ptc

thingworx® studio

Blue Pump QuickStart

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Contents

.....2

Welcome! 7

Scenario 9

Core Components 11

What You'll Need 13

Installing and Configuring ThingWorx Studio 15

Create and Publish Your Augmented Reality Experience 17

- Create a Project 18
- Add a 3D Model to the Experience 19
- Add a ThingMark 22
- Add a 3D Label 23
- Add 2D Buttons 27
- Name the Experience 40
- Publish the Experience 41

View the Experience in ThingWorx View 43

You Did It! 45

1

Welcome!

Welcome to the ThingWorx Studio Blue Pump QuickStart! This guide will introduce the core components of ThingWorx Studio as well as various sub-components.

2

Scenario

In this scenario, you'll be developing an augmented reality (AR) Experience using ThingWorx Studio to build a pump demonstration. We'll show you how to capture, store, analyze, and visualize data utilizing ThingWorx Studio.

3

Core Components

ThingWorx Studio

ThingWorx Studio is a web-native, easy-to-use tool for authoring domain and task-specific Experiences that provide an integrated view of digital and physical product data, dashboards, and alerts with 2D, 3D, and augmented reality.

ThingWorx Experience Service

ThingWorx Experience Service is an enterprise-class, secure and scalable server used by both ThingWorx Studio and ThingWorx View. The following table lists simple use cases for Experience Service.

ThingWorx Component	Use Case
ThingWorx Studio	Published Experiences are stored on ThingWorx Experience Service.
ThingWorx View	Once a ThingMark is scanned, ThingWorx View searches ThingWorx Experience Service for all relevant Experiences. Once search results are returned and a user selects an Experience, the Experience is loaded in ThingWorx View.
ThingWorx Core	Used to serve data from Edge devices. Optionally, it can delegate authentication.

ThingWorx View

ThingWorx View delivers Experiences rich with 2D and 3D graphics, augmented reality, and real-time product data. ThingWorx View uses specialized markers called ThingMarks, that once scanned, immediately deliver relevant 2D, 3D, and

AR Experiences. Experiences augment the view of your immediate surroundings with context-sensitive information and graphics, enabling you to interact directly with the things around you.

4

What You'll Need

To complete this QuickStart, you'll need the following:

- A printer to print your ThingMark
- A supported mobile device (phone or tablet)
  - For a list of supported iOS devices and Android operating systems, see the Getting Started with ThingWorx Studio Guide.
  - Download ThingWorx View from the Google Play Store or the Apple Store

5

Installing and Configuring ThingWorx Studio

Installation

For instructions on installing ThingWorx Studio, please see the *Getting Started* guide.

Also, installation and configuration instructions, a link to the *Getting Started* guide, and your Experience Service URL, are also available in your "Welcome to ThingWorx Studio" email.

After your Experience Service is provisioned, your ThingWorx Studio portal account will be updated to include the link to download your ThingMark (2D augmented reality codes which you scan with ThingWorx View to bring up specific Experiences). Below is an example of a ThingMark:

Print at least one of your ThingMarks, and make a note of which ThingMark it is. For example, 332:1.

Tip

Write the ThingMark number in the corner of the sheet you printed the ThingMark on.

Configuration

If you haven't yet configured ThingWorx Studio with your Experience Service URL, complete the following steps.

1. When the ThingWorx Studio installation completes, the ThingWorx Studio window appears. Click **Open**. This opens `localhost:3000/home` and your **My Projects** page is displayed.

Note

Currently, 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. From the **My Projects** page, click and select **Settings**.
3. Enter your Experience Service URL in the **Default ThingWorx Experience Service URL** field and click **Done**.
4. From your supported mobile device, go to the application store and search for ThingWorx View. Install ThingWorx View.
5. On the mobile device where you installed ThingWorx View, go to **Settings**. Find the ThingWorx View application, and expand its **Settings** options.

Note

For supported Android devices, open ThingWorx View, press on the toolbar, and tap **Settings**.

6. Enter the URL that was provided to you earlier for your Experience Service.
7. Exit **Settings**.

6

Create and Publish Your Augmented Reality Experience

Create a Project 18
Add a 3D Model to the Experience 19
Add a ThingMark 22
Add a 3D Label 23
Add 2D Buttons 27
Name the Experience 40
Publish the Experience 41

This chapter will take you through the process of creating and publishing your augmented reality (AR) Experience using ThingWorx Studio. We'll take you through the following steps:

1. Create a project.
2. Add a 3D model to your Experience.
3. Add a ThingMark to your Experience.
4. Add a 3D label to your Experience to display information.
5. Add a 2D button for the disassembly animation along with other information.
6. Name your Experience.
7. Publish your Experience.

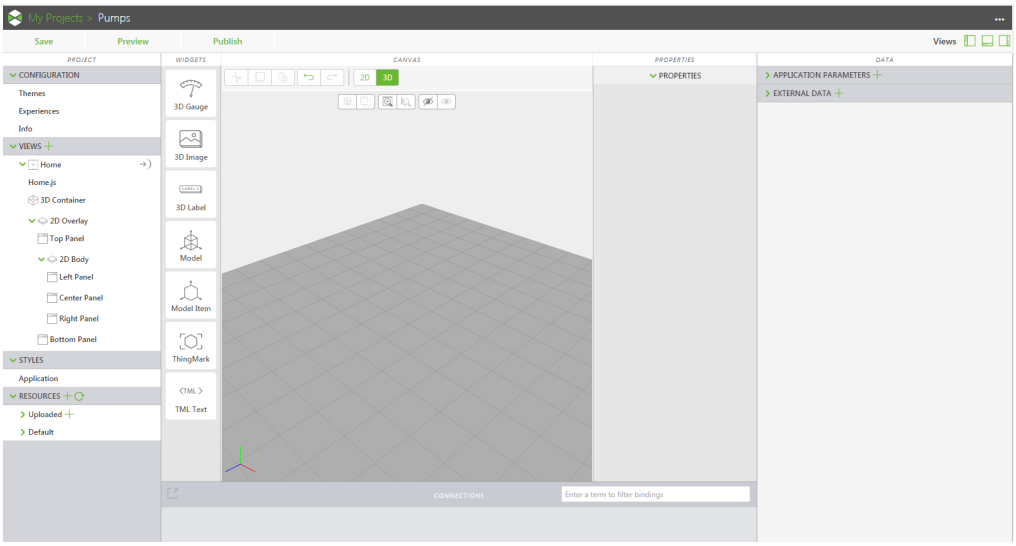
Create a Project

1. Open ThingWorx Studio.

> **Note**
>
> If Google Chrome is not your default browser, open Chrome and navigate to `localhost:3000/home`.

2. Click the green plus in the upper-right corner to create a new project.

3. Enter `Pumps` in the **Project Name** field.
4. Ensure that **AR** is selected and click **Create**.
5. The ThingWorx Studio development environment opens.

