Extending & Improving *p5.touchgui* library Functionalities and User Experience.

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PROJECT ABSTRACT

p5.touchgui Library is a flexible, easy-to-use multi-touch GUI library for p5.js. It was part of the gsoc'19 project , built by Carlos Gracia (l05) under the mentorship of Yining Shi. p5.touchgui is intended to extend the p5.js and makes easy to add buttons, slidders, and other GUI (graphical user interface) objects to your p5.sketches ,enabling you to focus on the quickly iterating ideas with easily created GUI objects that work with both mouse touch and multi-touch input.

The goal of this project is to extend the functionality and User experience of *p5.touchgui* by implementing whole new features and also improving the existing functionalities.

Goals

1. Implementation of new GUI objects like Pad Banks, TextField, Color Picker, Radio Button, Range Slider.

2. Implementing methods to load style from external json files with help of loadStyleJson() and save the style of GUI objects with help of saveStyleJson() and also implementing more Color Palettes (Preset Styles) .

3. Implementing Group/page property (high priority feature) so that object can be grouped and toggled together.

4. Migrating the reference documentation to Docsify Model. Documentation for the prototype method, context method, all the objects and essential methods.

5. Implementing a set of new interactive examples to give an overview of the extensive nature of p5.touchgui .

PROJECT DESCRIPTION

1. GUI (Graphical User Interface)

The p5.touchgui is lightweight easy-to-use library built on top of p5.js and the objective of this library is to create the easily made GUI (graphical user interface) Objects in your p5 sketches and easily created GUI objects can work on both mouse and multi-touch inputs.

The functionality of the p5.touchgui library can be improved by implementing new GUI Objects to it. It currently has Button, Toggle Button, checkBox, Slider/SliderV, Crossfader/CrossfaderV, Slider2d, Joystick as its components. As I went through the development notes and Google Summer Report created by Carlos Garcia. I found out a lot of new GUI Objects can be added which would ease the development of creative art and improve its usability.

Here is the list of new GUI (graphical User Interface) Objects in detail.

1.1. createPadBank(Label, x, y, [w], [h], row, col)

a. The Pads object is a two dimensional array of buttons (up to 16x16).

b. They are intended to trigger events instead of representing a state, since they eventually turn to an 'off' value after you touch them.

c. You can set colour and labels for the whole array or for each individual cell.

d. Kind of like the functional equivalent of an MPC/MPD or Launchpad, two tactile digital music interfaces.

Arguments:

1.1. It is a label for GUIPad Bank whose type is string.

1.2. It is the x-coordinate of the GUIPad Bank.

1.3. It is the y-coordinate of the GUIPadBank.

1.4. It is an optional field for the width of the pad bank which has a default value of 128.

1.5. It is an optional field for the height of the pad bank which has a default value of 128.

1.6. It states the number of buttons in the row.

1.7. It states the number of buttons in cols.

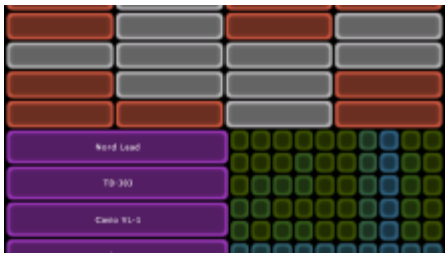


Fig - Pad Bank

1.2. createTextField(Label, x, y, [w], [h])

a. The Text Object produces no data when you touch it. Its purpose is to display arbitrary text including whitespace characters.

Arguments:

2.1 . It is a label for GUITextField which has a string as its type.

2.2. It is the x- coordinate for the GUITextField.

2.3. It is the y- coordinate for the GUITextField.

2.4. It is an optional field for the width of the text field which has a default value of 75.

2.5. It is an optional field for the height of the text field which has a default value of 28.

1.3. createRangeSlider(Label, x, y, [w], [h], [Min], [Max], steps)

a. A horizontal Slider which has a range depicted on it and it can be touched , clicked and dragged side to side to change its value.

