Vuforia Blue Pump QuickStart

Introduction

Welcome to the Vuforia Blue Pump QuickStart.

This guide will introduce the core building blocks of the Vuforia platform and its various sub-components.

Scenario

In this scenario, you will be developing an application that focuses on the Vuforia platform via a pump demonstration. We will teach you how to capture, store, analyze, and visualize data utilizing the Vuforia platform.

Suggested Reading

Vuforia Documentation

Many topics are covered within the Vuforia Studio Enterprise Help menu. We encourage you to utilize it regularly.

Questions/Issues/Recommendations

For bug and enhancement requests, please visit the [PTC Support Organization](#).
For ThingWorx issues, please visit the ThingWorx [Developer Community](#) forum.

What You Will Need

- Printer to print out your ThingMark

- Mobile device such as a phone or tablet

  - Only Apple iPhone and iPad supported at present, specifically:

Vuforia View Enterprise Supported Devices (iOS 9.0 or later)

Device	Supported Versions
iPhone	5s, 6, 6 Plus, 6s, 6s Plus, SE
iPad	Air, Air 2, Mini 4, Pro, Pro 9.7
Android	None

Vuforia Studio Enterprise Supported Operating Systems and Browsers

Operating System	Supported Versions	Supported Browsers
Mac	El Capitan	Chrome
Windows	7, 10 (64-bit only)	Chrome

  - Check the Vuforia View Enterprise requirements on the App Store for more information

Installing and Configuring Vuforia

Vuforia is composed of three separate parts, namely Vuforia Studio Enterprise, Vuforia Experience Service, and Vuforia View Enterprise. Vuforia Studio is the GUI which allows you to build your augmented-reality interface (or "Experience"). The Vuforia Experience Service is where you publish your Experiences. And Vuforia View is the application through which you view your Experiences on a supported mobile device.

To view the instructions on installing Vuforia, please follow the appropriate link below.

1. [Windows](#) (YouTube) or [Windows](#) (Learning Center)

2. [Mac](#) (YouTube) or [Mac](#) (Learning Center)

These instructions will also be detailed in your "Welcome to Vuforia" email upon sign-up, including the Vuforia Studio download-URL and your Vuforia Experience Service URL.

In addition, there will be a link to download your ThingMarks (2D augmented-reality codes which you scan with Vuforia View Enterprise to bring up specific Experiences).

An example ThingMark:

Print at least one of the ThingMarks on your personal printer, and make a note of which ThingMark it is, such as **332:1**. You may write the ThingMark-number on your printed ThingMark for later usage, but please do so in a location outside the ThingMark itself.

1. When the Vuforia Studio installation completes, you will see a pop-up window for Vuforia Studio Enterprise. Click on **Open Vuforia Studio Enterprise**. This will open **localhost:3000/home** on your default web browser.
   a. At present, only **Google Chrome** is fully supported. If you are using another browser as your default, it is highly recommended that you close your default browser, open Chrome, and manually navigate to **localhost:3000/home**.
2. Once in Chrome at **localhost:3000/home**, you will see three options. Click on **Builder Settings**.
3. Enter your Vuforia Experience Service address in the **Default Experience Service URL** and click **Done**.
4. On your mobile device, go to the application store and search for **Vuforia View Enterprise**. Install Vuforia View Enterprise.
   a. At present, only Apple iPhones and iPads support Vuforia View Enterprise.
5. On the mobile device where you installed Vuforia View Enterprise, go to Settings.
6. Find the Vuforia View Enterprise application, and expand its Settings options.
7. Enter the URL that was provided to you earlier for your Vuforia Experience Service.
8. Enter the same Username and Password which you used to access Vuforia Studio Enterprise.
9. Exit Settings.

Create and Publish Your Augmented Reality Experience

Next, we'll go into Vuforia Studio Enterprise and create your Experience.

1. In Google Chrome, navigate to **localhost:3000/home**.

   a. If Chrome is your default browser, then you alternately can click on **Open

   Vuforia Studio Enterprise** in the pop-up window that opened after you installed

   Vuforia Studio Enterprise. If you have closed that window, then the program is

   still running in your Taskbar. A single left-click will re-open the pop-up window.

b. If you have shut down that window via closing it in your Taskbar, then you will need to re-open Vuforia Studio Enterprise from your list of installed programs.