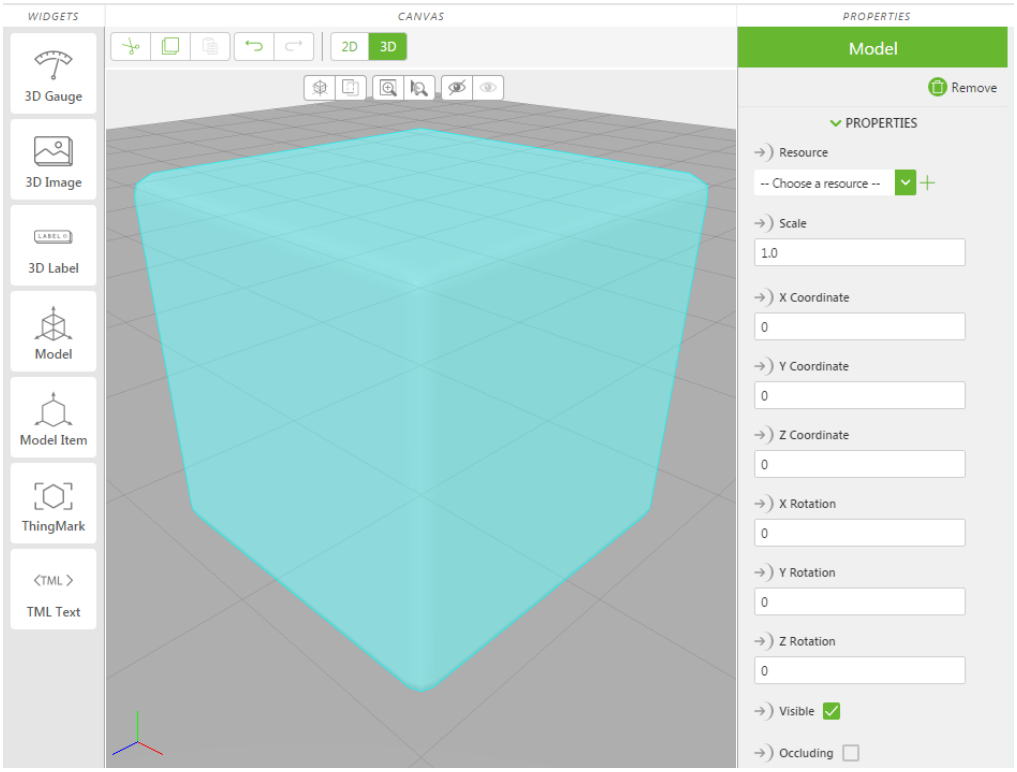


- On the left side you will see the **PROJECT** pane which contains individual components of your AR Experience in a tree. For example, you'll see sections for both the **3D Container** as well as the **2D Overlay** to which you can add items such as buttons for increased functionality.
- In the center, you'll see the **CANVAS** pane where you'll drag-and-drop widgets for your Experience. You can switch between **2D** and **3D** view of the canvas. Different widgets are available based on whether **2D** or **3D** is selected. Next to the canvas, the **PROPERTIES** pane is available to view properties specific to selected items.

- On the right side, you'll see the **DATA** pane, which includes default data listed under **Application Parameters**, as well as the ability to import external data. An example of external data could be properties saved in the ThingWorx Core platform.
- On the bottom, you'll see the **CONNECTIONS** pane which provides a list of all of the data connections. For example, when you bind certain ThingWorx properties to widgets, or connect two widgets, the connections will appear in this pane.

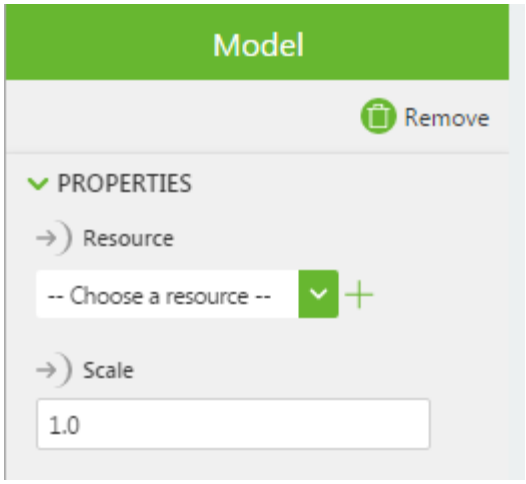
Add a 3D Model to the Experience

1. Drag-and-drop a **Model** widget onto the central canvas. You'll now see a default "cube" representing the 3D model. However, we still need to specify which model to display.

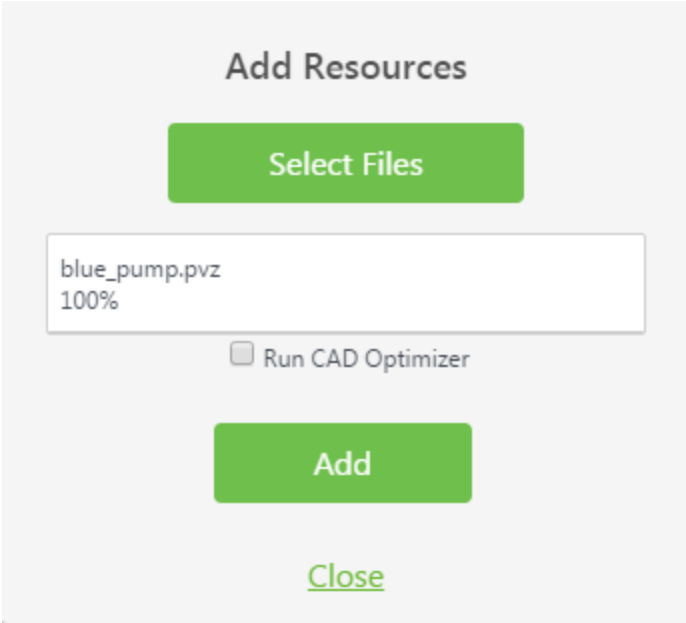


2. Navigate to the ThingWorx Studio Portal.
3. Under **Basic Tutorials**, click **Blue Pump QuickStart** to download the **BluePumpKit.zip** file. Extract the contents of the `.zip` file to a location on your system.
4. Navigate back to ThingWorx Studio.

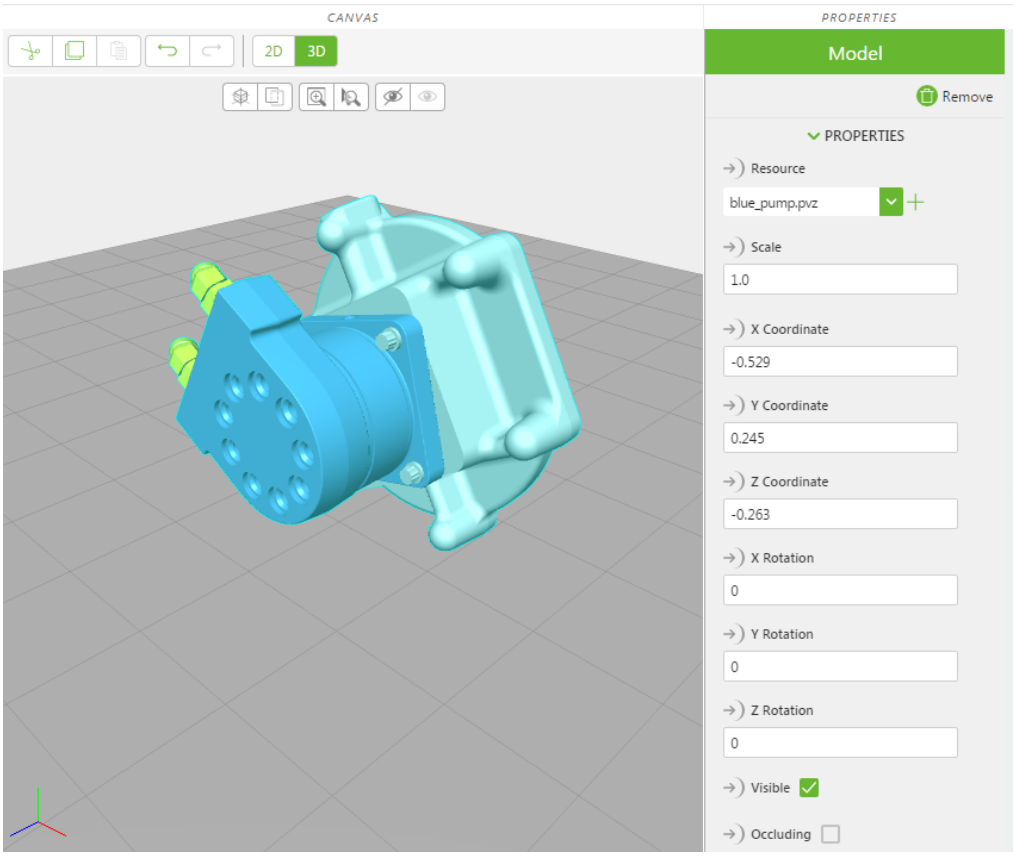
5. With the model selected, click the green + sign next to the drop-down menu under **Resource** in the **PROPERTIES** pane.



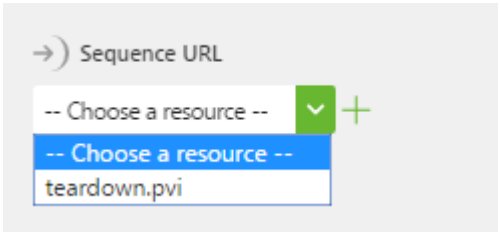
6. Click **Select Files** on the **Add Resources** window.
7. Select **blue_pump.pvz** and click **Open**.
8. Click **Add** on the **Add Resources** window.



