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KEYBOARD DANCING

Robert Loggia and Tom Hanks dancing on oversize keyboards in the film "Big" (1988)

objective

Create a large piano inspired by the 1988 film "Big" that allows users to interact with the robot and prompts robot to create music

introduction

Our project is inspired by the popular piano scene from 1988 film "Big" starring Tom Hanks. Our concept is to create an interdisciplinary environment that combines technology and music. In addition to film, we have found more projects based on Arduino. It also grasps the similar concept of users creating music on an unorthodox keyboard.

significance

This project will be able to demonstrate how robots can interact with their environment. It can show some of the possibilities of robotics with computer vision. The idea of playing music with images of a keyboard may not be anything new. However, having a robot play a resemblance of a keyboard from music loaded from its camera is very different. This project takes advantage of modern technology, like robots. It makes use of innovations in fields such as computer vision and image processing.

environment

playground

The surface that the robot will be moving on is a black board about 3 feet long and 6 feet wide. Our team plans to get either poster paper or cardboard to make the 'playground' smooth and easy to transport. In addition, the robot will move where the white tape is, so the robot would never leave the boundaries of the playground. For the robot to understand where it is in the outline, it will first calibrate itself in a designated 'start spot' that will remain the same when it is started. The robot will only move on the outlined path, and go to 'touch' the piano keys by moving in to play it.

sound

The robot will know which key to 'press' by calculating the distance it is from the 'start spot' and turn when it wants to play the key. Although the audience would only be able to hear a slow paced song since the robot has to move back and forth to play one note, it will play back the entire song once it completes hitting all the notes. Users can input notes into the code so the robot can play its own song.

camera

We are challenging ourselves to have our robot read sheet music through the Raspberry Pi camera. The idea is to have only a few measure of notes taped to some objects and have them at a close proximity from the playground so that the camera can detect them. Once it is detected, it will no longer read any more sheet music and play the song until it is done. When it finishes, it will randomly move about the piano outline searching for more sheet music. An API we considered using is SheetVision.

implementation (code)

1. use the tone() function from Arduino tutorial to define relationship between note, period, and frequency

2. use the zumo to follow white tape and re-calibrate itself

3. use the camera to do sheet music detection and read from that

technical challenges

The main challenges would be with programming the robot. None of our group members are experts with Python. Handling the image recognition may be a challenge. Calibrating the robot to treat the image of the keyboard as an actual keyboard will also be very difficult. Then there will be potential edge cases to sort out. What if the image of the sheet music was green? What if the music required quick changes in tempo? These are all issues that will have to be dealt with.

C D E F G A B C D E F G A B C D E