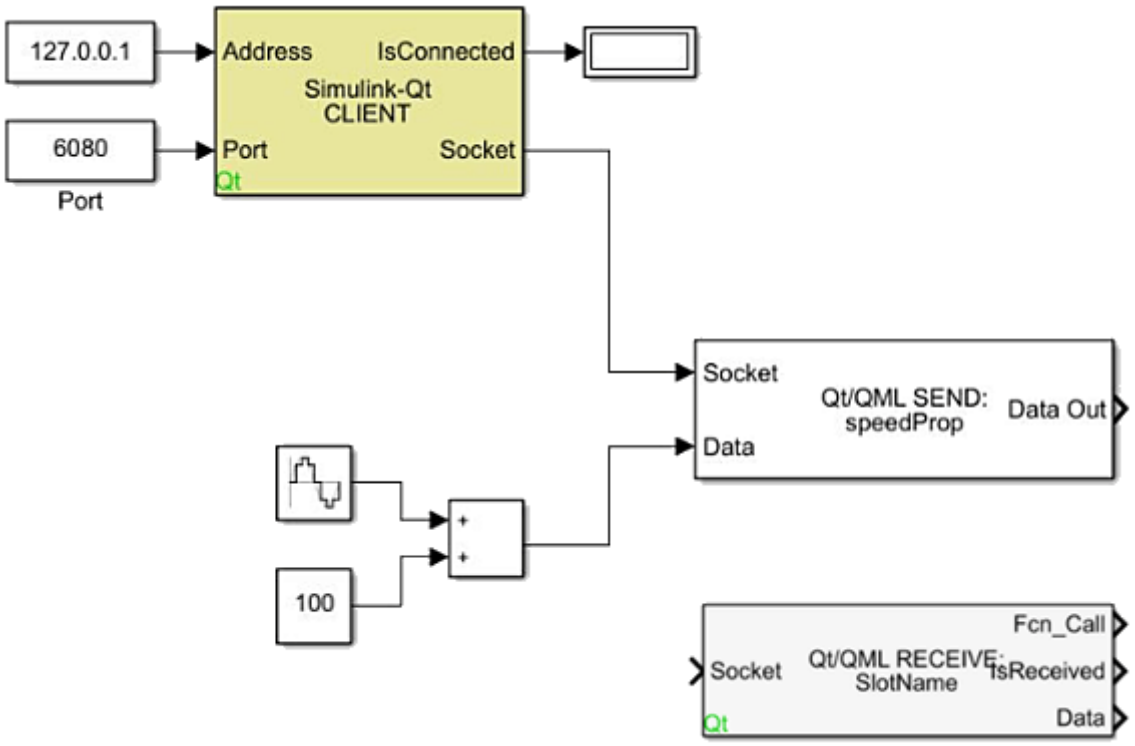
Simulating Dynamic Systems

Use the Simulink connector to connect simulation to your UI. Simulink is a MATLAB-based graphical programming environment for modeling, simulating, and analyzing multi-domain dynamic systems. On Windows, Qt Design Studio provides built-in support for connectivity to Simulink models, which allows them to send and receive data with applications developed using Qt Design Studio. Install Simulink on your computer and run it simultaneously with Qt Design Studio to enable communication between the applications.

The information given here is mainly focused on the integration of the Simulink connector in Qt Design Studio. For information on how to use the Simulink environment, see the documentation provided by MathWorks.

The Qt Blockset for Simulink

Install the Simulink Qt Blockset to your computer in order to connect a Simulink model to your application. The Qt Blockset installer adds the Simulink blocks needed to establish connectivity to your application. After installation, the **SLQTLibrary** blockset will be added to the Simulink blocks library. The blocks allow sending and receiving of **Property**, **Signal**, and **Slot** updates with your application. The Qt Blockset includes the **Simulink-Qt Client**, **Address**, **Qt/QML Send**, and **Qt/QML Receive** blocks.