9. Click **Close** to close the **Add Resource** window. The 3D model of the blue pump appears on the canvas.



10. Once you've added the `blue_pump.pvz` file, the **Sequence URL** drop-down is automatically populated with the `tearndown.pvi` file. Select it to add the disassembly animation sequence to the model.



11. At the top-center of the canvas area, click the **Transform** icon.

12. Click-and-drag the red arc of the **Transform** tool until the model is rotated 90 degrees clockwise. The X, Y, and Z coordinates are indicated by color where Red = X, Green = Y, and Blue = Z.

> **Note**
>
> Alternatively, you can enter `-90` in the **X Rotation** field for the model properties.

13. With the **Transform** tool still selected, click-and-drag the arrows until the model is placed where you want it to be.

> **Note**
>
> Placement of the model really only becomes an issue if you have multiple models and want them to all appear in particular locations. The model placement is arbitrary for this demo since you will not have a physical blue pump. Place the model wherever you think it looks best.

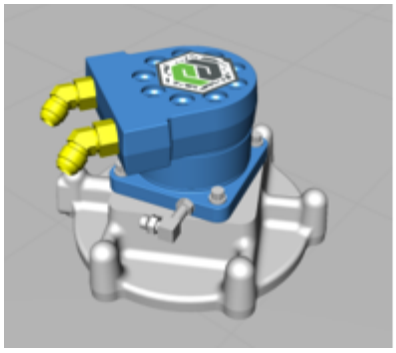
14. Click **Save**.

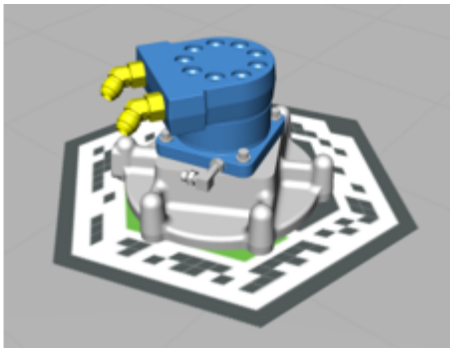
> **Tip**
>
> Click **Save** throughout creating your Experiences to ensure that your progress is saved.

Add a ThingMark

Experiences in ThingWorx View are displayed by scanning a ThingMark from your device. In order for the 3D model to display the correct location, you must place a digital ThingMark in the same location as your real-world ThingMark. For example, if you want the printed ThingMark to act as a tabletop for your AR Experience, you'll want to place the ThingMark underneath the model in

ThingWorx Studio. If you want the printed ThingMark to be applied to the surface of a physical object, you must place the ThingMark accordingly in ThingWorx Studio.





1. Drag-and-drop a **ThingMark** widget onto the canvas.
2. Click the **Mate** icon.

3. Drag-and-drop the ThingMark onto the model.

   The placement of the ThingMark in ThingWorx Studio directly corresponds to where the AR Experience places the model in ThingWorx View.

   This also corresponds to rotation. 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 ThingWorx Studio.

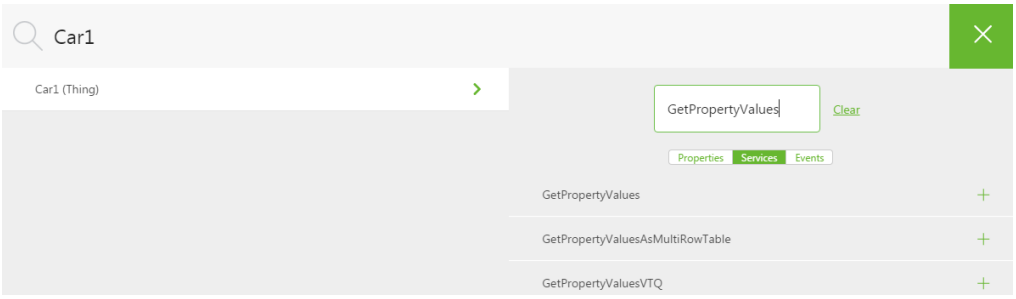
Add a 3D Label

Besides 3D models, you can also add 3D information to your Experience. Let's add a 3D Label to display information from the ThingWorx platform (an IoT Development Platform). To do this, you'll invoke a "Service" which will then pull in information from ThingWorx platform.

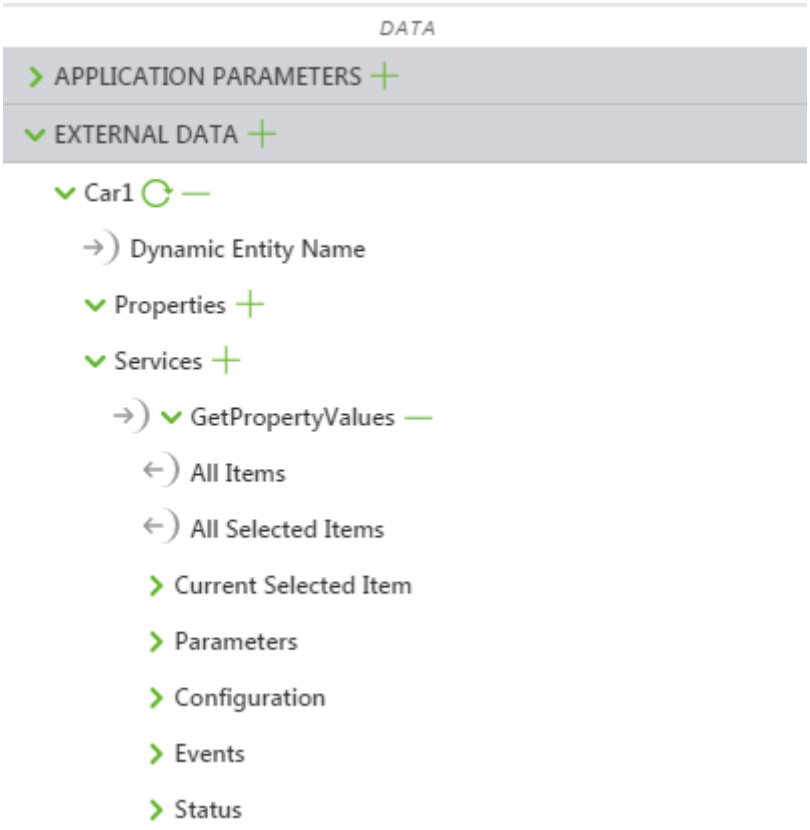
1. Drag-and-drop a **3D Label** widget onto the canvas.
2. While the 3D label is selected, scroll down in the **PROPERTIES** pane and select the checkbox for **Billboard**. This will cause the 3D label to rotate as you move around your AR Experience so that it is always pointed directly at you.
3. Click on **Transform** icon and move the label to a desired location.

4. Next, we'll pull data in from the ThingWorx platform for the label to display by navigating to the **DATA** pane and clicking the green + sign next to **EXTERNAL DATA**.

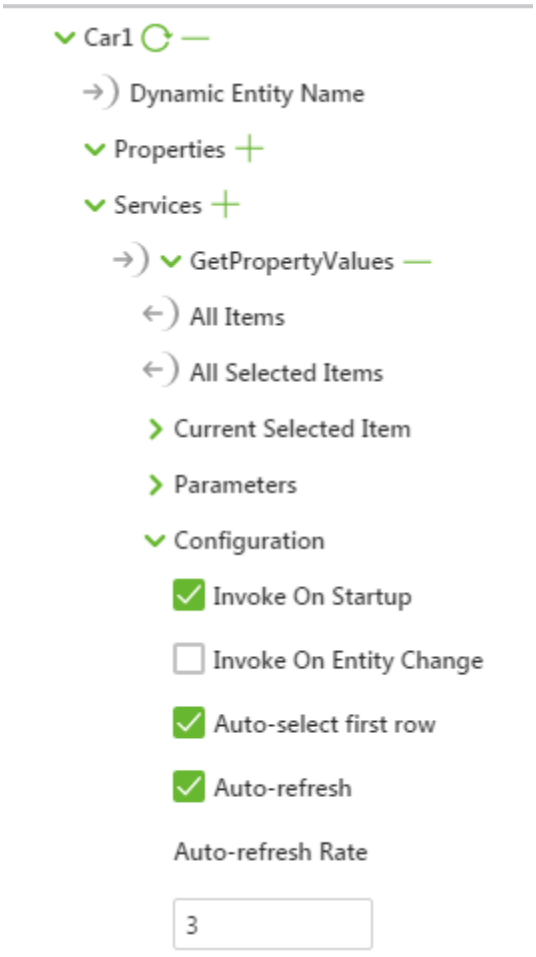
5. In the **Search Entities** field at the top-left, type in `car1`. This is a pre-configured thing that has been created to provide information, including a dynamically changing value. We'll use this changing RPM value to provide a changing value for the pump.
6. Wait for the system to search the available options, and then click the green arrow next to **Car1 (Thing)**. You'll now see a list of all available Services for that thing.
7. In the **Filter services** field, begin typing `GetPropertyValues`, and click the green + sign next to **GetPropertyValues** once filtering is complete.



