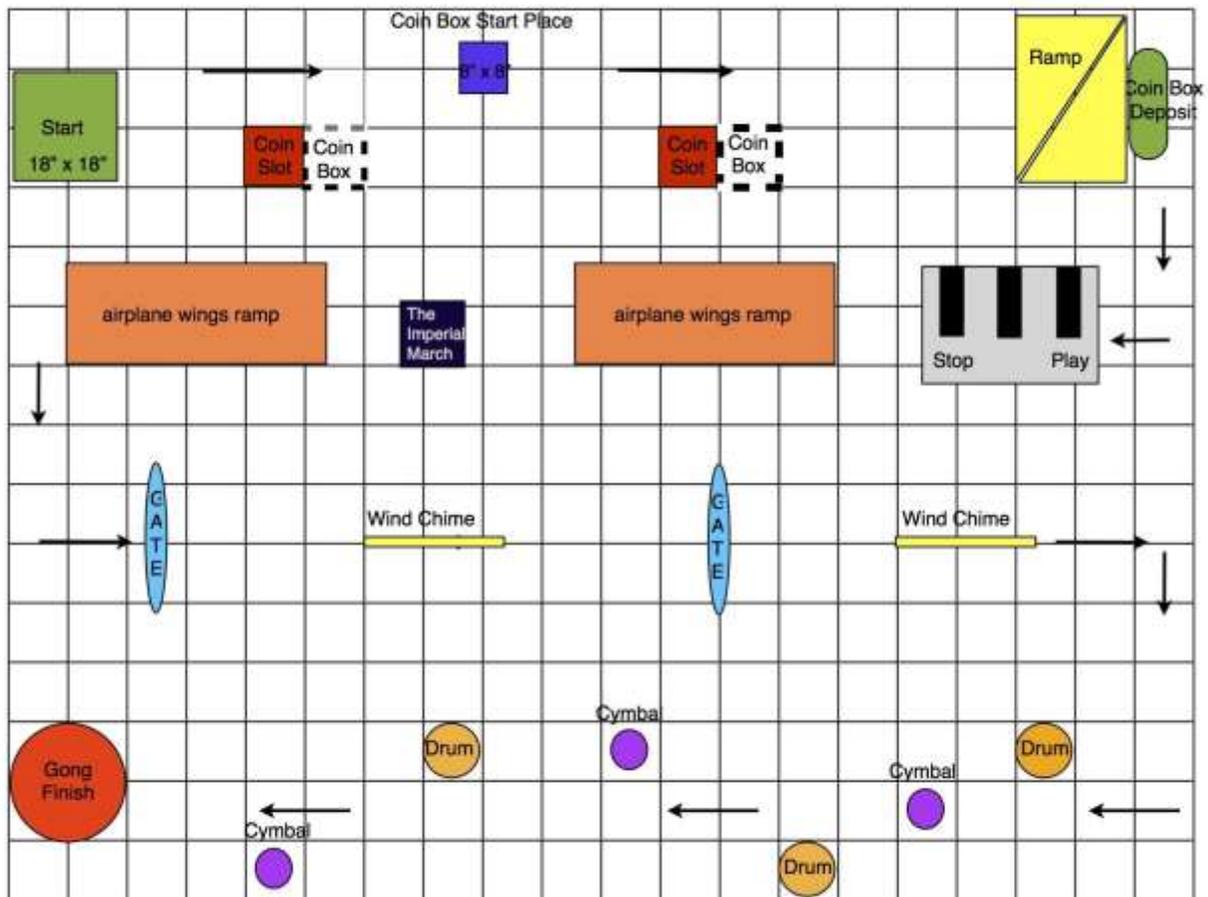


# Musical Jukebox Navigation Gauntlet



**BACKGROUND - WHY WE NEED Musicians**

“Music can raise someone’s mood, get them excited, or make them calm and relaxed. Music also- and this is important- allows us to feel nearly or possibly all emotions that we experience in our lives... It is an important part of their lives and fills a need or an urge to create music.”

<https://www.gilbertgalindo.com › importanceofmusic>

### **MISSION OBJECTIVE**

Go on a musical journey in the STEAM Jukebox using STEMBoT(s). Contestants will be given several musical tasks to explore music and technology. The team’s design, strategies and skills will be tested on a musical playground at the Nebraska Robotics Expo. The more tasks completed, the more points earned.