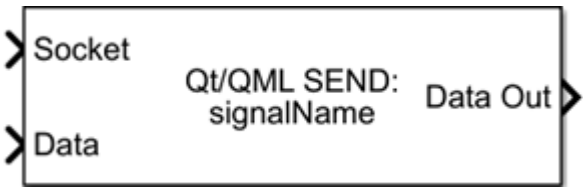
and two outputs:

- The **Address** input specifies the machine IP address of the server to the client block. To ensure the address is formatted correctly, use the **Address** block.
- The **Port** input specifies the port value for the IP address, which can be determined by using the **Port** block or a valid Simulink integer value.
- The **IsConnected** output is a Boolean signal. When true, specifies the connection to the server has been established.
- The **Socket** output sends a signal that presents the socket ID of the connection. This signal needs to be delivered to corresponding **Qt/QML Receive** and **Qt/QML Send** blocks.

Address and Port

An **Address** block delivers the IP address of a server to the **Simulink-Qt Client** block as a typical IP address string. A **Port** block determines the port value for the IP address. For simulations where the Simulink model and your application are run on the same machine, use the IP address 127.0.0.1 and any port available.

Qt/QML Send



A **Qt/QML Send** block sends a **Signal** or **Property** value change from Simulink. It is used for each property that Simulink needs to send to your application. The property name of the block needs to correspond to the name of the property or slot in your application.

The block has two inputs and one output:

- The **Socket** input receives the socket signal from the **Simulink-Qt Client** block.
- The **Data** input receives the data to be sent as a **Signal** or **Property** update.
- The **Data Out** output outputs the passed-through data to connect it to other Simulink blocks if needed.

Qt/QML Receive

A **Qt/QML Receive** block receives **Signal** or **Property** value changes from your application. It is used for each property that Simulink needs to receive from your application. The property name of the block needs to correspond to the name of the property or slot in your application.

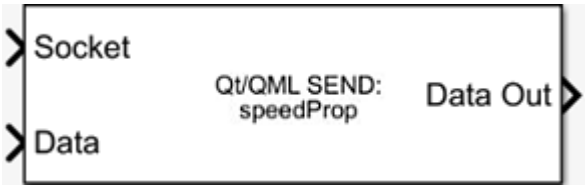
The block has one input and two outputs:

- The **Socket** input receives the socket signal from the **Simulink-Qt Client** block.
- The **Fcn_Call** output sends the function-call, which can either be terminated if idle, or connected to a valid function call subsystem.

- The **Data** output signals data payload from a **Signal** or **Property** value.

Specifying Property Names in Simulink

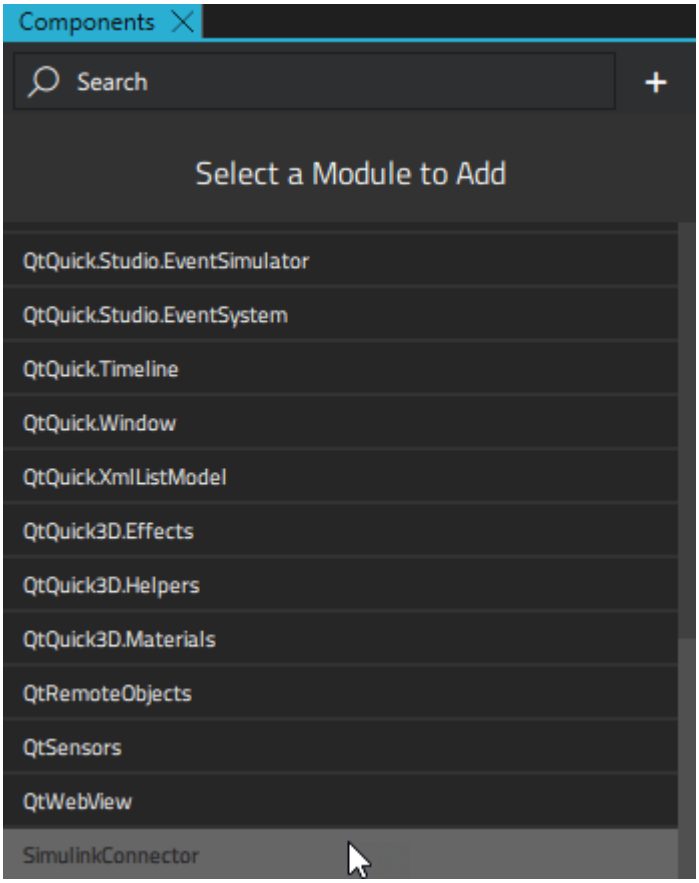
Double-click the **Qt/SML Send** or **Qt/QML Receive** block in Simulink to specify a property name. A pop-up for **Block Parameters** appears. Type the name of the property in the **Qt Signal/Property Name** field and click **OK**. The name, for example speedProp, needs to match a **signal** or a **property** in Qt Design Studio.