8. Click the green X to return to the canvas.
9. You'll now see the data for Car1 appear under **External Data**.

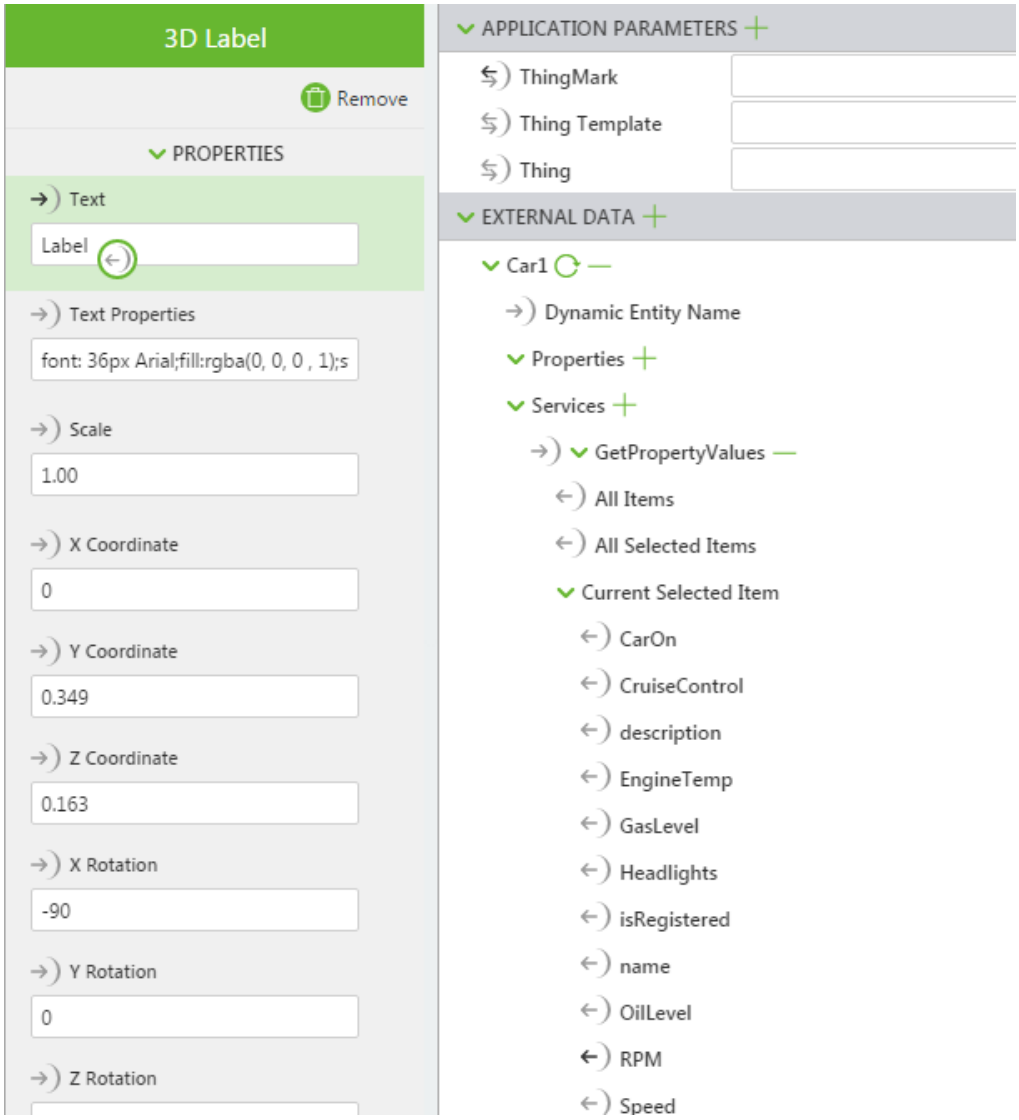


10. Under **Car1** ▸ **Services** ▸ **GetPropertyValues**, expand the **Configuration** section.
11. Click the checkbox next to **Invoke On Startup**. This will cause the Experience to pull in all of the property values as soon as the Experience is loaded in ThingWorx View.
12. Click the checkbox next to **Auto-refresh**, and change the **Auto-refresh Rate** to 3. This will cause the values to update three seconds.



13. Select the 3D Label (**3DLabel-1**) in the project tree.
14. Under **Car1** ▸ **Services** ▸ **GetPropertyValues**, expand **Current Selected Item** to view all of the available properties being stored on the ThingWorx platform.

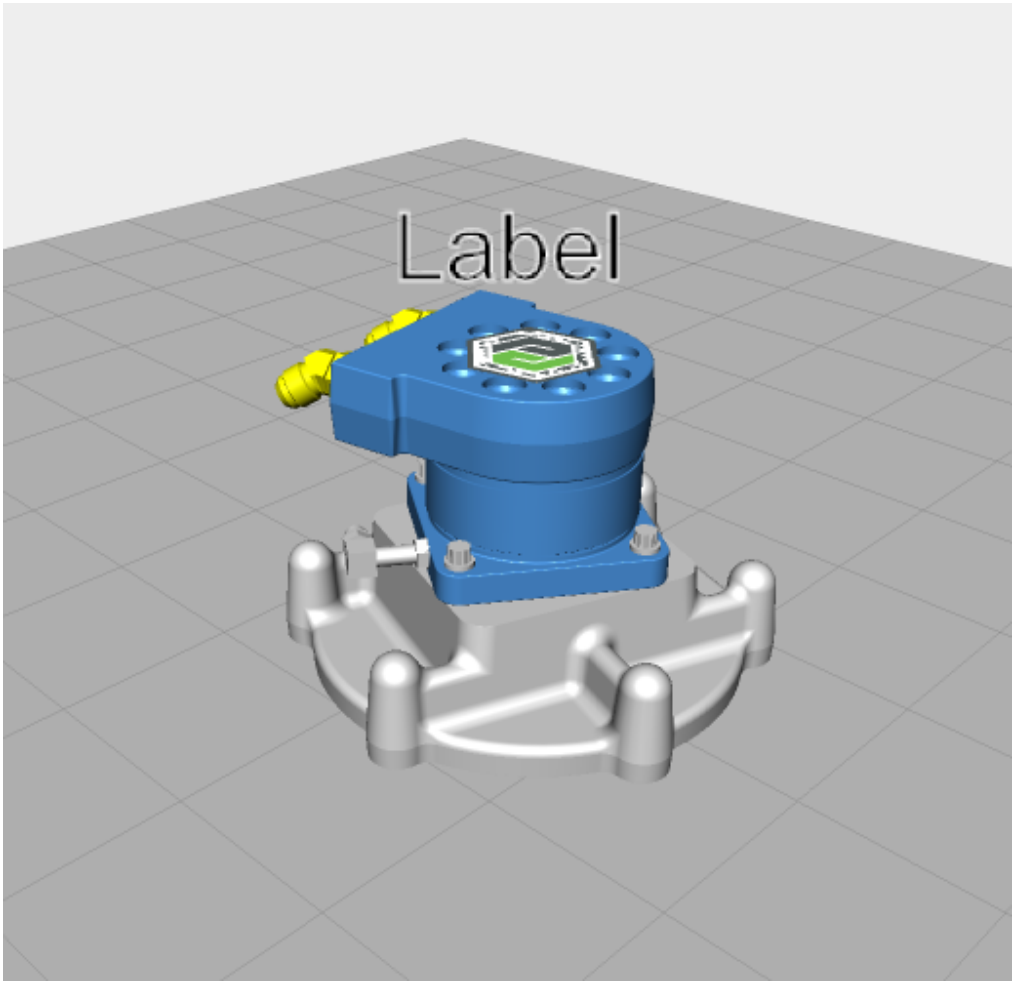
15. Drag the binding icon next to **RPM** and drop it onto the **Text** field in the **PROPERTIES** pane for the 3D Label widget. This will cause the 3D Label to display the value of the property from the ThingWorx platform.



