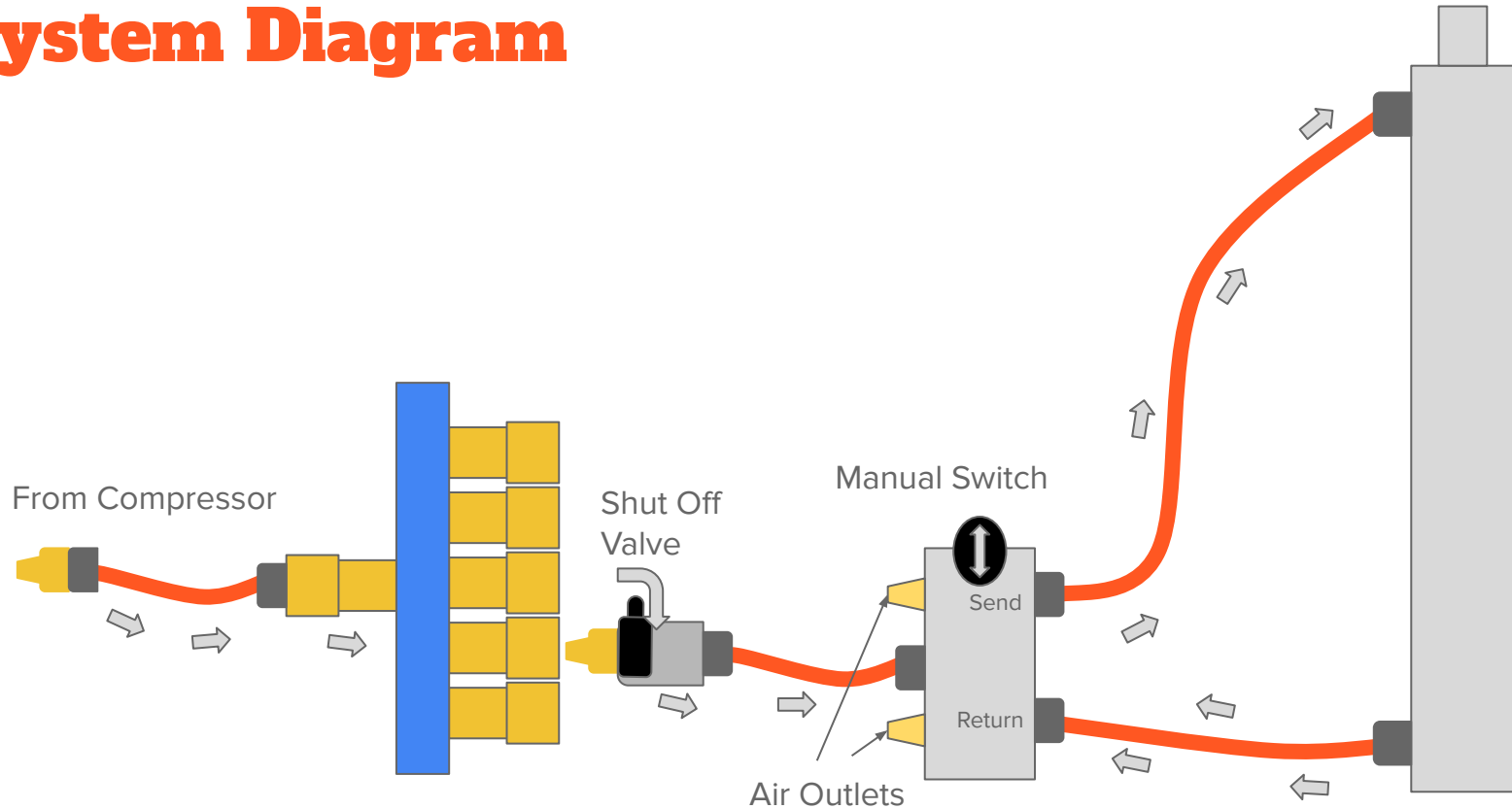
# Quick Connect - Negative Tap

This negative tap has a sleeve that is pulled downward to open the flange inside.

Once pulled down, it is held and the positive tip is placed inside, then the sleeve is released. This action locks the two pieces.