Integrating the Simulink Model to Qt Design Studio

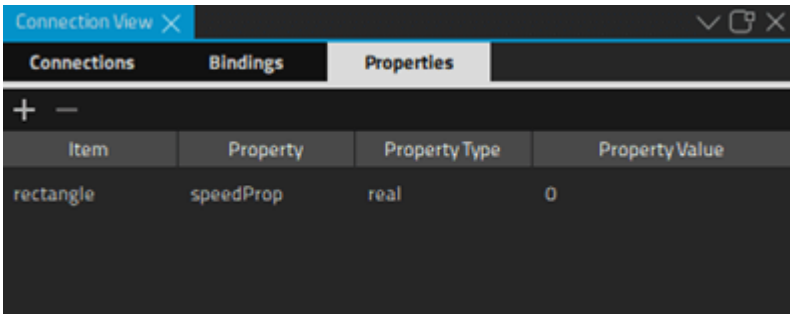
Importing the Simulink Connector

To integrate the Simulink model into Qt Design Studio, you first need to add the Simulink connector module to your project. In the **Components** view, select + > **SimulinkConnector**. Qt Design Studio is now ready to communicate with the Simulink model.



If you need to change the IP address and/or port, you need to select the **SimulinkConnector** item in Navigator and set the IP address and/or port in the Properties view. If you cannot see **SimulinkConnector** in **Navigator**, you need to click (**Filter Tree**) and unselect **Show only visible items**.

See Specifying Custom Properties for a detailed description of how to add a custom property. The name of the property and the data type need to match those of the send or receive property of the Simulink model.

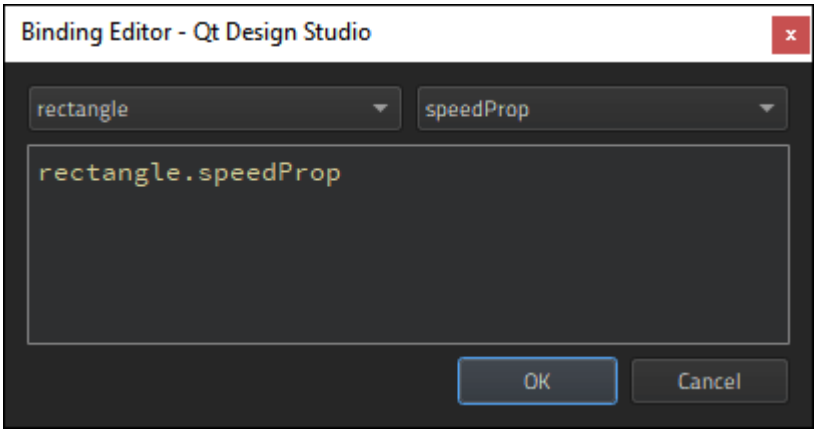


Creating Bindings

Next, you need to bind the value of the property you just created to the desired properties of UI components.

By binding the root item property to a component property you can use it, for example, to rotate an component. Binding a root item property of speed to a component property of rotation would result in the item rotating in the screen when the simulation is run.

To bind the root item property to a component property, select the component either by clicking on it on the canvas or in **Navigator**. In the **Properties** view, find the component property to which you want to bind the root item property. Select the (**Actions**) menu next to a property, and then select **Set Binding**. In the **Binding Editor**, select the text field and type in `<id>.<property name>`, for example `rectangle.speedProp`. For more information, see Setting Bindings.



Run the simulation by first clicking the **Run** icon in Qt Design Studio and then the **Run** icon in Simulink.

‹ Simulating Application Logic

Using QML Modules with Plugins ›