UIWidgets

Introduction

UIWidgets is a plugin package for Unity Editor which helps developers to create, debug and deploy efficient, cross-platform Apps using the Unity Engine.

UIWidgets is mainly derived from Flutter. However, taking advantage of the powerful Unity Engine, it offers developers many new features to improve their Apps as well as the develop workflow significantly.

Efficiency

Using the latest Unity rendering SDKs, a UIWidgets App can run very fast and keep >60fps in most times.

Cross-Platform

A UIWidgets App can be deployed on all kinds of platforms including PCs, mobile devices and web page directly, like any other Unity projects.

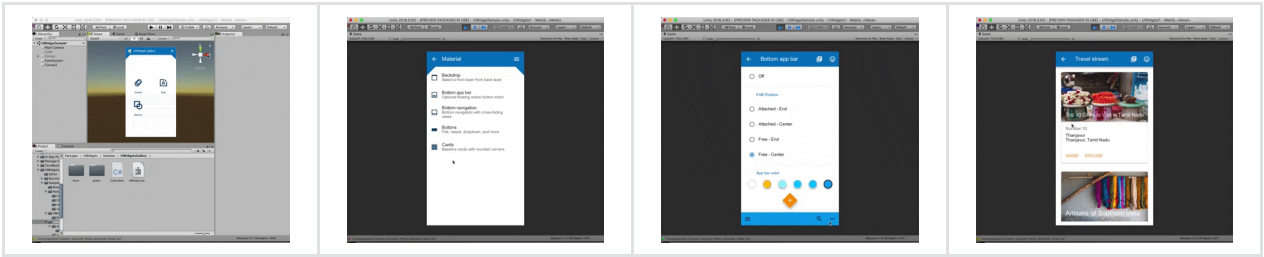
Multimedia Support

Except for basic 2D UIs, developers are also able to include 3D Models, audios, particle-systems to their UIWidgets Apps.

Developer-Friendly

A UIWidgets App can be debug in the Unity Editor directly with many advanced tools like CPU/GPU Profiling, FPS Profiling.

Example



Requirement

Unity

Install **Unity 2018.3** or above. You can download the latest Unity on https://unity3d.com/get-unity/download.

UIWidgets Package

Visit our Github repository https://github.com/UnityTech/UIWidgets to download the latest UIWidgets package.

Move the downloaded package folder into the **Package** folder of your Unity project.

Generally, you can make it using a console (or terminal) application by just a few commands as below:

```
cd <YourProjectPath>/Packages
git clone https://github.com/UnityTech/UIWidgets.git com.unity.uiwidgets
```

Getting Start

i. Overview

In this tutorial, we will create a very simple UIWidgets App as the kick-starter. The app contains only a text label and a button. The text label will count the times of clicks upon the button.

First of all, please open or create a Unity Project and open it with Unity Editor.

And then open Project Settings, go to Player section and **add "UIWidgets_DEBUG" to the Scripting Define Symbols field.** This enables the debug mode of UIWidgets for your development. Remove this for your release build afterwards.

ii. Scene Build

A UIWidgets App is usually built upon a Unity UI Canvas. Please follow the steps to create a UI Canvas in Unity.

1. Create a new Scene by "File -> New Scene";
2. Create a UI Canvas in the scene by "GameObject -> UI -> Canvas";
3. Add a Panel (i.e., **Panel 1**) to the UI Canvas by right click on the Canvas and select "UI -> Panel". Then remove the **Image** Component from the Panel.

iii. Create Widget

A UIWidgets App is written in **C# Scripts**. Please follow the steps to create an App and play it in Unity Editor.

