# NUTCRACKER BALLET + STEM
## LIGHTS AND SOUNDS ACTIVITY (GRADES 2-12)

## Overview

Youth will code their very own light show using block coding and the micro:bit or circuit playground.

## Materials

- [ ] Computer or tablet
- [ ] Internet access
- [ ] micro:bit or circuit playground (optional but preferred)

## Words to Know

- **Algorithm** is a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer
- **Input** is data that is entered into or received by a computer
- **Output** is any information processed by and sent out from a computer
- **Loop** is a sequence of instructions that is continually repeated until a certain condition is reached

## Goals

- **Sound and Light Technicians** prepare and operate the sound and lighting systems for productions such as those in a theater or a concert
- **Light and Sound Theater Engineers or Controls & Automation Engineers** program and manage the sound and light system for concerts and productions
- **Costume Designers** can use circuits for costumes like STEM from Dance has done

# Directions

1. Go to <u>MakeCode (micro:bit)</u> or <u>MakeCode (circuit playground)</u> where youth will be using block coding and a virtual simulation to create a computer program that will make their lights on their device change depending on the sound level.
2. Once youth are on the website, they will want to find the "on start" and "forever" blocks located in the "Basic" menu if using micro:bit or the "Loops" menu if using circuit playground.
3. Inside of the "on start" block, youth will need to add a show LEDs/ring block. This is located in the "Basic" menu for micro:bit and the "Lights" menu for circuit playground. Whatever is inside this block will be shown once the program is begun. Youth can personalize the lights however they want!
4. Next youth will need to program the portion that will make the lights change based on the volume of sound. This is done by placing a "set brightness" block inside of the "forever" block which can be found in the "LED… more" menu for micro:bit and the "Light" menu for circuit playground. This part of the code will be repeated indefinitely until the program is ended.
5. The next step is for youth to put a "sound level" block inside of the "set brightness" block. This is so that the sound level will determine the brightness of the LED lights on the device. This block is found in the "Input" menu for both devices. Once this is done, the code will look like this:
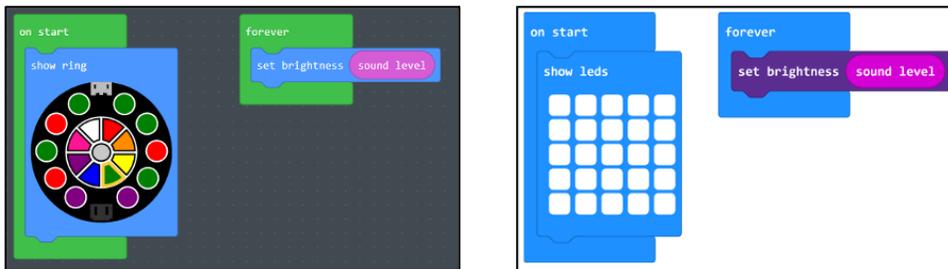


6. Once this is complete youth can move the volume level on the screen and see the changes in the lights. If you have micro:bits or circuit playgrounds available, you can allow youth to download the program to their hardware and they can play music in the room and watch the lights change to the different volumes in the song.
7. Youth can also go through and explore some of the more advanced blocks to change their code and personalize their program to their liking.

# Reflect and Apply

1. Observe the device and describe what happens when the volume changes. What happens when the volume increases or decreases?
2. Can you make the lights get darker with louder sounds?
3. How might this technology be useful in the real world? Can you think of some real life examples of lights and sounds being programmed through a computer?