2. Click on **Create a New Project**.

3. Provide a name for the project such as **VuforiaBluePumpDemo**.

4. Ensure that **AR** is selected and click **Create**.

5. You'll now be presented with the Vuforia Studio Enterprise development environment.
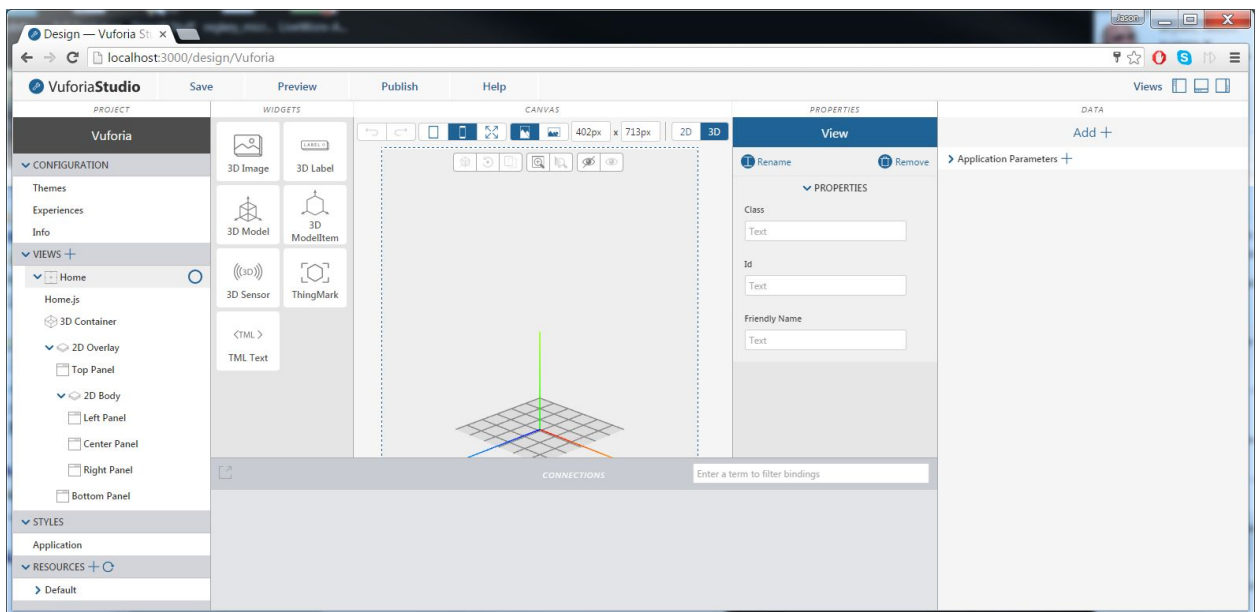

a. On the left side are links to the individual components of your augmented reality Experience. For instance, you will be able to see sections for both the Container as well as the 2D overlay to which you may add items such as buttons for increased functionality.

b. In the center, you'll see the **CANVAS** where you may place 3D widgets for augmented reality such as a 3D Model, 3D Label or 3D Sensor.

c. On the right side, you'll see a section for **DATA**, including default data listed under **Application Parameters**, as well as the ability to import additional data such as Properties saved by the ThingWorx Foundation platform.

d. On the bottom, you'll see a **CONNECTIONS** window, which provides a list of all of the data connections, such as when you bind certain ThingWorx Properties to display Widgets, or connections between two Widgets (ex. Binding a toggle button to the visibility of a label).

1- Get a 3D Model into your Experience

1. Drag-and-drop a **3D Model** Widget onto the central **CANVAS**. You'll now see a default

   "cube" representing the 3D Model. However, we still need to tell Vuforia Studio

   Enterprise which exact model to display.
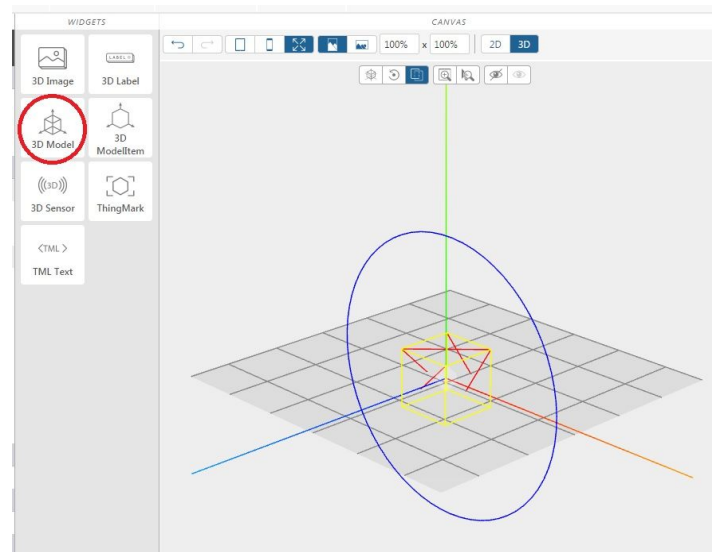
2. Navigate to the Vuforia Download page.

3. Download the BluePumpKit.zip file to your computer and extract it to a convenient folder.

4. On the left-side of Vuforia Studio Enterprise, click the blue **+** sign beside **RESOURCES**.

5. Click **Select Files** on the **Add Resource** pop-up window.

6. Navigate to the location where you extracted the .zip file.

7. Select **blue_pump.pvz** and click **Open**.

   a. Note that at this stage you want the .pvz file, *not* the .pvi.

8. Click **Add** on the **Add Resource** pop-up window.
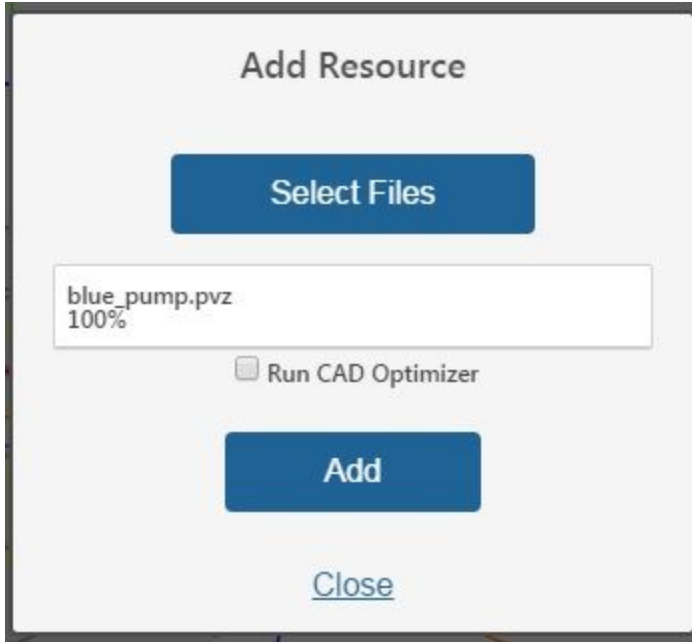
9. Click **Close** to close the **Add Resource** pop-up window.