1. Create a new C# Script named "UIWidgetsExample.cs" and paste the following codes into it.

```
using System.Collections.Generic;
using Unity.UIWidgets.animation;
using Unity.UIWidgets.engine;
using Unity.UIWidgets.foundation;
using Unity.UIWidgets.material;
using Unity.UIWidgets.painting;
using Unity.UIWidgets.ui;
using Unity.UIWidgets.widgets;
```

```
using UnityEngine;
using FontStyle = Unity.UIWidgets.ui.FontStyle;

namespace UIWidgetsSample {
    public class UIWidgetsExample : UIWidgetsPanel {
        protected override void OnEnable() {
            // if you want to use your own font or font icons.
            // FontManager.instance.addFont(Resources.Load<Font>(path:
"path to your font"), "font family name");

            // load custom font with weight & style. The font weight &
style corresponds to fontWeight, fontStyle of
            // a TextStyle object
            // FontManager.instance.addFont(Resources.Load<Font>(path:
"path to your font"), "Roboto", FontWeight.w500,
            //    FontStyle.italic);

            // add material icons, familyName must be "Material Icons"
            // FontManager.instance.addFont(Resources.Load<Font>(path:
"path to material icons"), "Material Icons");

            base.OnEnable();
        }

        protected override Widget createWidget() {
            return new WidgetsApp(
                home: new ExampleApp(),
                pageRouteBuilder: (RouteSettings settings, WidgetBuilder
builder) =>
                    new PageRouteBuilder(
                        settings: settings,
                        pageBuilder: (BuildContext context,
Animation<float> animation,
                            Animation<float> secondaryAnimation) =>
builder(context)
                    )
            );
        }

        class ExampleApp : StatefulWidget {
            public ExampleApp(Key key = null) : base(key) {
            }

            public override State createState() {
                return new ExampleState();
            }
        }

        class ExampleState : State<ExampleApp> {
```

```
            int counter = 0;

            public override Widget build(BuildContext context) {
                return new Column(
                    children: new List<Widget> {
                        new Text("Counter: " + this.counter),
                        new GestureDetector(
                            onTap: () => {
                                this.setState(()
                                    => {
                                    this.counter++;
                                });
                            },
                            child: new Container(
                                padding: EdgeInsets.symmetric(20, 20),
                                color: Colors.blue,
                                child: new Text("Click Me")
                            )
                        )
                    }
                );
            }
        }
    }
}
```

2. Save this script and attach it to **Panel 1** as its component.
3. Press the "Play" Button to start the App in Unity Editor.

iv. Build App

Finally, the UIWidgets App can be built to packages for any specific platform by the following steps.

1. Open the Build Settings Panel by "File -> Build Settings..."
2. Choose a target platform and click "Build". Then the Unity Editor will automatically assemble all relevant resources and generate the final App package.

How to load images?

1. Put your images files in Resources folder. e.g. image1.png.
2. You can add image1@2.png and image1@3.png in the same folder to support HD screens.
3. Use Image.asset("image1") to load the image. Note: as in Unity, ".png" is not needed.

UIWidgets supports Gif as well!

1. Suppose you have loading1.gif. Rename it to loading1.gif.bytes and copy it to Resources folder.
2. You can add loading1@2.gif.bytes and loading1@3.gif.bytes in the same folder to support HD screens.

3. Use Image.asset("loading1.gif") to load the gif images.

Using Window Scope

If you see the error `AssertionError: Window.instance is null` or null pointer error of `Window.instance`, it means the code is not running in the window scope. In this case, you can enclose your code with window scope as below:

```
using(WindowProvider.of(your gameObject with UIWidgetsPanel).getScope()) {
    // code dealing with UIWidgets,
    // e.g. setState(() => {....})
}
```

This is needed if the code is in methods not invoked by UIWidgets. For example, if the code is in `completed` callback of `UnityWebRequest`, you need to enclose them with window scope. Please see HttpRequestSample for detail. For callback/event handler methods from UIWidgets (e.g `Widget.build, State.initState...`), you don't need do it yourself, since the framework ensure it's in window scope.

Show Status Bar on Android

Status bar is always hidden by default when an Unity project is running on an Android device. If you want to show the status bar in your App, this solution seems to be compatible to UIWidgets, therefore can be used as a good option before we release our full support solution on this issue.

Besides, please set "Render Outside Safe Area" to true in the "Player Settings" to make this plugin working properly on Android P or later.

Automatically Adjust Frame Rate

To build an App that is able to adjust the frame rate automatically, please open Project Settings, and in the Quality tab, set the "V Sync Count" option of the target platform to "Don't Sync". The default logic is to set the frame rate to 25 when the screen is static, and change the frame rate to 60 whenever the screen changes. If you would like to modify the behavior of speeding up or cooling down the frame rate, please set `Window.onFrameRateSpeedUp` and/or `Window.onFrameRateCoolDown` to your own functions.