Tip

This is an easy portion of the guide to modify to personalize your Experience. Any of the properties stored in the ThingWorx platform will work here. If you don't like the current selection, click delete icon in the **CONNECTIONS** pane to remove the binding to the 3D Label, and then drag-and-drop a different property onto the **Text** field instead.

16. At this point, your canvas should look similar to this:

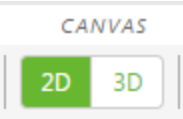


Add 2D Buttons

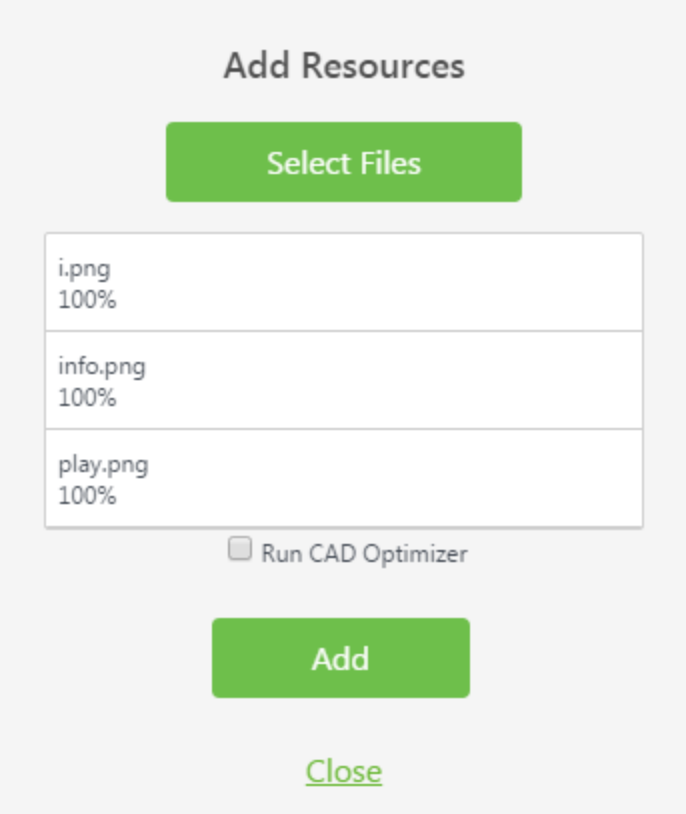
Now that you've completed the 3D portion of your Experience, let's add some 2D elements.

Add Resources

1. On the canvas toolbar, click **2D**.



2. In the **PROJECT** pane, click the green + sign next to **RESOURCES**.
3. The **Add Resource** window appears.
4. Navigate to the location where you extracted the contents of the `BluePumpKit.zip` file.
5. Use the `Ctrl` key to select the following files:
   - `play.png`—This will be the image we use to activate the disassembly/re-assembly animation.
   - `info.png`—This will be the image we use to display or hide a "card" section with Warranty information.
   - `i.png`—This will be the image we use to display or hide the 3D Label.
6. Click **Open**.
7. Click **Add** on the **Add Resource** window.

