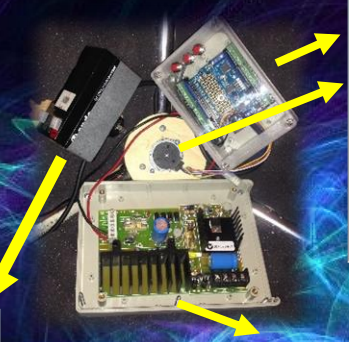
Self-Adjusting microphone stand

Lifting mechanism
The motor is connected to a threaded rod by a grub screw. The threaded rod runs up the centre of the tube and has a nylon spacer at the top. The smaller rod holding the microphone has a nut welded on to the bottom. The threaded rod is then fed through the nut. When the motor spins one way, the nut will either be forced up or down.

underneath



Arduino and motor shield
The clear box holds my Arduino and shield. The shield is the device which operates the stepper motor and sends the information to my Arduino which is stacked underneath. The motor I am using is a 47 step motor. This means that it takes 47 steps to do one revolution. My Arduino has two sketch programs saved onto it. The first sketch is for the manual setting. This allows the microphone to move up and down with the switch of a button. The other sketch is for the automatic part which consists of programing the baby microphones to pick up a persons voice and move it to the correct height. The red buttons on the clear box are for calibration. The calibration buttons are used when you want to reset the maximum and minimum heights at which the microphone can go.

How it all began
Last year at the Young Scientist award ceremony there was a vast range of heights of the different speakers. The microphone that was used on the night was fastened to a stand that stayed in the same position, this meant that when people of varying heights came to speak, the microphone was not in the correct position. This meant it was very hard to hear the announcements given. That was when I came up with an idea to invent a microphone that could either move with a press of a button or automatically adjust to someone's height.

Battery
The battery is simply for calibration. The calibration buttons are on the Arduino box. They are for resetting the maximum and minimum height at which the microphone can go down to.

Power box
This box contains the power supply which consists of two power boards. These boards are connected to a normal power point and convert 240 volts to 12 volts which is required to run all the individual parts of my project.

Automatic Setting
The two microphones that are mounted on either side of the centre microphone are critical for making my project work. I came up with the idea of using sound energy as the control to create an automatic setting. The way the automatic part works is through the baby microphones which are connected via the black cable. This cable runs down the shaft and into my Arduino box. The microphones on the automatic setting are programed to recognise sound energy. I did this by programing the microphones to move whenever they come in contact with volume higher than 50 decibels. Once this setting was done I had to write a complicated sketch which would allow the stand to self adjust. How this works is; if the speaker is tall, the top mike would pick up the most volume and tell the motor to move the mike stand down until there is even amount of volume between the two microphones symbolising that the microphone is in the right spot. The same would happen to a short speaker.

Instructions
1) Turn the black power box on and make sure it is set at 12V.
2) Pick up the little black box and first switch it down to manual. I have programed my project to have a manual setting and automatic setting. Once the bottom lever is at manual, lift the top momentary switch up and down to manually move the microphone. I have added this setting as a different option so that the PA man can also move the mike to the right position when needed.
3) Then switch the bottom lever on the remote to automatic. This will allow you to speak into the little microphones. If you speak into the top microphone, the stand should move up. If you speak into the bottom one, it should move down.
4) Once finished, please turn the remote back to manual and switch off the power supply.

Problem

Solution

The future
My SAM Stand is prototype 1 and I am looking forward to expanding and make my project even better. I am already looking at getting a faster and more powerful motor for prototype 2 and also I want to experiment with different sensors to determine how I could make my idea a reality. I am really excited how far one thought has gotten me and are looking forward to finding out what is next.

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