Arguments:

3.1 . It is a label for GUIRangeSlider which has a string as its type.

3.2. It is the x- coordinate for the GUIRangeSlider.

3.3. It is the y- coordinate for the GUIRangeSlider.

3.4. It is an optional field for the width of the text field which has a default value of 128.

3.5. It is an optional field for the height of the text field which has a default value of 28.

1.4. createRadioButton(Label, x, y, [w], [h], id)

a. A radio button or option button which allows to choose only one among all other Options.

Arguments:

4.1 . It is a label for GUIRadio Button which has a string as its type.

4.2. It is the x- coordinate for theGUIRadio Button.

4.3. It is the y- coordinate for the GUIRadio Button

4.4. It is an optional field for the width of the radio button which has a default value of 32.

4.5. It is an id to group radio buttons of the same type whose type is string.

1.5. createColorPicker(Label, x, y, [w], [h], color)

a. A GUIColor picker enables you to select the color from the color bank .

Arguments:

5.1 . It is a label for GUIColor Picker which has a string as its type.

5.2. It is the x- coordinate for the GUIColor Picker.

5.3. It is the y- coordinate for the GUIColor Picker..

5.4. It is an optional field for the width of the color picker which has a default value of 75.

5.5. It is an optional field for the height of the color picker which has a default value of 28.

5.6. It is the color that you can pick whose type can be String/p5.color.

2. GUI (Graphical User Interface) Style

GUI (graphical user interface) Styling is another Important area which has great potential for further improvement for p5.touchgui. I had a little conversation with Carlos Gracio and I went through his development notes and concluded about what can be the possible feature enhancement in this section.

Here are the list of enhancement listed in detail below :

2.1. loadJsonStyle(fileName) :

a. Implementing loadStyleJson() method will provide an extra edge over the styling of the GUI object. It will load a json file that contains styling of different gui objects. It would allow developers to provide their own way to customize the style of gui object in addition to the current preset style.It will deep copy the style from json file and apply to the current styling.

Arguments:

a.1. It is a json file containing the customised style for the gui objects.

2.1 saveJsonStyle(target) :

a. Implementing saveStyleJson() method will enable developers to save their Current customised style of GUI Objects into a json file for later use.

Arguments:

a.1. It is a location where it will store the current GUI styling as a json file.

2.3. Page/Group/Tabs Property (high priority features) :

a. It is a property which helps to grouped and toggled objects together. This property is inherited by all the GUI objects so they can be tracked and grouped together.

b. It will be quite useful in setting the style for same grouped GUI objects.

2.4. Extending the collection of color palettes :

a. Currently p5.touchgui uses different color palettes (preset style) for styling GUI objects. It contains Gray(), Rose(), Seafoam(), Blue(), TerminalGreen(), TerminalRed(), TerminalBlue(), TerminalYellow(), TerminalMagneta() as its preset style.

b. Implementing more color palettes like Pink(), Orange(), purple(), Indigo(), Amber(), Cyan() to current preset style collection. This would provide the more option for GUI objects styling.

3. DOCSIFY MODEL FOR DOCUMENTATION

Migrating the current documentation to the docsify model. Docsify will generate documentation site on the fly. It will have all the component like Method, Example, API in a single page.

Advantage of Doscify Model for Documentation :

1. It will have all the documentation, api, interactive example in a single interactive page and will provide a very easy platform for beginners to explore.