10. On the right-side of the Canvas area, expand the options for **Resource** by clicking on its

    "up/down" arrow icon, then expand the **Uploaded** group.

11. Select **blue_pump.pvz**, and the pump's 3D model will appear in the Canvas.

12. The model is probably a little too large in its current form, so while **3DModel-1** is

    selected, set **PROPERTIES -> Scale** to **.3**. When working with the physical object, the

    objective would be to ensure that the 3D measurements match the actual pump.

13. At the top-center of the Canvas area, click on the **Rotate** icon (hover over the icons to

    get a description.

14. Click-and-drag the red circle until the model is rotated 90-degrees clockwise.

    a. Alternately, you may enter **-90** in the **X Rotation** field for the 3D Model

       Properties.

15. At the top-center of the Canvas area, click on the **Translate** icon (hover over the icons to get a description).

16. Click-and-drag the arrows until the model is placed where you want it to be.

    a. Note that the location of the 3D Model is largely up to you. Simply place it at a location which seems "correct". Placement via Translate really only becomes an issue if you have multiple 3D Models and want them to all appear in particular locations from scanning a single ThingMark.

    b. Note that, at any time, you may save your current progress by clicking the **Save** button in the top-left section of Vuforia Studio Enterprise.

2- Provide an Animation of the 3D Model's Breakdown

1. We now have a 3D Model inside Vuforia Studio Enterprise, but an augmented-reality

   Experience can have animations as well, such as disassembly instructions. Let's add an

   example of that now.

2. On the left-side of Vuforia Studio Enterprise, click the blue **+** sign beside **RESOURCES**.

3. Click **Select Files** on the **Add Resource** pop-up window.

4. Navigate to the location where you extracted the .zip file.

5. Select **teardown.pvi** and click **Open**.

   a. Note that a .pvz file is a 3D model, while a .pvi file is an animation tied to that 3D

      model. Please ensure that you choose the .pvi file at this time.

6. Click **Add** on the **Add Resource** pop-up window.

7. Click **Close** to close the **Add Resource** pop-up window.

8. Select the 3D Model by left-clicking on it.

9. On the right-side of the Canvas area, scroll down in PROPERTIES until you find the

   Sequence URL section.

10. Expand the Sequence URL options by left-clicking on the blue, "up/down" icon.

11. Select **teardown.pvi**.

   a. Once again, please note that you want the .pvi file this time.
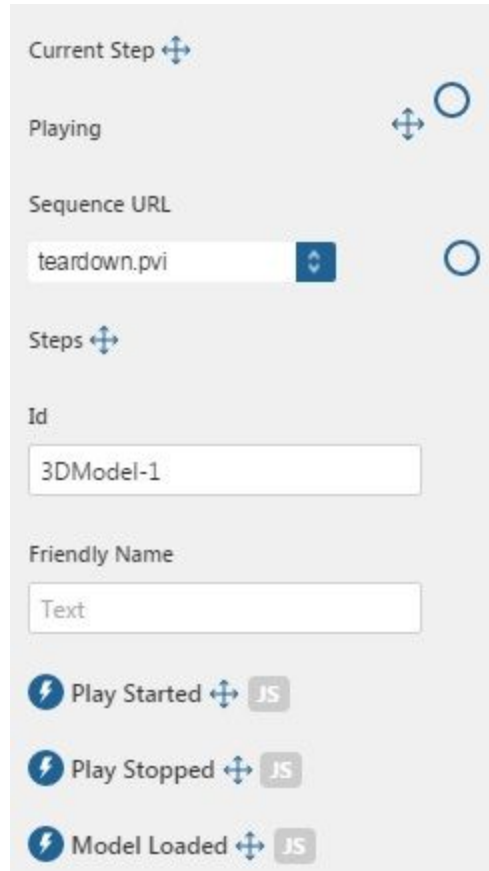
12. We will tie this animation to a button later, but we now have access to it within Vuforia

Studio Enterprise.

3- Tie in a ThingMark so that we can view the Experience in Vuforia View

Enterprise

1. Experiences in Vuforia View Enterprise are selected via scanning a ThingMark. In order
   to get the augmented-reality 3D Model to show up in the correct location, you must place
   a digital ThingMark in the same location as your *real-world* ThingMark.

2. Drag a **ThingMark** Widget onto the central Canvas.

3. Left-click the ThingMark to select it.

4. On the far-right of Vuforia Studio Enterprise, expand the options for **Application**
   Parameters.

5. Drag the blue, movable, "up/down/left/right" icon beside **Application Parameters ->**
   ThingMark onto the blue circle associated with **Properties -> ThingMark**.

