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PHYS 580

11/19/20

Dr. Kwon

### Final Project: Development and Management Plan

#### 1. Design Plan:

##### a. Define the Problem (Scenario):

- i. Create a photoresistor theremin that can be calibrated and then used to play, record, and play back recorded files in LabVIEW.

##### b. Inputs:

- i. Wait (ms) (Possibly)
- ii. Start Calibration
- iii. Log Calibration Data
- iv. Restart/Exit
- v. # of Major Scale
- vi. Volume Knob
- vii. Harmony Button
- viii. Octave Button
- ix. Record
- x. Stop Recording
- xi. Filename Out
- xii. Playback
- xiii. Filename In

xiv. Restart

xv. Exit

c. Outputs:

i. Wait (ms) (Possibly)

ii. # of Major Scale

iii. Output Audio Frequency

iv. Volume Knob

v. Harmony LED

vi. Octave LED

vii. Filename Out

viii. Recording LED

ix. Playback LED

d. Additional Requirements:

i. AI Voltage Task (myDAQ/ai0:1)

ii. AO Voltage Task (myDAQ/ao0)

iii. Digital Input (myDAQ/dio0:1)

iv. Voltage Out (10 V)

v. # of Notes in Scale (7)

vi. Set Voltage Out to 0 V After While Loop Stops

vii. Calculate Frequencies as a Function of Inputted Scale Number Using  
Equal Temperament Tuning Relative to Middle C

viii. Using iPhone Flashlight as Light Source for Photoresistor

ix. Made 6 Evenly Spaced Lines on Paper for Calibrating V\_PR

- x. Circuit Components: Red LED, Photoresistor, 220 Ohm Resistor, Potentiometer, 2 Buttons, Breadboard Jumper Wires

e. Algorithm:

i. Main Menu

1. Prompt user if they want to start calibration
2. If yes, go to “Calibrate” state, else go to “Reset and Restart or Stop” state

ii. Calibrate

1. Prompt user for # of Major Scale
2. Use user input to calculate frequencies of all notes in the scale
3. Prompt user for when they want to record each of the 6 V<sub>PR</sub> readings to calibrate the theremin
4. Go to “Practice” State

iii. Practice

1. Read V<sub>PR</sub> and output the corresponding audio frequency
2. If Harmony Button is pressed, add the frequency one third above the current frequency in the inputted scale
3. If the Octave Button is pressed, double the frequency
4. If the Record Button is pressed, start writing the data to a log file with a user-inputted path and filename until the Stop Recording Button is pressed. Trim beginning and ending of recording
5. If the Playback Recording button is pressed, go to “Playback Recording” state