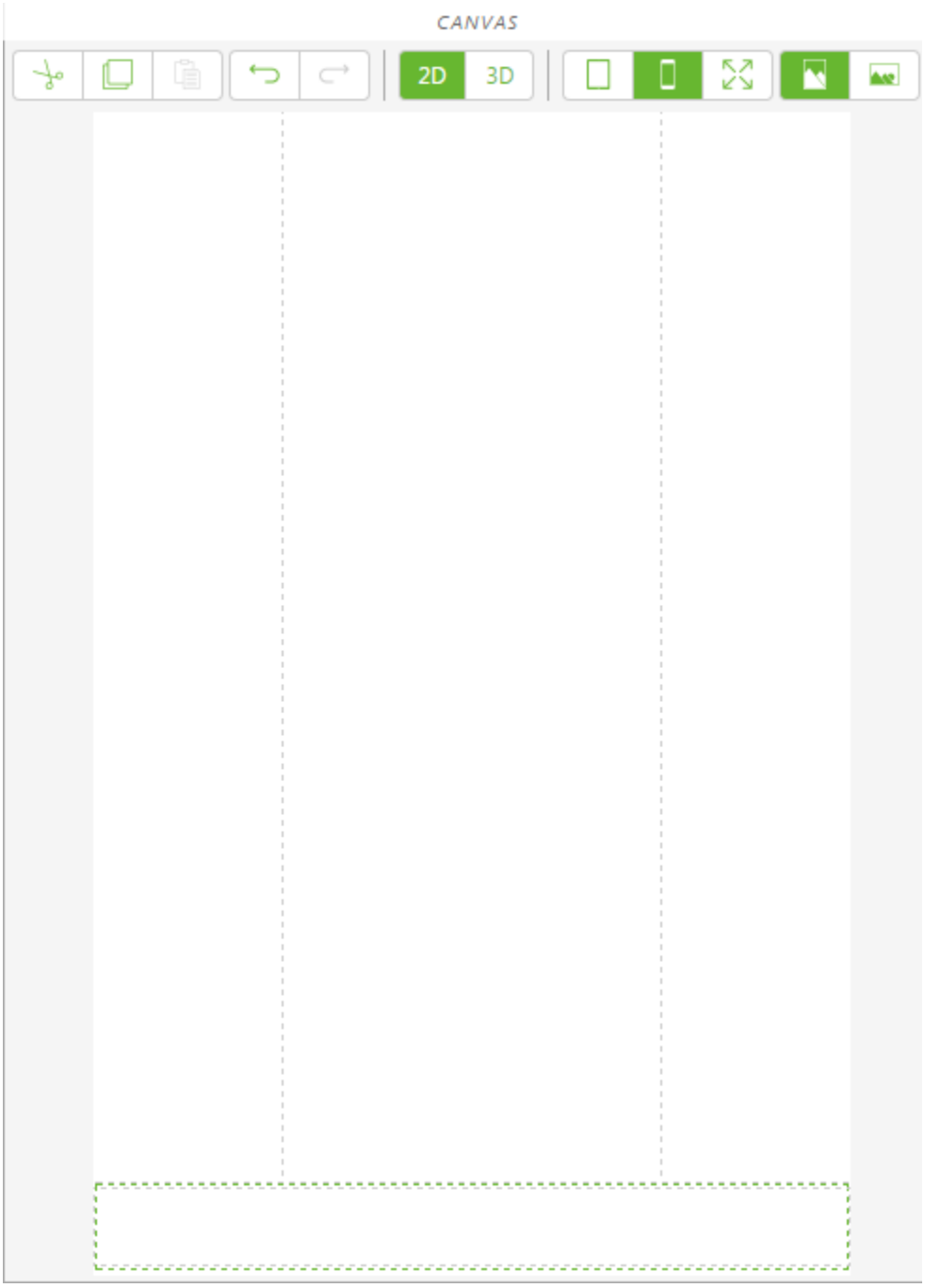


8. Click **Close** on the **Add Resources** window.

Add Buttons

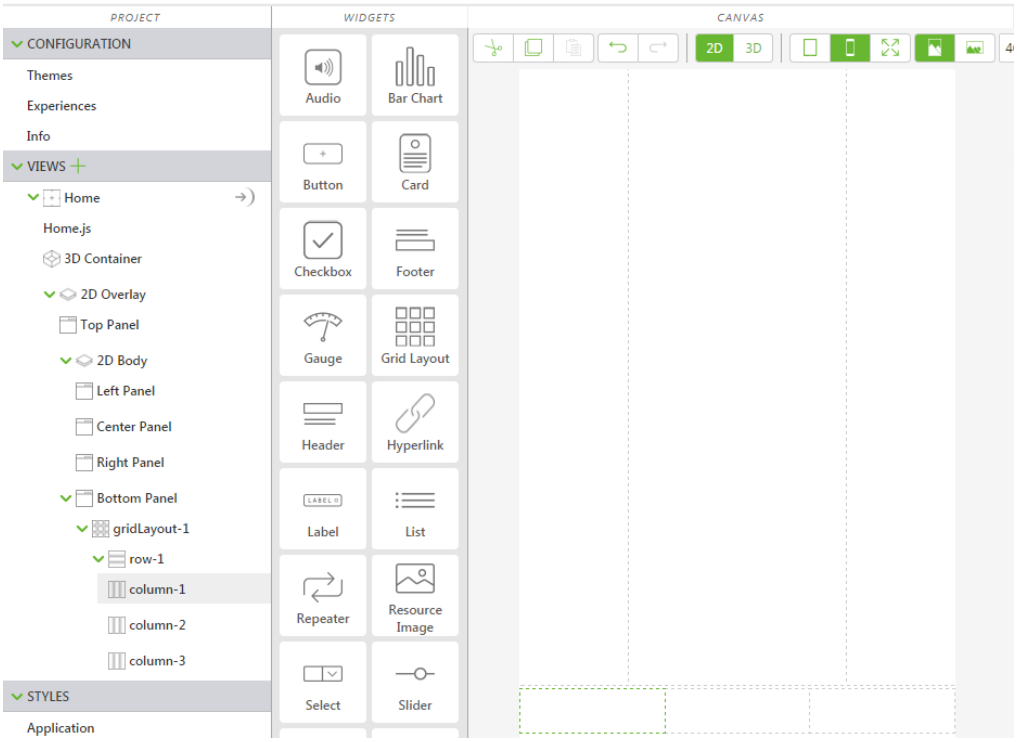
1. In the **PROJECT** pane, select **Bottom Panel** under **VIEWS ▸ Home ▸ 2D Overlay ▸ 2D Body**.
2. Drag-and-drop a **Grid Layout** widget onto the bottom panel.

> **Note**
>
> You may need to scroll down on the canvas to view the bottom panel.



3. In the **PROJECT** pane, under **VIEWS ▸ Home ▸ 2D Overlay ▸ 2D Body ▸ Bottom Panel ▸ gridLayout-1**, click **row-1** to select it.
4. In the **PROPERTIES** pane, click on **+ Add Column** two times. The bottom panel is now divided into three equal sections.

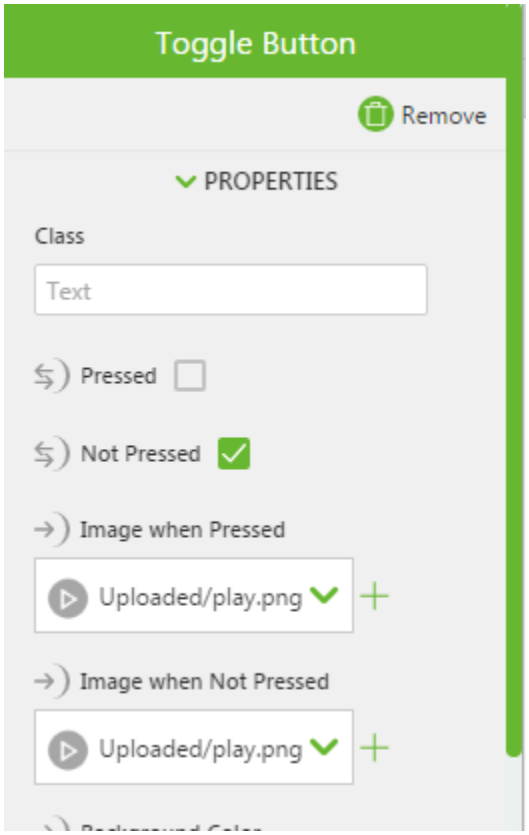
5. Select the first column on the canvas, or click **column-1** in the project tree.



6. In the **PROPERTIES** pane, set **Alignment** to **Center**.
7. Repeat this process for **column-2** and **column-3**, setting their **Alignment** to **Center** as well.
8. Drag-and-drop a **Toggle Button** widget into the first column.

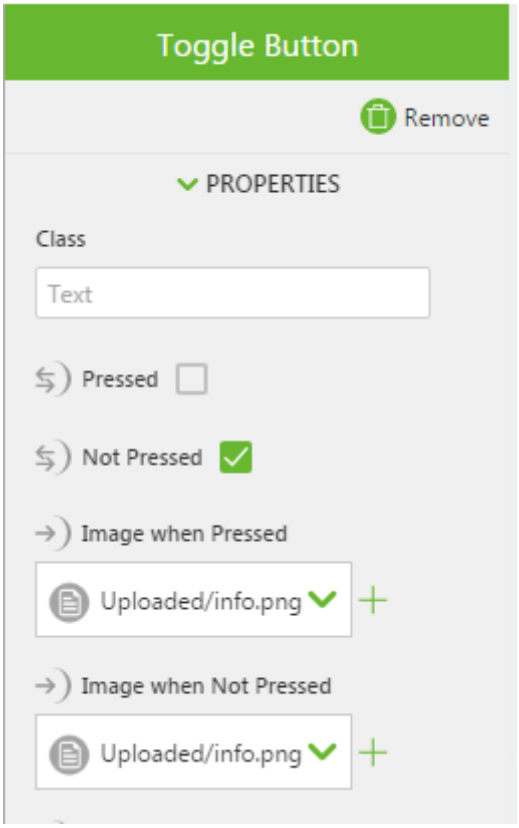
> **Note**
>
> There are both a Button widget and Toggle Button widgets; make sure you use **Toggle Button**.

9. In the **PROPERTIES** pane, change both **Image when Pressed** and **Image when Not Pressed** to the `play.png` image using the drop-down menu under the fields.



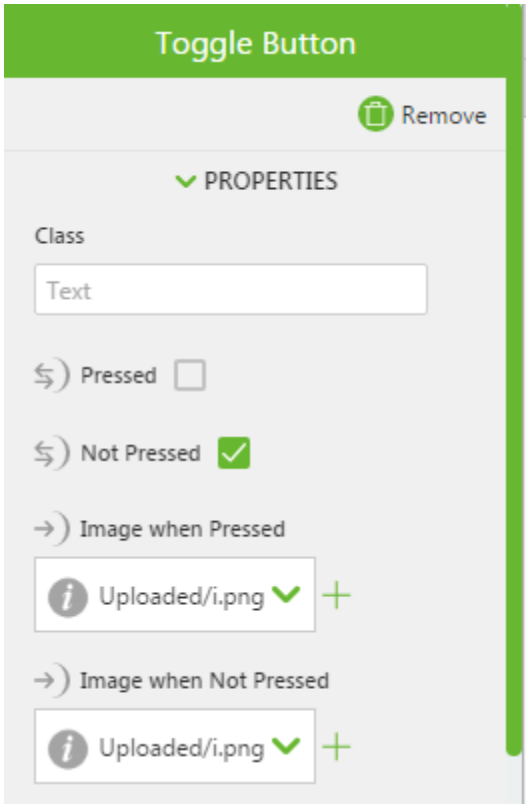
10. Drag-and-drop a **Toggle Button** widget into the second column.

11. In the **PROPERTIES** pane, change both **Image when Pressed** and **Image when Not Pressed** to the `info.png` image using the drop-down menu under the fields.



12. Drag-and-drop a **Toggle Button** widget into the third column.

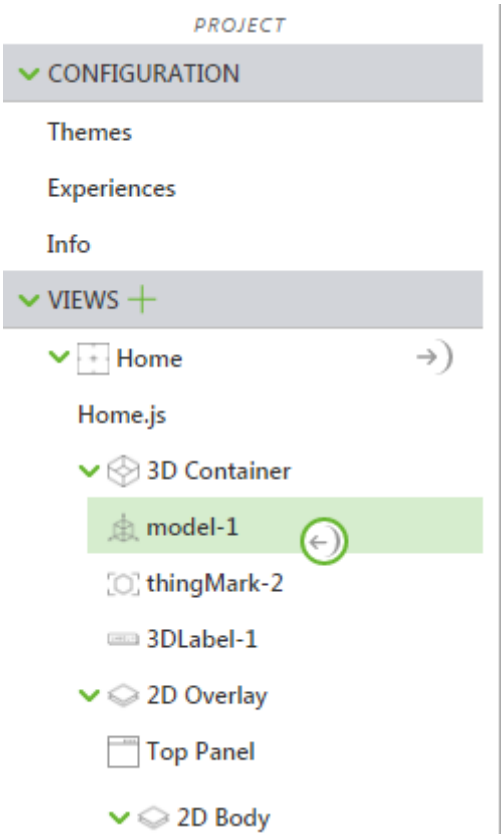
13. In the **PROPERTIES** pane, change both **Image when Pressed** and **Image when Not Pressed** to the `i.png` image using the drop-down menu under the fields.