### **DESCRIPTION**

The goal is to complete as many tasks as possible within three minutes.

Teams may have up to five members. Team members will work on the tasks in the above order. Two STEMBoTs will be required on the field to complete teamwork tasks. Additional BoTs will not be allowed. All BoTs, including modifications, need to fit inside the 18” X 18” X 18” start zone. The course will be inside a 20’ X 15’ area surrounded by pvc pipe.

### **RULES**

1. The team will have up to 3 minutes to complete the course. The tasks must be completed in the order as stated on the diagram. The BoTs will be working in tandem to complete many of the tasks. If your robot needs to be touched or moved during the course (because the robot gets stuck or other problems occur) ask the judges to move your BoT; each touch will result in the loss of two points. (up to 6 points lost) Robots can be rotated in any direction during a touch but must remain in the same location.
2. The area of the playing field that is the STEAM Jukebox will be surrounded by pvc pipe. The two contestants entering the course will be allowed to move around three sides of the course that are labeled ‘contestants only.’
3. Contestants must innovate a striking device that falls in the 18” X 18” X 18” start parameters. They will be using the device they innovate to strike the lever to activate the coin to start the jukebox, play the windchimes, bang the drums and clang the cymbals. Every obstacle will be 2” off the ground. Each contestant will need a striking device for their BoT. You can have students attach the device to the robot.
3. The course begins at the start and moves directly to the ‘COIN SLOT.’ This is a teamwork section of the course. It takes two quarters to make our jukebox play. One participant must move the coin box to the bottom of the coin slot within the designated area. The next participant will knock the first quarter (marble) into the STEAM Jukebox using an attachment they have innovated on their bot, running the marble across the

xylophone and into the coin box. The mechanism that hits the coin will have to be struck by driving around the end of the xylophone and then maneuvering your BoT backwards to hit the popsicle lever which will activate the coin to slide down the xylophone. 5 points for activating coin and landing it in the coin box.

Five points will be given for placing the coin box within the designated area (see the dotted area in the diagram above), Any part of the BoT out of the designated area will receive a one point deduction.

One participant will move the coin box to the next coin slot. Using the same process, coin box must fit within the designated area. The next contestant must use their bot attachment to knock the quarter (marble) onto the xylophone and into the coin box. 5 points for moving the coin box, 5 points for activating the quarter and landing it into the coin box. One point deduction for not having the coin box within the designated area. (the box can fit anywhere within the taped area, just not any part outside of the tape)

4. Contestants then must deposit their coin box into the jukebox activating machine. They will maneuver the box up the ramp to make their 50 cent deposit. If they successfully make their coin deposit, they will earn 10 points.

5. The contestants will move to the next area of the course. They will have to use a makey makey to activate the song Fur Elise by driving over the correct piano key PLAY button. They will stop the song by driving over the STOP button piano key. 2 points for turning the song on. 2 points for turning the song off.

6. The robots must now one by one roll over the airplane wings ramp. 2 points per BoT.

7. The next task is to have the BoTs play the Imperial Death March using a makey-makey. Two points will be awarded if they can activate the song, and two points will be earned if they can stop the song. One BoT will be in charge of hitting the PLAY and STOP button. The other BoT must do a Darth Vader spin (360 degree turn/dance) while the song is playing. 2 points for the spin.

8. There is one more airplane wing ramp for the contestants to roll over. 2 points per BoT.

9. BoTs will then have to find a way to enter the next part of the jukebox using teamwork to open and close two gates. BoT 1 must open and hold open the gate for BoT 2 to use their attachment to hit and play the windchimes. This process will be done two times. Two points for each step.

2 points- BoT 1 opens the gate

2 points - BoT 2 activates the windchimes with their attachment

2 points- BoT 1 closes the gate

Contestants will use an attachment they have innovated and attached to their BoT to hit the wind chimes (tin cans suspended by a pvc pipe stand).

10. The final “song” in the jukebox is percussion. The BoT attachment must hit each of the drums (buckets) with the device they have innovated on the bottom of the bucket. The bottom of the bucket will be painted red. 2 points awarded for each bucket that is struck on the red drum target. There are 3 drum buckets for a total of 6 points.

Cymbals- the BoT must also hit the 3 cymbals- 2 points each for 6 points total possible.

BoTs can divide and conquer through this section of the course, one BoT should be used. An additional 12 points may be obtained if each BoT can hit the 3 drums and 3 cymbals.