6. If the Exit Button is pressed, go to the “Reset and Restart or Stop” state

iv. Playback Recording

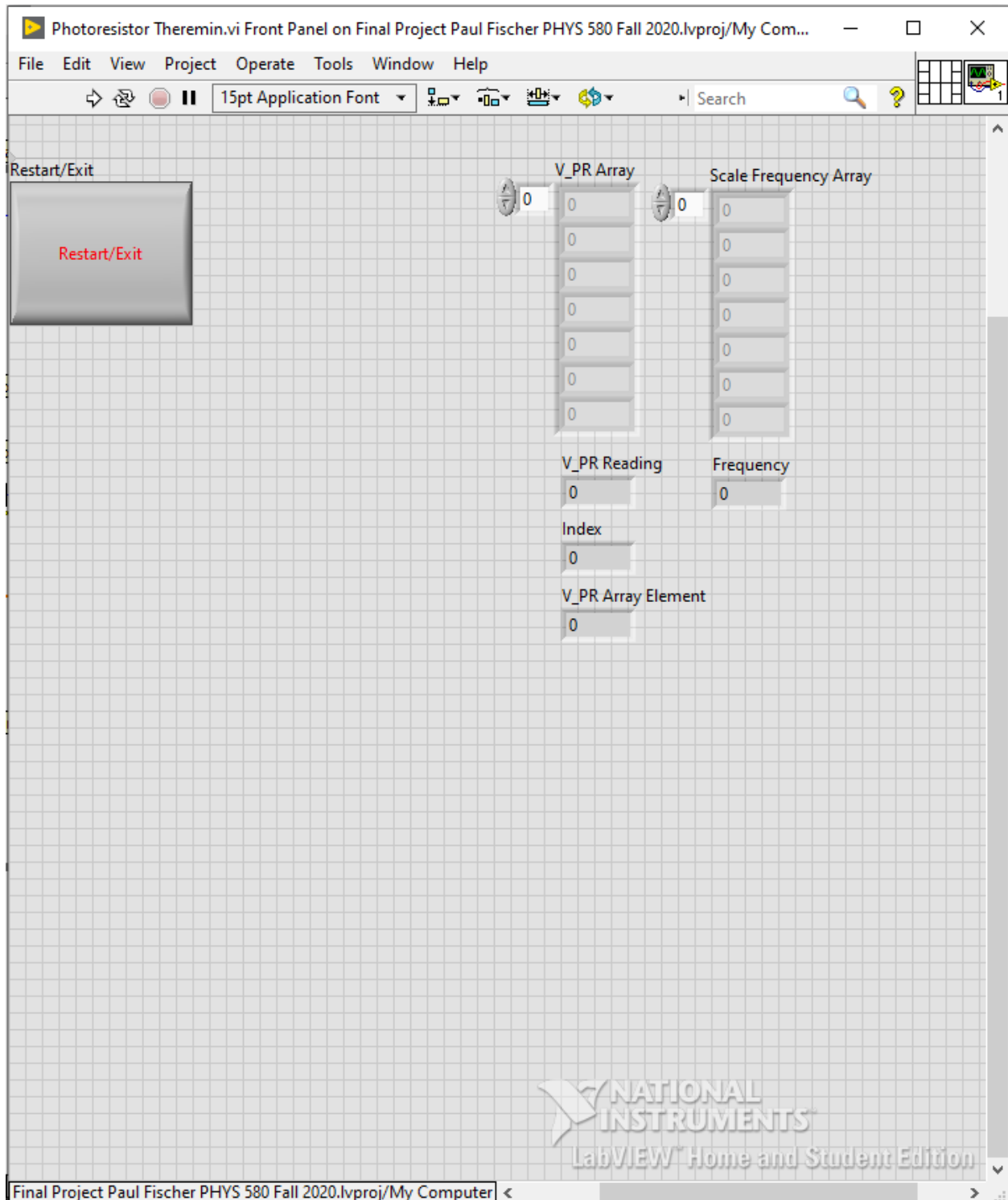
1. Prompt the user for the path and filename of the recording to be played
2. Play audio file
3. Go to “Practice” state

v. Reset and Restart or Stop

1. Prompt user if they want to restart or stop VI. If they choose restart, go to “Main Menu” state, else stop the while loop, send an Output Voltage of 0V to the physical circuit, and clear tasks

f. Front Panel:

- i. \*Note: The VI is currently in the initial debugging stage and the Front Panel is intentionally missing features so that testing can take place



2. Management and Testing Plan including Milestones, Timeline and Tracking Plan  
including Weekly Benchmarks to Track (to be checked during the lab)
  - a. Development Plan (final) to Dropbox: 8am, Nov. 24 (Tuesday)
  - b. Weekly Check: Week 15 during the lab
    - i. Nov. 26:
      1. Add audio features to VI and get recording and playback features to work
    - ii. Dec. 3:
      1. Polish VI
  - c. VI Demo & Presentation (15 min): Week 16 (Dec. 10)
  - d. VI Screenshot, Description, and PDF of the Full VI to Discussion (2pm Dec. 10)
  - e. Final VI to Dropbox (4:45pm Dec. 10)