   a. Note that the blue circle will now be "filled in", and you will see a new connection
   in the bottom **CONNECTIONS** section.
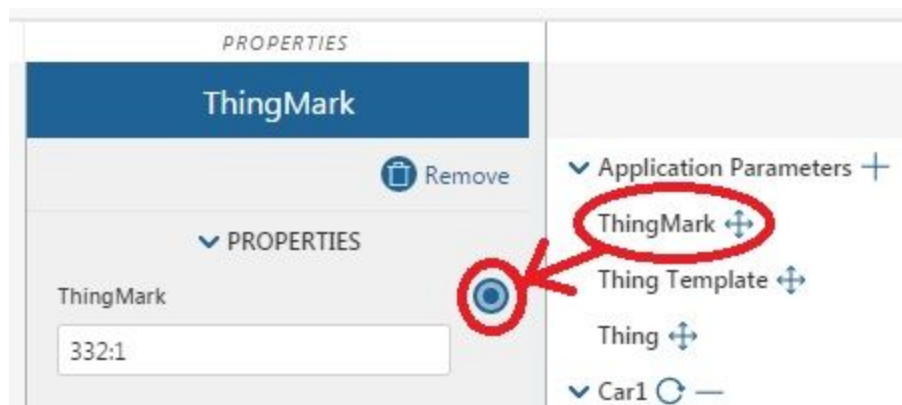
6. Change the value for **PROPERTIES -> ThingMark** to the value of the ThingMark that you previously printed, such as **332:1**.

7. At the top of the **CANVAS** area, click on the **Mate** icon (hover over the icons to get a description).

8. Drag the ThingMark on top of the 3D model.

    a. Note that the placement of the ThingMark in Vuforia Studio Enterprise will directly correspond to where the augmented-reality Experiences places the model in Vuforia View Enterprise.

    b. This also corresponds to rotation. So you either want to rotate the digital ThingMark in the same way as it will be placed in real-life, or you want to rotate the ThingMark in real-life to the same orientation as in Vuforia Studio Enterprise.

    c. Since we won't have a "real" Blue Pump, this matters less, but it's an important point to remember for real-world applications.

**4- Add a 3D Label to the Experience to show some information**

1. Besides 3D Models, we can also add some 3D information to our Experience. Let's add a Label to display some information from the ThingWorx Foundation platform (an IoT Development Platform). This will require us to invoke a "Service" which will grab information from ThingWorx Foundation.

    a. This is not the only way to get external information into Vuforia Studio, but it is convenient for our current usage, and a pre-configured item has been set up which provides a useful, changing value.

2. Drag a **3D Label** Widget onto the Canvas area.

3. Click on **Translate** (hover over the icons to get a description) and then move it to a desired location.

4. While the 3D Label is selected, scroll down in the **PROPERTIES** until you see the option for **Billboard**.

5. Check the **Billboard** box. This will cause the 3D Label to rotate as you move around your augmented-reality Experience so that it is always pointed directly at you.

6. Now we need to get some data for our 3D Label to display. In this instance, we'll pull that information from the ThingWorx Foundation platform. However, you can get external information into the Vuforia platform via other means as well.

7. In the top-right under **DATA**, click on **Add +**.

8. In the **Search Entities** field at the very top-left where you see a magnifying glass, type in

    car1. This is a pre-configured Thing which has been created to provide some

    information, including a regularly-changing value. We'll use this changing **RPM** value to

    provide a changing value for the Pump.

9. Wait for the system to sort through the available options, and then click the blue

    right-arrow for **Car1 (Thing)**. You'll now see a list of all available Services for that Thing.

10. In the **Filter services** field, start typing **GetPropertyValues**, and click the blue **+** symbol

    beside GetPropertyValues when it filters out of the available options. You'll now see the

    Services -> GetPropertyValues information on the right-hand side of Vuforia Studio

    Enterprise under **Data**.
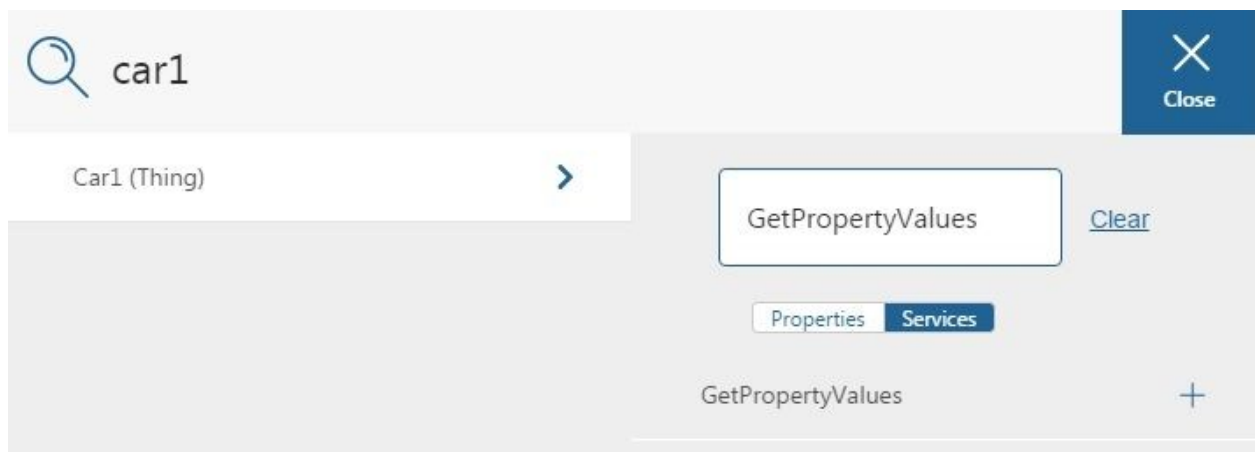
11. Click on the blue **X Close** icon in the top right to return to the **CANVAS**.

12. Expand **GetPropertyValues -> Configuration** by clicking on the blue "right arrow"

    beside **Configuration**.

13. Click the checkbox beside **Invoke on Startup**. This will cause the Experience to grab all

    the Property values as soon as you load the Experience in Vuforia View Enterprise.