11. Four points (two points for each BoT) will be given for both BoTs signalling their finished by hitting the gong at the end of the course. The final gong will signal the judge to stop time.

12. When time is called all robots must stop and points for tasks completed will be calculated. The team with the highest number of points will be the winner. If there is a tie, the team with the shortest time and the highest number of points will win.

13. All judges decisions are final.

Scoring for Musical Jukebox

<https://docs.google.com/spreadsheets/d/1Bdixv2Uy58NUVHHJ2mZh3Of5WI-ezQz7/edit#gid=1323980547>

### **STEAM Juke Box Layout**

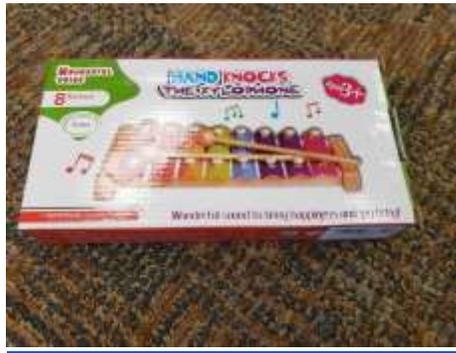
18” x 18” x 18” area (start BOX)



### **8X8 cake pan for the coin box**

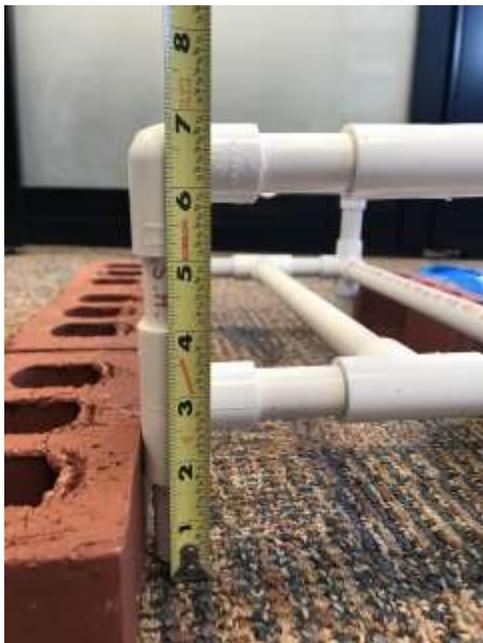
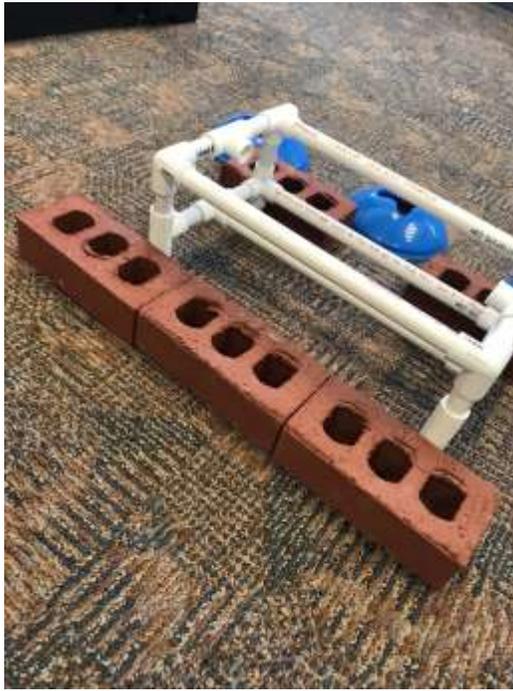
Coin Slot: Must hit the popsicle lever by driving around the coin slot and hit the popsicle stick backwards using your attachment. The coin will drop down the xylophone and into the coin box that your partner has placed for you.

Click picture for amazon link



Coin Lever- 6" craft sticks, rubber bands, 12" wooden dowel





Coin Activator:  $\frac{1}{2}$ " pvc pipe, 16" X 8" x 7"



Windchimes Strike Dimensions: 2" above the ground  
(tin cans various sizes)



Strike Height: 2" above the ground- 12" x 12"  
(paint can lid)

