

Project Proposal

Pianodo – the self-playing pianist robot

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1.0 INTRODUCTION

What is this project?

- This project is a self-playing robot for a piano consisted of an “arm” with 13 solenoids that will play the notes on a piano (they act as the “fingers”) which can all be moved at the same time throughout the piano. The piano has 88 keys (standard full-size piano). A stepper motor will control the movement of the arm from going to each end of the piano. An Arduino Mega 2560 microcontroller will be at the heart of the system controlling the movement of the arm and the notes being played on the piano along with an LCD screen that will show to the user various tones/melodies the piano can play and that the user can select. Each key that is pressed will be illuminated on a fictional picture of the piano, where the keys that are lit there are correspondent to the keys being played on the real piano. All the components of this system will be together on a removable system on wheels. The complete assembly/system can be rolled over the piano and rolled off when the system is not needed.

2.0 APPLICATION

Where and what can it be used for?

- This system can be used in the education sector of music for those who are learning to play the piano. The user will be able to watch and play back the tune they are practicing onto the piano. The system can also be used to play tunes/melodies on a real piano when there is no pianist available to play those tunes/melodies (a real piano sounds a lot better and looks cooler than an electric piano!). The system would be easily placed over the piano and at the touch of a button, will play all the tunes the user desires!

3.0 PARTS REQUIRED BUDGET

Project Parts Required

Budget = \$200

- (?x) Different wires with colors
- (?x) Wood with screws
- (?x) RJ45 ends & CAT twisted-pair low-voltage communication cable
- (2x) Plastic enclosure Arduino, LCD and motor driver controller
- (1x) Arduino Mega 2560
- (13x) 12V 10mm 0.3-8N push-pull solenoid
- (88x) LEDs

- (1x) 16-channel relay module/board for Arduino
- (1x) 16x2 LCD with i2C module for Arduino
- (4x) push-buttons
- (1x) 12V 10A power supply
- (1x) Stepper motor
- (1x) Motor driver controller for Arduino

4.0 TIMING

Tentative Schedule

- Schematic: 7 days
- Waiting for parts: 11-30 days
- Prototype: 12 days
- Assembly: 14 days
- Programming & debugging: 21 days
- Final touch ups: 7 days

5.0 FINISHING DATE

May 11th

- Based on the tentative schedule above and the complexity of the project, the predicted delivery of the project will occur on the 11th of May 2021. The project may be delivered at an earlier time if there are no problems that occur. The 11th of May is also the worst-case project delivery date (if delays occur, problems, changes in design, etc.).



Solenoids which will act as “fingers” that will play the individual notes on the piano



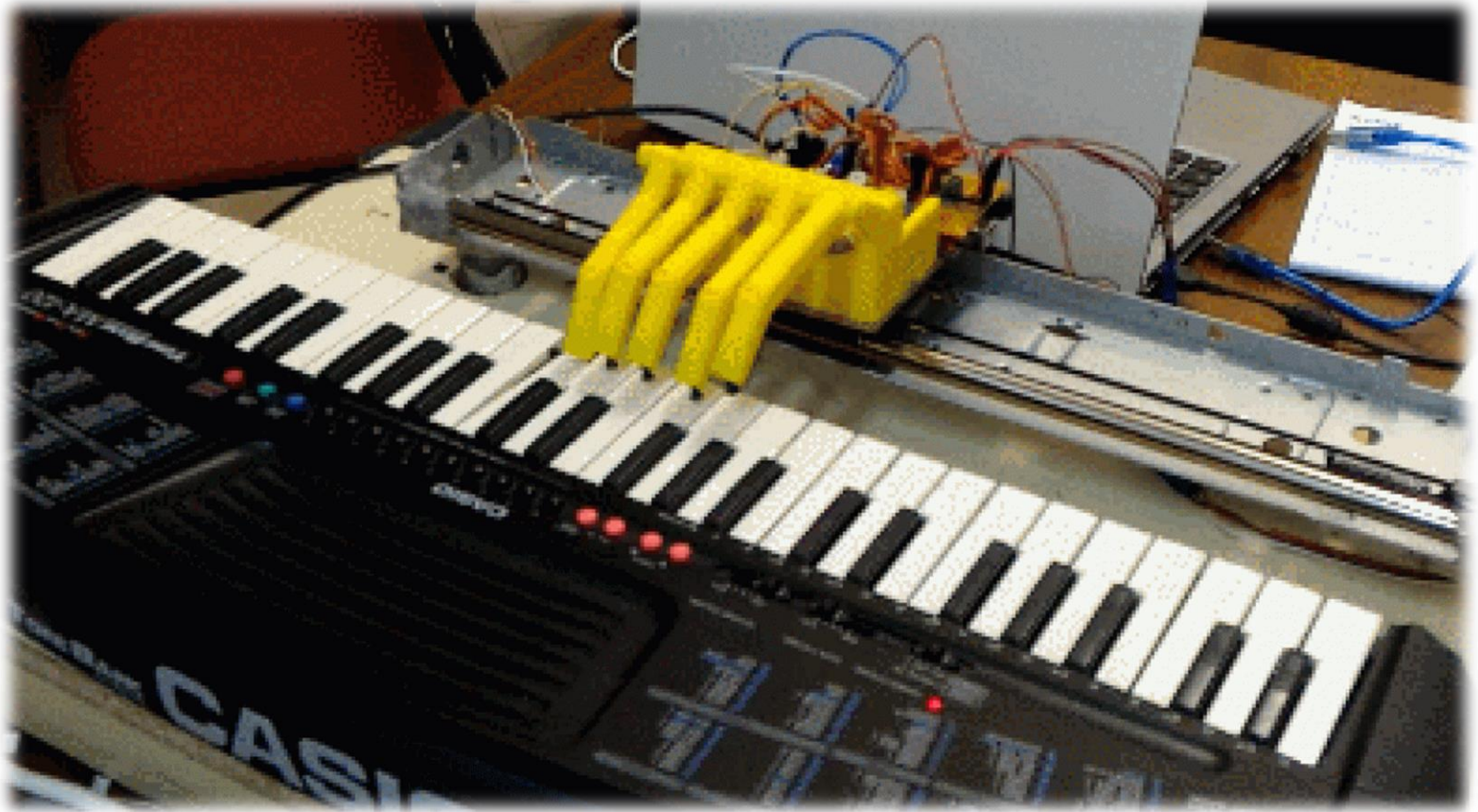
Mobility concept for system so that it can be easily moved onto and rolled off of the piano



Fig. 1 The proposed piano robot

The developed system is a hierarchical control structure

Track concept where the arm will be moving across to reach both ends of the piano



Possible alternative to using solenoids as “fingers” on the piano and other track concept