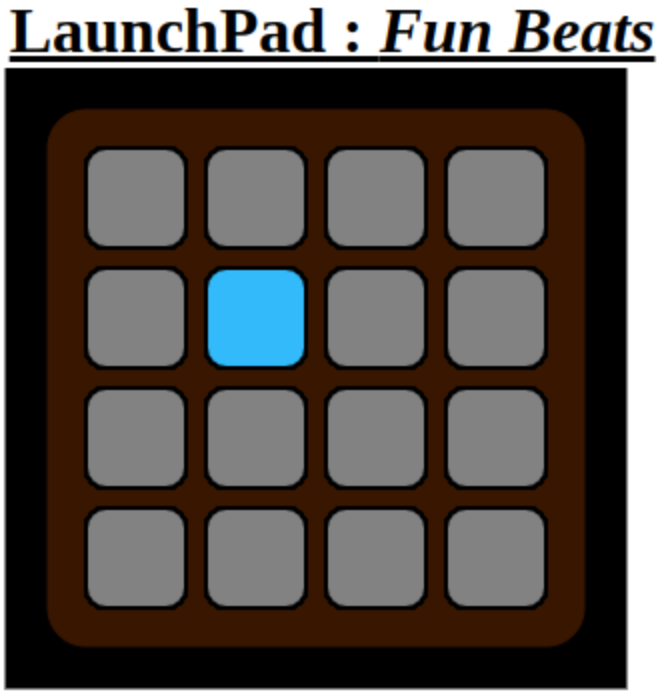
2. It will have a quick start section which will provide a quick overview of p5.touchgui and how to get started.

4. MORE INTERACTIVE EXAMPLES

Examples are the best way to portrait what a library can do. Currently p5.touchgui has a very limited set of interactive examples. I was checking the p5.play library of p5.js. It was very fascinating to see that it has an amazing set of interesting examples grouped together in a single page and demonstrating the full potential of p5.play and what it can do.

I want to implement a new set of interactive examples for p5.touchgui and it will demonstrate the full capacity of p5.touchgui library. Creating multi-touch games as examples . Few examples of hot games are : Multi-Balls - Multitouch multiplayer game, Oculusia: Multi-touch gaming, Giant Multi-Touch Air Hockey etc.

Related Work:



Demonstration :

Above shown ‘Multi Touch Launch-Pad’ is a sample prototype of a very famous music device, Launch-Pad that lets you make music or mix tracks using an intuitive grid of multi-color buttons. This sample GUI based ‘Multi Touch Launch-Pad’ involves various buttons in place of the grid system of the original Launch-Pad. Best user experience can only be experienced on a touch device like Smart phones.It has the same functionality as shown in this reference video : LaunchPad Play.

Url : **https://padlaunch.000webhostapp.com/**

In a very similar way to the original device, this ‘Multi Touch Launch-Pad’ produces music when a user touches any of its buttons. A user can keep playing music by pressing various buttons endlessly and producing a mix of tracks. It is simple demonstration of extensive nature of p5.touchgui(p5.js) library. It can also be seen as a demonstration of the Pad Bank GUI object.

Development Timeline and Related Implementation (May 04-Aug 31,2020)

1. May 04 - June 01, 2020 - Community Bonding

For the three weeks, I will be mainly spending time familiarizing with codebase.I will also get familiar with the community and interact with my gsoc mentor specific to the various methods I proposed to implement.

2. June 01 - Aug 31, 2020

- **Phase -1(June 01 - June 28) :**

  - **0 ---** June 01- June 09

    Goal : Implementing the GUITextField

    1. Implementing the GUITextFieldObject class which extends the GUIObject class.
    2. Implement the style for the textfield in the current preset style.

  - **0 ---** June 10 - June 18

    Goal : Implementing the GUIRadio Button

    1. Implementing the page/group property to group the guiObject together.
    2. Implementing the GUIRadioButton Object class which extends the GUIObject class.
    3. Implement the style for the radio button in the current preset style.

  - **0 ---** June 19 - June 28

    Goal : Implementing the GUIPad Bank

    1. Analysing the all possible features for the object.
    2. Implementing the GUIPad Bank Object class which extends the GUIObject class.
    3. Implement the style for the pad bank in the current preset style.