Cymbal

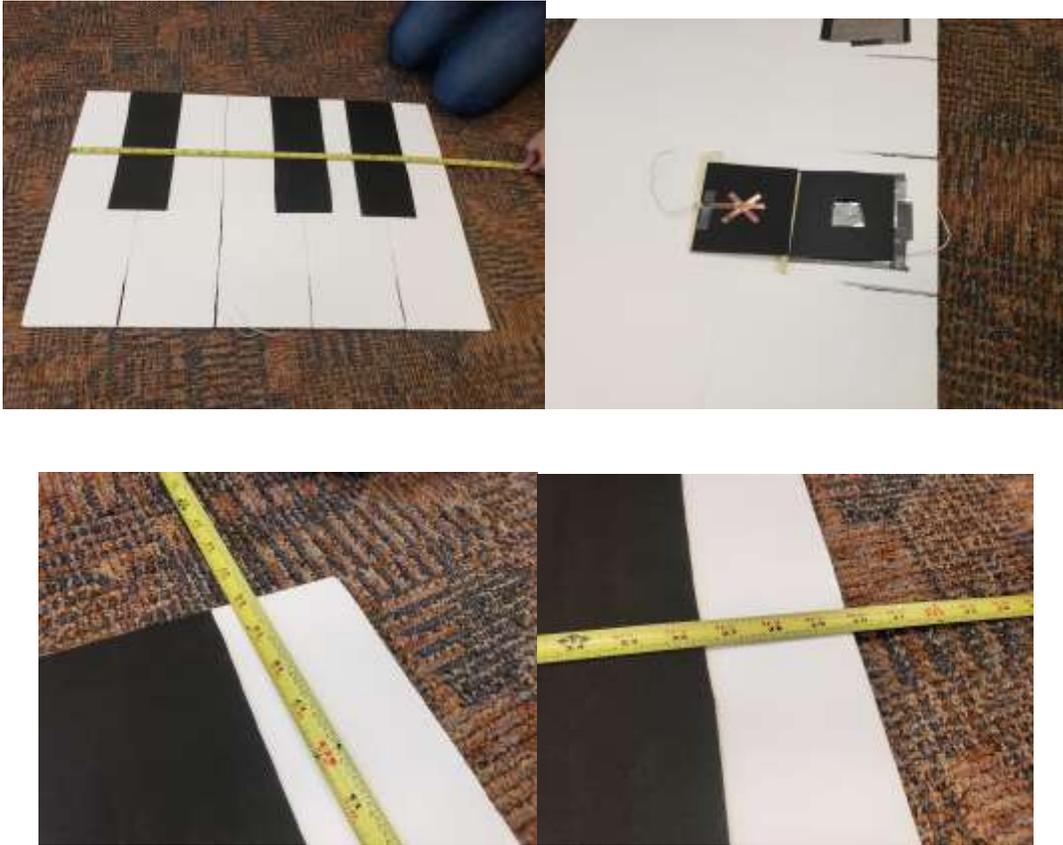


Drum: Strike Height 2" above the ground (gallon paint can)



Gong: Strike Height- 2" above the ground  
(lowes 12 qt. General bucket)

Example of the piano makey makey



**Scratch Makey Makey Keyboard**

<https://scratch.mit.edu/projects/10836772/>

**Star Wars Death March Song**

**(Played when you drive over the star wars image (8 ½ X 11))**

<https://www.youtube.com/watch?v=XZquOFdPnyU>

☰ YouTube Search



Star Wars "Imperial Death March"

48,766 views • Jul 27, 2015

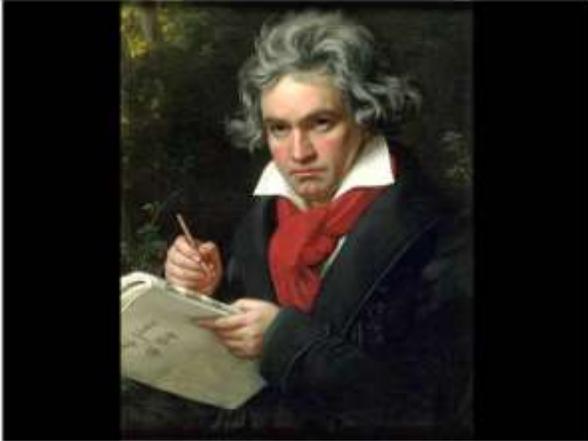
👍 123 🗨️ 20 ➦ SHARE 📌 SAVE ...

This is a YouTube video player interface. At the top, there is a search bar with the YouTube logo and a search icon. The main content area shows a video thumbnail featuring a close-up of Darth Vader's helmet and chest, with his hands clasped in front of him. Below the thumbnail, the video title is "Star Wars 'Imperial Death March'", followed by the view count "48,766 views" and the upload date "Jul 27, 2015". At the bottom, there are icons for likes (123), comments (20), share, save, and a menu icon.