14. Click the checkbox beside **Auto-refresh**, and then change the **Auto-refresh Rate** to

    something like **3** seconds. This will cause the values to update at whatever rate you

    manually set.
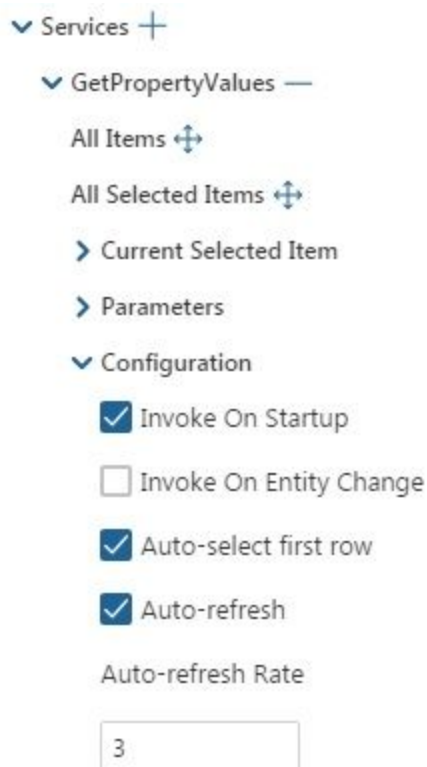
15. Expand **GetPropertyValues -> Current Selected Item** to see all of the available

    Properties currently being stored on the ThingWorx Foundation platform.

16. Choose the **RPM** Property to apply to the label.

17. Drag the blue, movable, "up/down/left/right" icon from the Property over to the empty, blue circle beside **Text**. This will cause the Label Widget to show the value of the Property from the ThingWorx Foundation platform.
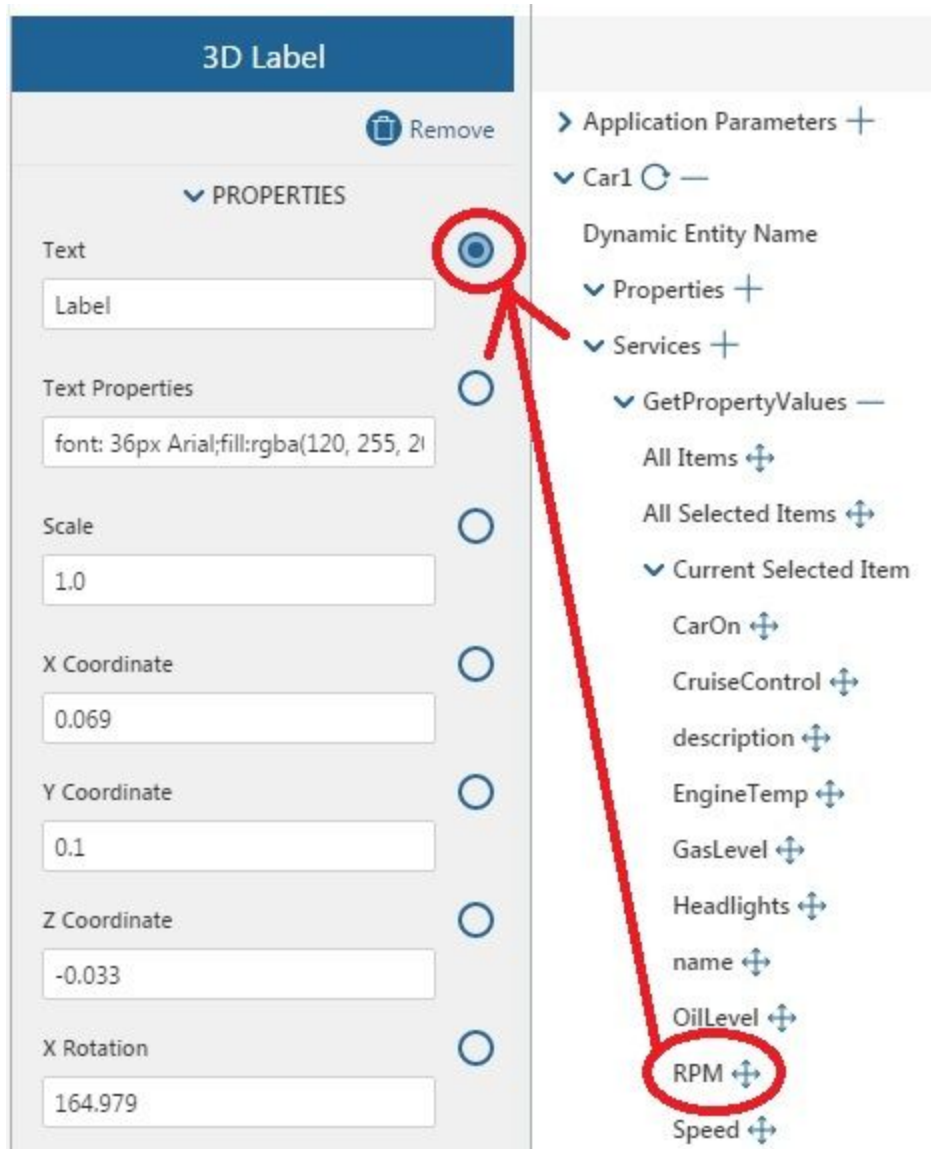
a. Note that you will also see that the blue circle beside **Text** is now filled in, and a new connection has been added to the CONNECTIONS section in the bottom.

b. Also note that this is an easy portion of the Guide to modify for personalization of your Experience. Any of the Properties stored in the ThingWorx Foundation platform would work here. If you don't like the current selection, click on the blue "trashcan" icon down in the CONNECTIONS window to remove the link to the 3D Label, and then drag-and-drop a different Property onto the Label's Text binding instead.

c. This may also be a place to further work with the ThingWorx Foundation platform. For instance, you could go into the ThingWorx Foundation platform and add a Property named DisplayInfo of the type TEXT. To manually set this DisplayInfo ThingWorx Property, simply clicking Set in the ThingWorx Foundation platform and enter a value. You could then tie the platform's DisplayInfo to the 3D Label in your Experience.