- **Evaluation (June 28 - July 03)**
  1. Remove any bugs, and complete any previous work if left.
  2. Comprehensive testing of implementation.
  3. Write Proper documentation and examples which are not very complex and understandable to the community.
  4. Submit the Final Code.

- **Phase -2(July 04 - July 24)**

  - **July 04 - July 09**

    Goal : Implementing the GUIRange Slider

    1. Implementing the GUIRange Slider Object class which extends the GUIObject class.
    2. Implement the style for the range slider in the current preset style.

  - **July 10 - July 15**

    Goal : Implementing the GUIColor Picker

    1. Implementing the GUIColor Picker Object class which extends the GUIObject class.
    2. Implement the style for the color color in the current preset style.

  - **July 16 - July 22**

    Goal : Implementing loadJsonStyle() method.

  - **July 23 - July 27**

    Goal : Implementing saveJsonStyle() method.

  - **Evaluation (July 27 - July 31)**
    1. Remove any bugs, and complete any previous work if left.
    2. Comprehensive testing of implementation.
    3. Write Proper documentation and examples which are not very complex and understandable to the community.
    4. Submit the Final Code.

- ## Phase - 3 (July 31 - August 24) :

July 31 - August 07

Goal : Developing more color palettes to extend the collection of preset style.

August 08 - August 17,

Goal : Migrating the reference documentation to the docsify mode .

August 18 - August 24,

Goal : Implementing a set of new interactive examples for p5.touchgui.

August 24 - August 31 , 2020 - Final Evaluation

End of Google Summer Of Code. Here, I will

- Remove any bugs, and complete work if left.
- Comprehensive testing of implementation.
- Write Proper documentation if left.
- Submit the Final Code.

About Myself

Hi all! My name is Vishal Singh and I am a Computer Science undergrad at Harcourt Butler Technical University, India. I devote most of my time to coding, solving new problems, taking new competitive programming challenges on CodeChef(handle_name)and learning new stuff. I have completed a few freelancing Web Development projects recently.

I was the Campus Ambassador,Organiser and Lecturer for the workshop on 'Open Source' by 'GirlScript Summer of Code 2020 '. I have been a lead member of Harcourt Butler Technical University's Decoder Club which gets involved in various development projects and events like meetups, speaker sessions, workshops and organise hackthops all round the year.

This proposal was possible because of Carlos Gracia who guided me as a mentor in drafting it and the Processing Community. One thing about the Processing Community is their friendliness and their supportive nature. I got first introduced to p5.js when I was watching a video of a lecturer who was teaching how to get started with open source. From there onwards, I started using p5.js and later on I fell in love with it. Then I started playing with the codebase of p5.js and also have made few contributions.

My recent ventures include in creating a College's Website Image Gallery which is A fully functional and independent site that keeps all photo frames categorically sorted. A major improvement for the College website, independently completed using React js, Redux and Django framework.And my another personal projects includes A conversational bot along with GUI interactions which enables the user to learn a specific language by interacting with the bot.It is built using Django framework for messenger platform.And Another project includes a Project Management Software which helps you to manage all your projects, track the progress,compare your progress with the actual required progress and help you to complete the targets in real time.

Commitments

I will be having my summer vacations during the entire duration of the program and due to absence of any other commitments, I will be available at least 40 hours a week with full devotion and dedication.

I'm keen and excited to have this opportunity to contribute to p5.touchgui and hope my contributions will benefit other users and the Processing Community.

Contributions:

Merged Pull Requests(PRs):

#4085 : Add mechanism to stop recordings from createCapture().

#4140 : Switching between front and rear camera on a smartphone using P5.js

#3966 : image() in WEBGL affected by the material/lighting conditions

#4046 : filter() should log warning in WEBGL

#3990 : p5.Vector in LocalStorage

#3897 : p5js Reference should include entries for JavaScript basics

Issues Opened:

#636 : Add a " Launch Pad " as Examples

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