## Für Elise Song (Played when you roll over the keyboard)

[https://www.youtube.com/watch?v= mVW8tgGY\\_w](https://www.youtube.com/watch?v=mVW8tgGY_w)

☰ YouTube Search

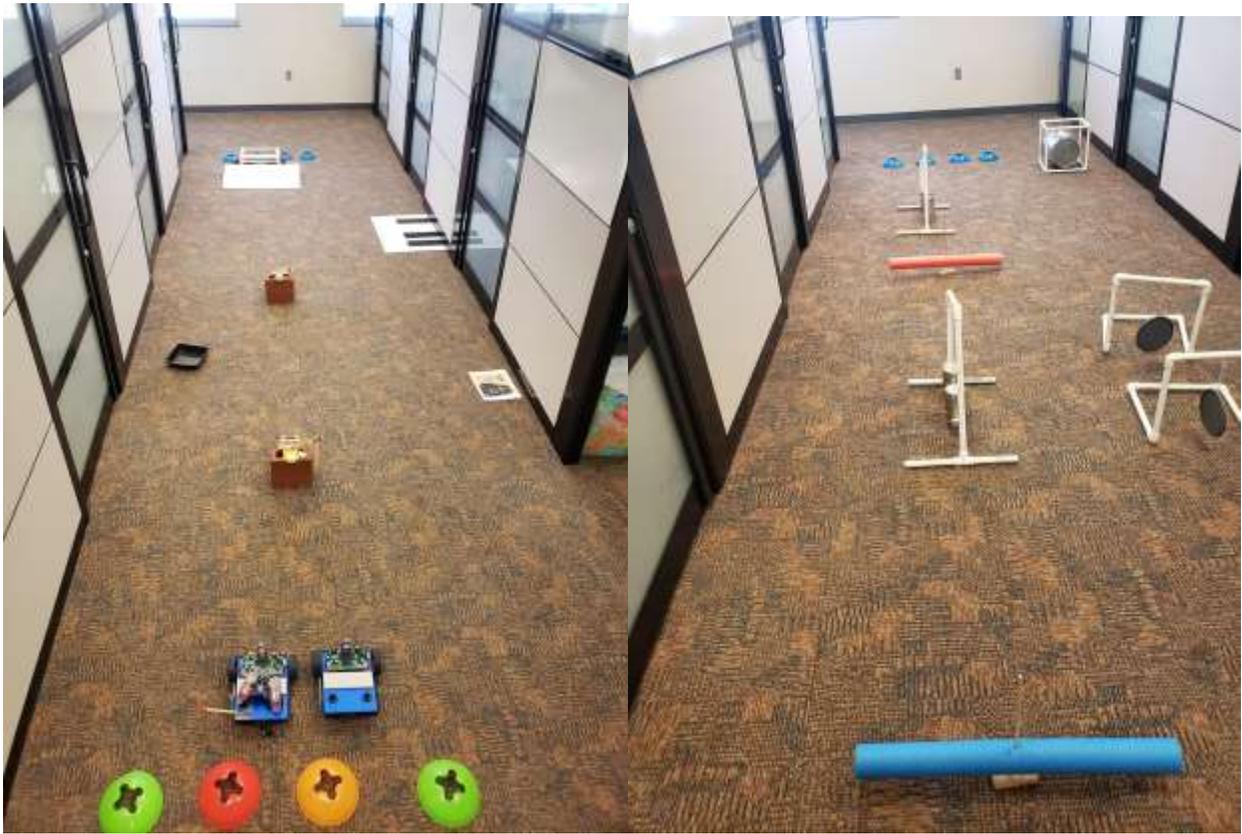


Für Elise (Piano version)

47,399,000 views

👍 403K 🗨️ 9.3K ➦ SHARE 📌 SAVE ...

This is a YouTube video player interface. At the top, there is a search bar with the YouTube logo and a search icon. The main content area shows a video thumbnail featuring a portrait of Ludwig van Beethoven, looking down at a piece of paper he is holding. Below the thumbnail, the video title is "Für Elise (Piano version)", followed by the view count "47,399,000 views". At the bottom, there are icons for likes (403K), comments (9.3K), share, save, and a menu icon.



50" length, Width 19", Height in middle from floor- 5"