18. At this point, your Vuforia Studio Enterprise setup should look roughly like this:
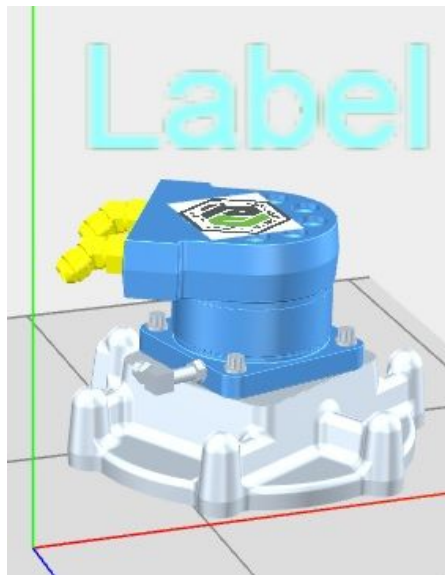
5 - Add a 2D Button for the Disassembly-Animation and Other Information

We're now finished with the 3D portion of our augmented-reality Experience, but we can also

add 2D overlay elements as well.

1. Let's do that now by clicking on the **2D button** at the top right under **CANVAS**.

2. First, we need to get some images for the Toggle Button Widgets we'll be using shortly.

   a. On the left-side of Vuforia Studio Enterprise, click the blue **+** sign beside

      RESOURCES.

   b. Click **Select Files** on the **Add Resource** pop-up window.

   c. Navigate to the location where you extracted the .zip file.

   d. Select **play.png** and click **Open**. This will be the image we use to activate the

      disassembly / re-assembly animation.

   e. Click **Add** on the **Add Resource** pop-up window.

   f. Without closing the **Add Resource** pop-up window, click **Select Files** again.

   g. Select **info.png** and click **Open**. This will be the image we use to display or hide

      a "card" section with Warranty information.

   h. Click **Add** on the **Add Resource** pop-up window.

   i. Without closing the **Add Resource** pop-up window, click **Select Files** again.

   j. Select **i.png** and click **Open**. This will be the image we use to display or hide the

      3D Label.

   k. Click **Add** on the **Add Resource** pop-up window.

i. Note that there is also an **iot.png** image. It is not utilized in this guide, but you may still add it if you choose for personalization purposes.

l. Click **Close** to close the **Add Resource** pop-up window.

3. Now we need to setup a location to hold our buttons.

    a. Select the **Bottom Panel** from the VIEWS section on the far left by left-clicking on it.

    b. Drag-and-drop a **Grid Layout** Widget on the Bottom Panel.

    c. In the far-left VIEWS section, click on **row-1** under your **gridLayout-1** to select it.

    d. On the right-side of the Canvas section under **PROPERTIES**, click on **+ Add Column** a total of 2x times.

        i. You'll now see that the Bottom Panel has been divided into three sections.

    e. Select **column-1** by clicking on it.

    f. On the right side of the Canvas section under **PROPERTIES**, change **Alignment** from **Stretch** to **Center**.

    g. Repeat this process for **column-2** and **column-3**, setting their Alignment to Center as well.

4. Next, we need to place some buttons and set up their display-images.

    a. Drag-and-drop a **Toggle Button** Widget onto the first column.

        i. Note that there are both Button Widgets and Toggle Button Widgets. You want the Toggle version.

b. Select **toggleButton-1** inside **column-1**.

c. On the right side of the Canvas area under **PROPERTIES**, change both **Image when Pressed** and **Image when Not Pressed** to **play.png**.

d. Drag-and-drop a **Toggle Button** Widget onto the second, and third columns.

e. Select **toggleButton-2** inside **column-2**.

f. On the right side of the Canvas area under **PROPERTIES**, change both **Image when Pressed** and **Image when Not Pressed** to **info.png**.

g. Select **toggleButton-3** inside **column-3**.

h. On the right side of the Canvas area under **PROPERTIES**, change both **Image when Pressed** and **Image when Not Pressed** to **i.png**.

i. In the end, your button layout should look like this:

5. Now we need to tie our first Button to the Disassembly/Assembly animation.

a. Select **toggleButton-1** (i.e. the "Play" icon).

b. On the right side of the Canvas area under **PROPERTIES**, scroll down to find the

   Click Event. Drag the blue, movable, "up/down/left/right" icon from **Click** over to