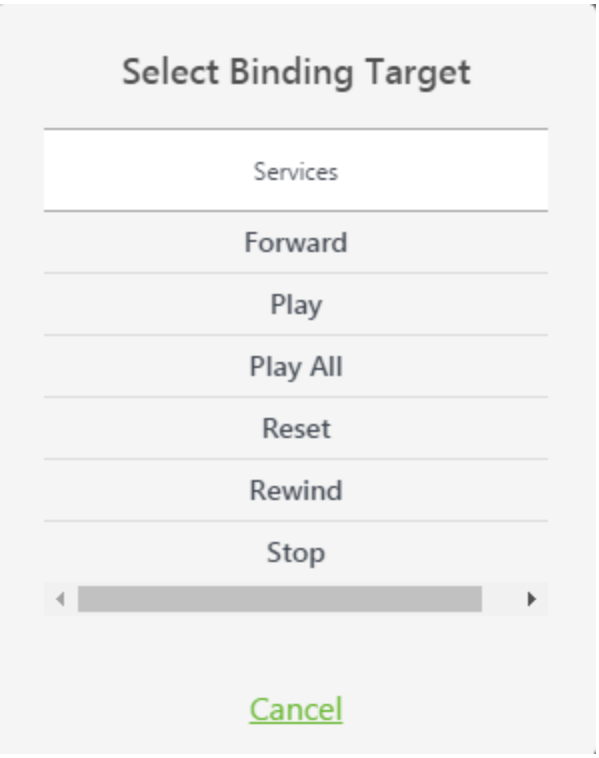
14. In the end, your button layout should look like this:

Bind the Toggle Buttons

1. Select the toggle button in the first column, or click **toggleButton-1** (Play icon) in the project tree.
2. In the **PROPERTIES** pane, scroll down to the **Click** event and drag the binding icon next to the **Click** event and drop it onto **model-1** in the project tree.


PROJECT
CONFIGURATION
Themes
Experiences
Info
VIEWS
Home
Home.js
3D Container
model-1
thingMark-2
3DLabel-1
2D Overlay
Top Panel
2D Body

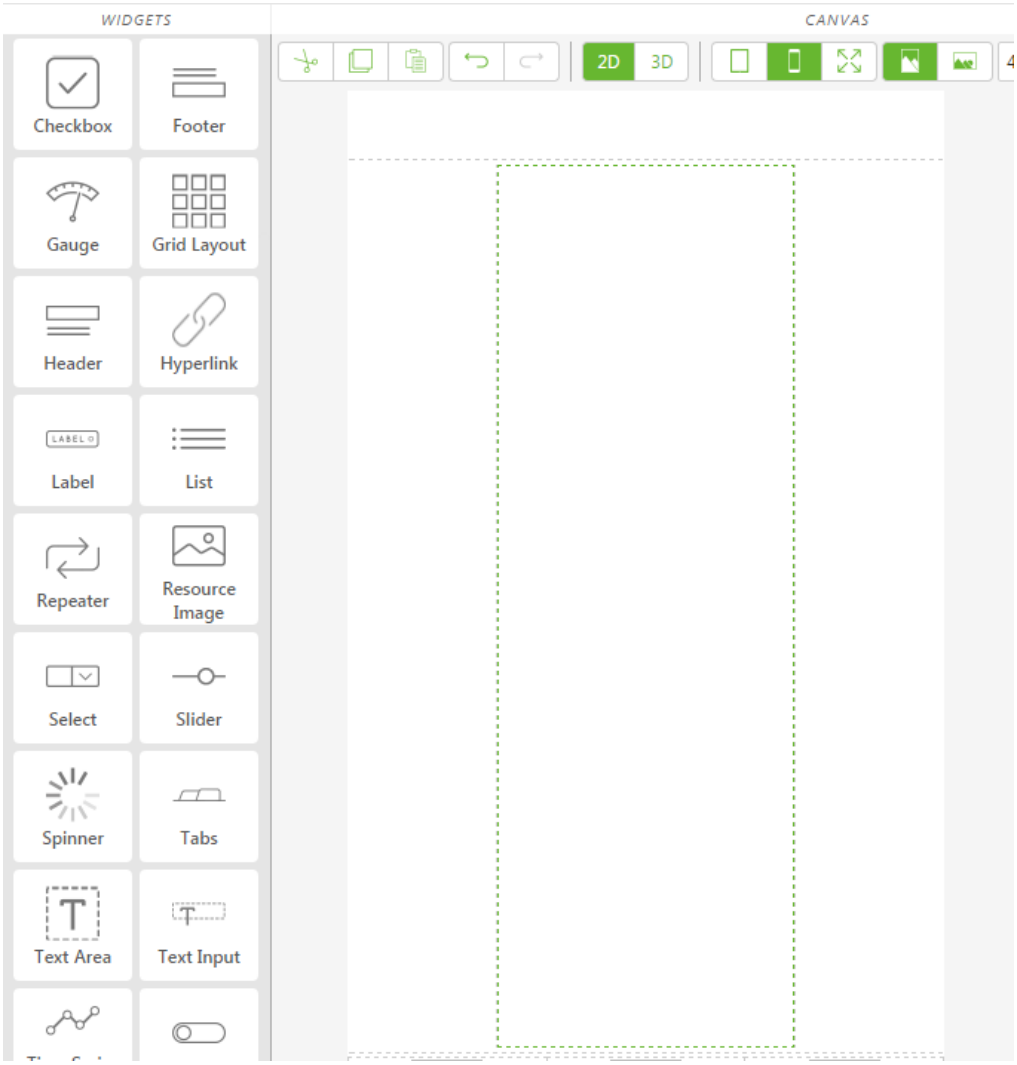
3. On the **Select Binding Target** window, select **Play**.



Now, whenever the Play toggle button is pressed in ThingWorx View, the Blue Pump's disassembly animation will play. If you press the Play toggle button again, the pump will reassemble.

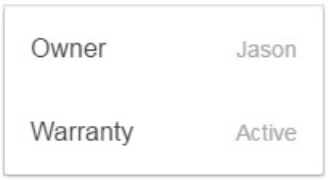
4. Next, we'll create an overlay section that we can selectively hide or display.

5. On the canvas, click on the Center Panel to select it.



6. 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.
7. Drag-and-drop two **Value Display** widgets onto the Card in the Center Panel.
8. Click on the top Value Display to select it or select **valueDisplay-1** in the project tree.
9. In the **PROPERTIES** pane, enter `Owner` in the **Label** field.
10. In the same manner, enter your own name in the **Value** field.
11. Click on the bottom Value Display to select it or select **valueDisplay-2** in the project tree.
12. Enter `Warranty Status` in the **Label** field.