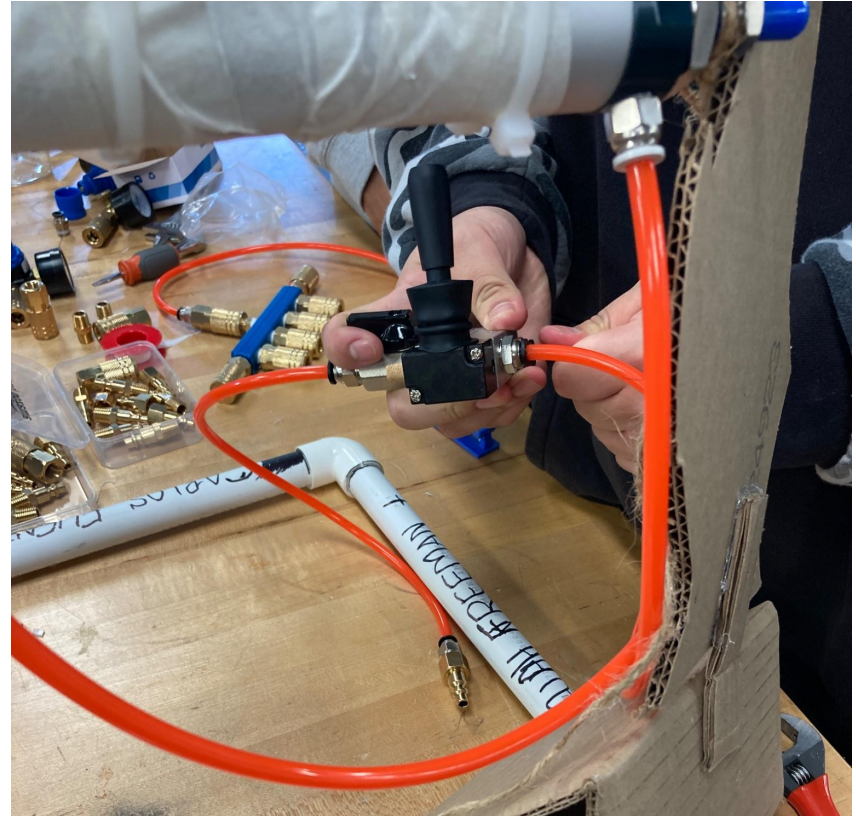


# Basic Pneumatic System Diagram

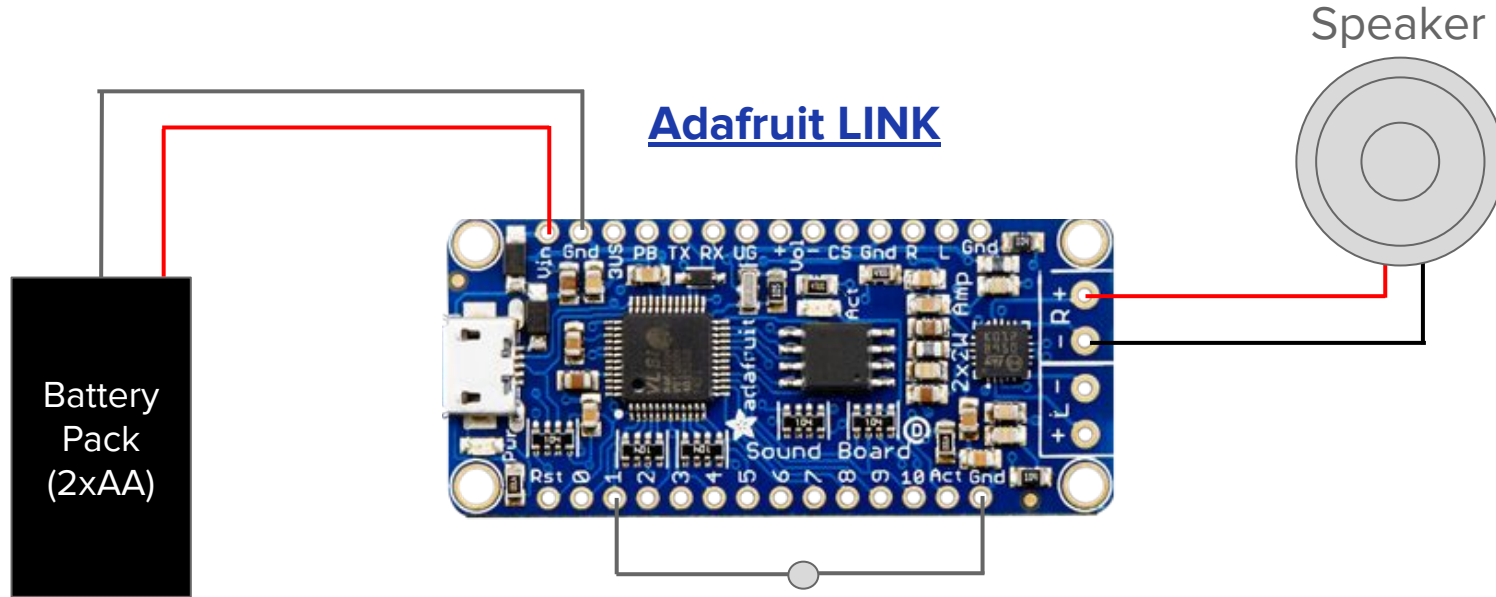


# Pneumatic Systems: Best Practices

- Make sure all **shut off valves** and **manual switches** are in the closed position. This will ensure the pneumatic valves don't extend prematurely.
- The **shut off valve** should come before the **manual switch**.
- Use a **pressure gauge** after the compressor to verify the amount of pressure in the system. Aim for 25-30 PSI.
- Once the **pressure gauge** reads between 25-30 PSI, open the **shut off valve**.



# Audio Player Installation Basics



Audio files are triggered by the connection to GND to pins 0-10. This project will use a DIY limit switch to create a 'trigger' using the movement of the pneumatic puppet

# Limit Switch 'Trigger'

- This limit switch 'trigger' will connect the GND pin to one of the 0-10 pins to play an audio file.
- Using two conductive zinc washers, we wrapped bare copper wire ends from the GND wire and the other from PIN(X).
- We then ran one wire through the middle of the washer from the other wire. The other wire is connected to the piston that moves upwards once it received pressurized air.
- When its lifted, it pulls the two wires together and the two zinc washers make contact and complete the circuit, thus playing the audio file (see next slide).



# Video of Limit Switch Trigger