WebGL Canvas Device Pixel Ratio Plugin

The width and height of the Canvas in browser may differ from the number of pixels the Canvas occupies on the screen. Therefore, the image may blur in the builded WebGL program. The Plugin `Plugins/platform/webgl/UIWidgetsCanvasDevicePixelRatio_20xx.x.jslib` (2018.3 and 2019.1 for now) solves this issue. Please select the plugin of the Unity version corresponding to your project, and disable other versions of this plugin, as follows: select this plugin in the **Project** panel, and uncheck **WebGL** under **Select platforms for plugin** in the **Inspector** panel. If you need to disable this plugin for any reason, please disable all the versions of this plugin as described above.

This plugin overrides the following parameters in the Unity WebGL building module:

```
JS_SystemInfo_GetWidth
JS_SystemInfo_GetHeight
JS_SystemInfo_GetCurrentCanvasWidth
JS_SystemInfo_GetCurrentCanvasHeight
$Browser
$JSEvents
```

If you would like to implement your own WebGL plugin, and your plugin overrides at least one of the above parameters, you need to disable the `UIWidgetsCanvasDevicePixelRatio` plugin in the above mentioned way to avoid possible conflicts. If you still need the function provided by this plugin, you can mannually apply the modification to Unity WebGL building module introduced in this plugin. All the modifications introduced in `UIWidgetsCanvasDevicePixelRatio` are marked by `////////// Modifcation Start //////////` and `////////// Modifcation End //////////`. In the marked codes, all the multiplications and divisions with `devicePixelRatio` are introduced by our modification. To learn about the original script in detail, please refer to `SystemInfo.js` and `UnityNativeJS/UnityNative.js` in `PlaybackEngines/WebGLSupport/BuildTools/lib` in your Unity Editor installation.

Image Import Setting

Unity, by default, resizes the width and height of an imported image to the nearest integer that is a power of 2. In UIWidgets, you should almost always disable this by selecting the image in the "Project" panel, then in the "Inspector" panel set the "Non Power of 2" option (in "Advanced") to "None", to prevent your image from being resized unexpectedly.

Debug UIWidgets Application

Define UIWidgets_DEBUG

It's recommended to define the **UIWidgets_DEBUG** script symbol in editor, this will turn on debug assertion in UIWidgets, which will help to find potential bugs earlier. To do this: please go to **Player Settings -> Other Settings -> Configuration -> Scripting Define Symbols**, and add **UIWidgets_DEBUG**.
The symbol is for debug purpose, please remove it from your release build.

UIWidgets Inspector

The UIWidgets Inspector tool is for visualizing and exploring the widget trees. You can find it via *Window/Analysis/UIWidgets* inspector in Editor menu.
Note

- **UIWidgets_DEBUG** needs to be define for inspector to work properly.
- Inspector currently only works in Editor Play Mode, inspect standalone built application is not supported for now.

Learn

Samples

You can find many UIWidgets App samples in the UIWidgets package in the **Samples** folder. Feel free to try them out and make modifications to see the results. To get started, the UIWidgetsTheatre scene provides you a list of carefully selected samples to start with.

You can also try UIWidgets-based Editor windows by clicking **UIWidgetsTest** on the main menu and open one of the dropdown samples.

Wiki

The develop team is still working on the UIWidgets Wiki. However, since UIWidgets is mainly derived from Flutter, you can refer to Flutter Wiki to access detailed descriptions of UIWidgets APIs from those of their Flutter counterparts. Meanwhile, you can join the discussion channel at (https://connect.unity.com/g/uiwidgets)

FAQ

Question	Answer
Can I create standalone App using UIWidgets?	**Yes**
Can I use UIWidgets to build game UIs?	**Yes**
Can I develop Unity Editor plugins using UIWidgets?	**Yes**
Is UIWidgets a extension of UGUI/NGUI?	**No**
Is UIWidgets just a copy of Flutter?	**No**
Can I create UI with UIWidgets by simply drag&drop?	**No**
Do I have to pay for using UIWidgets?	**No**
Any IDE recommendation for UIWidgets?	**Rider, VSCode(Open .sln)**

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