   **3DModel-1** in the far left area of Vuforia Studio Enterprise.

c. When the pop-up window appears, select **Play** out of the available selections.
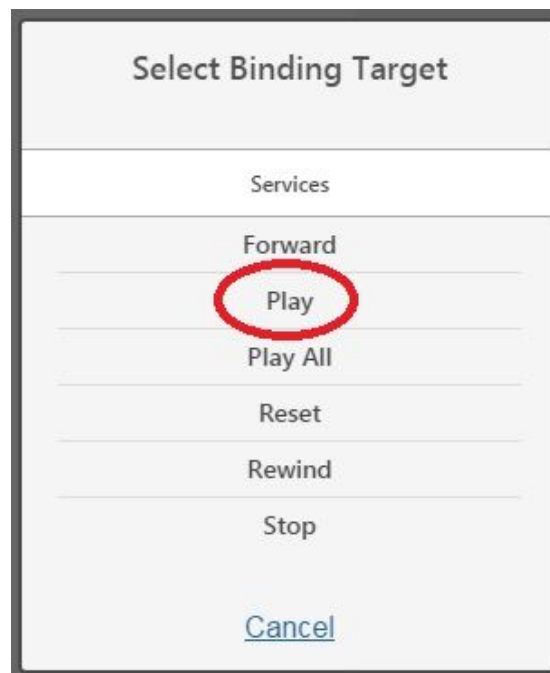
d. Now, whenever the **Play** Toggle Button is pressed inside Vuforia View

Enterprise, the Blue Pump's disassembly animation will play. If you press the

Play Toggle Button again, the pump will reassemble.

6. Next, we need to create an overlay section that we will selectively hide or display.

a. Click on **VIEWS -> Home -> 2D Overlay -> 2D Body -> Center Panel** on the left

side of Vuforia Studio in order to select it.

b. Drag-and-drop a **Card** Widget into the Center Panel in the Canvas area. This will

create a static area onto which we can then add additional Widgets.

c. Now drag-and-drop two **Value Display** Widgets onto the Card in the Center

Panel.

d. Left-click on the top Value Display (i.e. **valueDisplay-1**) to select it.

e. On the right side of the Canvas area under **PROPERTIES**, enter a value for

Label such as **Owner**.

f. In the same manner, change **Value** to your name or something else appropriate.

g. Left-click on the bottom Value Display (i.e. **valueDisplay-2**) to select it.

h. Enter some text for **Label** such as **Warranty Status**.

i. Enter some text for **Value** such as **Active**.

i. Also note that this is another good place where you can personalize this QuickStart. For instance, you have access to the various Properties being retrieved from **car1**. You could drag-and-drop **name** onto **Value** for **valueDisplay-1** or something similar. Then the information that you're showing in this central Card will be dynamically set from the ThingWorx Foundation platform rather than a static value that you're manually entering.

7. Since we have our Card overlay, let's tie a button to make it visible or invisible.

   a. Select **toggleButton-2**, i.e. the "Info" icon.

   b. Ensure that the check box beside **Pressed** is *unchecked*. This will cause the Toggle Button to start out not-pressed, so that your Warranty Info Card is not visible from the start.

   c. On the right side of the Canvas area at the top of the **PROPERTIES**, drag-and-drop the blue, movable, "up/down/left/right" icon from **Pressed** over to **card-1** in the far left area of Vuforia Studio Enterprise.

      i. Note that there are two different "Pressed" sections under PROPERTIES. You want the Pressed that is at the very top of toggleButton-2's PROPERTIES.
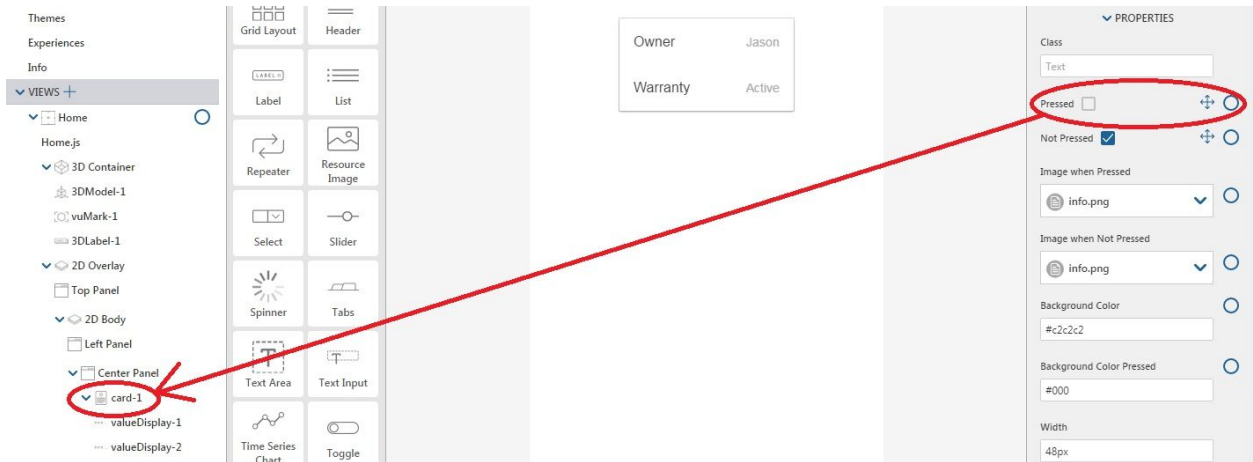
d. When the pop-up window appears, select **Visible** out of the available selections.

e. Now, whenever the **Info** Toggle Button is pressed inside Vuforia View Enterprise, the Card that you've created will become either visible or invisible with each press. This is a great way to get more info into your augmented-reality Experience without constantly tying up screen real estate. Instead, the info is only visible when you need it.

8. In a similar vein, let's also make the last button hide/display the 3D Label.

a. Select **toggleButton-3**, i.e. the **i** icon.

b. Ensure that the check box beside **Pressed** is *checked*. This will cause the Toggle Button to start out pressed, so that your 3D Label is visible from the start.

c. On the right side of the Canvas area at the top of **PROPERTIES**, drag-and-drop the blue, movable, "up/down/left/right" icon from **Pressed** over to **3DLabel-1** in the far left area of Vuforia Studio Enterprise.

       i.   Note that there are two different "Pressed" sections under PROPERTIES.