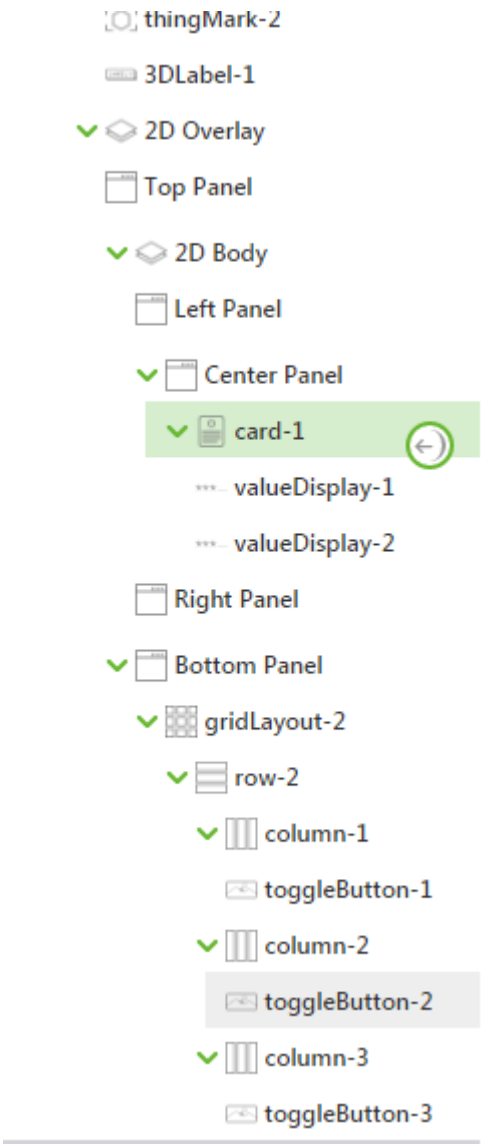
13. Enter `Active` in the **Value** field. It should look similar to the following:



> **Note**
>
> This is another place where you can personalize this QuickStart. For example, 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 platform rather than a static value that you're manually entering.

14. Since we have our Card widget, let's bind a button to it that we can use to make it visible or invisible. Select the toggle button in the second column, or click **toggleButton-2** in the project tree.
15. Make sure that the checkbox beside **Pressed** is not selected. This will cause the toggle button to start out not-pressed, so that your Warranty Info Card is not visible to begin with.

16. In the **PROPERTIES** pane, drag the binding icon next to **Pressed** and drop it onto **card-1** in the project tree.



Note

There are two different Pressed sections under **PROPERTIES**. For this, we'll want to select the **Pressed** that is at the very top of **PROPERTIES**.

17. In the **Select Binding Target** window, select **Visible**.

Now, whenever the Info toggle button is pressed in ThingWorx View, the Card that you've created will become visible or invisible. This is a great way to get more information into your AR Experience without using up screen real estate.

18. Next, let's make the last toggle button hide or display the 3D Label. Select the toggle button in the third column or click **toggleButton-3** in the project tree.
19. Ensure that the checkbox beside **Pressed** is selected. This will cause the toggle button to start out pressed so that your 3D Label is visible from the start.
20. In the **PROPERTIES** pane, drag the binding icon next to **Pressed** and drop it onto **3DLabel-1** in the project tree.

> **Note**
>
> There are two different Pressed sections under **PROPERTIES**. For this, we'll want to select the **Pressed** that is at the very top of **PROPERTIES**.

21. On the **Select Binding Target** window, select **Visible**.

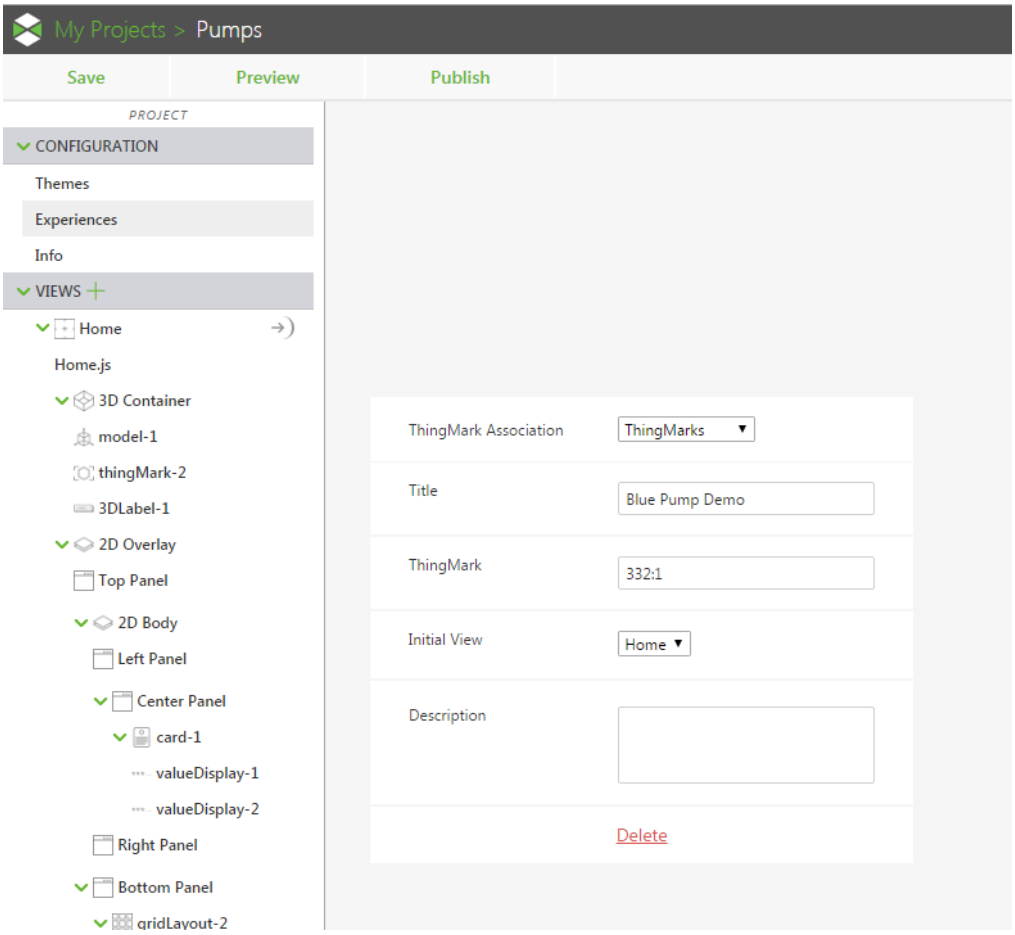
    Now, whenever the i toggle button is pressed in ThingWorx View, the 3D Label you've created will become visible or invisible each time you press it.

Name the Experience

Naming your Experience will let the program know which Experience to load when aThingMark is scanned.

1. In the **PROJECT** pane, under **CONFIGURATION**, click **Experiences**.
2. With the **ThingMark Association** set to **ThingMarks**, enter the ThingMark number that you printed out.

3. Enter `Blue Pump Demo` in the **Title** field.
4. Your Experience settings should look similar to the following:



Publish the Experience

Click **Publish**. Publishing an Experience may take some time, as all of the elements of your Experience must be pushed to your Experience Service. Wait until the green, rotating, progress indicator disappears.

7

View the Experience in ThingWorx View

Now, it's time to view the completed project!

1. Place the appropriate ThingMark on a flat surface where you can easily interact with it.
2. From your supported mobile device, open ThingWorx View.
3. Point the camera of your device at the ThingMark.
4. ThingWorx View will alert you with a sound or vibration once the ThingMark has been scanned successfully, and a list of available Experiences appears. The Experiences in the list have all been associated with the particular ThingMark that you scanned.
5. Select the **Blue Pump Demo** Experience you just published.
6. Wait a moment with your device still pointed at the ThingMark.

> **Note**
>
> If the model is large, a progress indicator appears. Try not to move the mobile device until this loading process completes.

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

7. Once the Experience loads, you should see and be able to interact with the various components of your AR Experience:
    - You should see the Blue Pump. As you move the mobile device around (while still pointed at the ThingMark), you will see the pump move as well. This allows you to view the model from different angles.
    - You should see the 3D Label displaying the RPM value, which should also be changing every 3 seconds. In addition, the 3D Label should always be facing towards you, regardless of how you move around the ThingMark.
    - If you press the Play button one time, you'll see the disassembly animation. If you press the Play button a second time, you will see the pump reassemble itself.
    - If you press the Info button, you'll see the card appear in the middle of the screen with the information you added. If you press the Info button again, the information will disappear.
    - If you press the **i** button, you'll see the 3D Label appear or disappear each time your press it.

8

You Did It!

We hope that you've enjoyed this ThingWorx Studio Blue Pump QuickStart.

Feel free to go back into ThingWorx Studio and modify this Experience further. Or, try the ThingWorx Studio Raspberry Pi QuickStart to see an alternative AR Experience.

Also, check out the ThingWorx Studio Community to post questions, search for answers, and chat with others. This site is monitored by PTC Technical Support experts.