              You want the Pressed that is at the very top of toggleButton-4's

              PROPERTIES.

d. When the pop-up window appears, select **Visible** out of the available selections.

e. Now, whenever the **i** Toggle Button is pressed inside Vuforia View Enterprise, the

   3D Label that you've created will become either visible or invisible with each

     press.

       i.   However, since you checked the "Pressed" box, the 3D Label will start out

              Visible, because that 3rd **i** button will start out pressed.

6- Name Your Experience

1. We must let the program know *which* Experience to load when a ThingMark is

   scanned.

2. Click on **CONFIGURATION -> Experiences** in the top-left of Vuforia Studio Enterprise.

3. In the ThingMark Association drop-down menu, select **ThingMark** if it is not already

   selected.

4. In the **Title** box, enter something like **VuforiaBluePumpDemo**.

5. In the **ThingMark** box, enter the ThingMark number that you previously printed, such as

   332:1.

6. In the **View Name** drop-down box, select **Home** if it is not already selected.
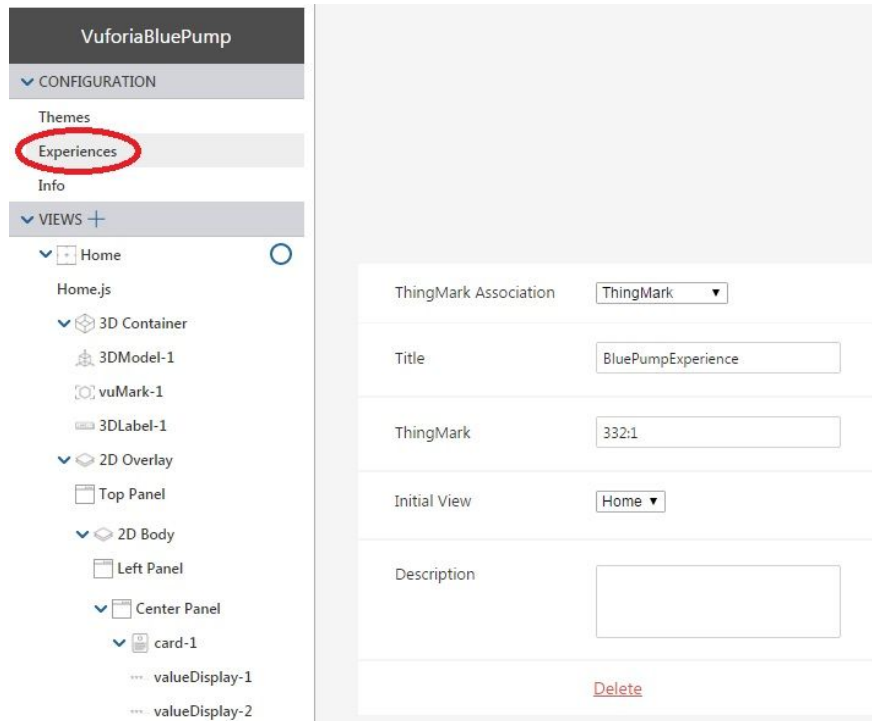
7. Click on **VIEWS -> Home** if you want to return to the CANVAS.

7- Save and Publish your Experience

1. Click on the **Save** button in the top-left of Vuforia Studio Enterprise.

2. Click on the **Publish** button at the top of Vuforia Studio Enterprise.

   a. Note that Publishing an Experience may take some time, as all of the elements of your Experience must be pushed to your Vuforia Experience Service. Simply wait until the green, rotating, "progress" indicator disappears.

View your Experience in Vuforia View Enterprise

Now it's time to view the completed project.

1. Place the appropriate ThingMark somewhere on a flat surface where you can easily interact with it.
2. On your mobile device, bring up Vuforia View Enterprise.
3. Move your mobile device until the camera picks up the **ThingMark**.
4. Vuforia View Enterprise will make a noise/vibrate and provide a selection of Experiences that have been tied to that particular ThingMark.

    a. If prompted, enter your Vuforia Username and Password.

5. Select the name of the Experience you have published.
6. Wait a moment with your mobile device still pointed at the ThingMark.

    a. If your model is large, then you will see a "Loading" progress indicator. Try not to move the mobile device until this loading process completes.

    b. Slowly move the mobile device further away from the ThingMark so that you can view the entire Experience.

7. Your augmented reality Experience should now be viewable.

    a. You should see the Blue Pump.

    b. As you move the mobile device around (while still pointed at the ThingMark), you will see the augmented-reality pump move as well. This can allow you to view the item from multiple angles.

    c. You should see the 3D Label showing the Property that you bound, such as the changing **RPM** value. In addition, the 3D Label should always be facing towards you, regardless of how you move about the ThingMark.

    d. If you hit the **Play** button one time, you should see the disassembly animation. If you press the **Play** button a second time, you will see the pump reassemble itself.

e. If you hit the **Info** button, then you will see the Card appear in the middle of the screen with whatever information you added. If you press the Info button again, the information will disappear.

f. If you hit the **i** button, then you will see the 3D Label appear or disappear with each press.

We hope that you've enjoyed this Vuforia Blue Pump QuickStart. Please feel free to go back into Vuforia Studio Enterprise and modify this Experience further.

Or you may wish to try out the Vuforia Raspberry Pi QuickStart to see an alternative augmented-reality Experience.

Also, don't forget to consult the Vuforia community if you have questions or simply want to learn more.