QUANSER
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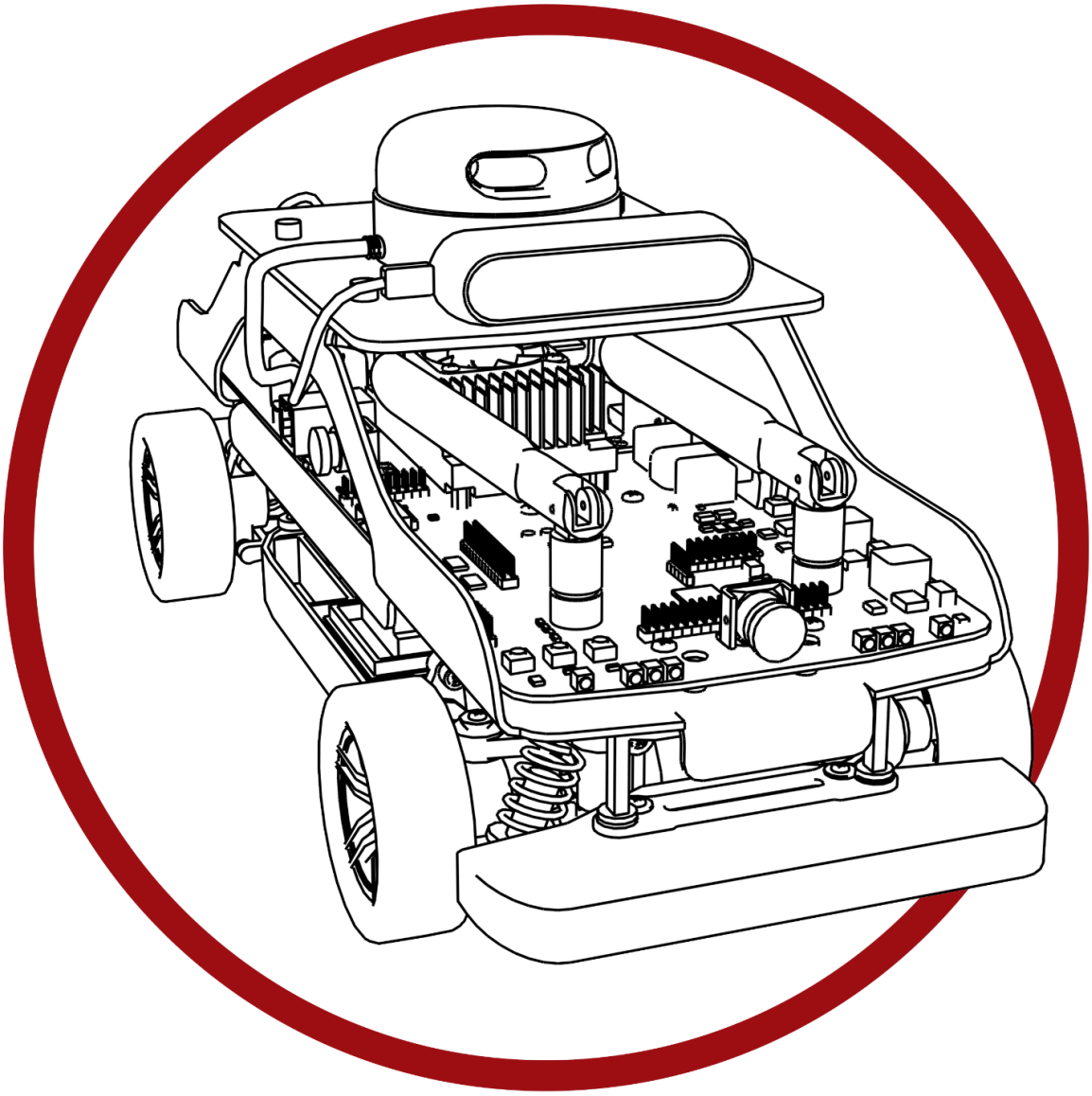
Self-Driving Car Research Studio



Manual Drive - Simulink

V 1.1 (November 2020)

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I. System Description

In this example, we will capture commands from a Gamepad and use it to manually drive the QCar platform. The application will also display the percentage battery remaining, power consumption in Watts as well as the car's speed in m/s. The process is shown in Figure 1.

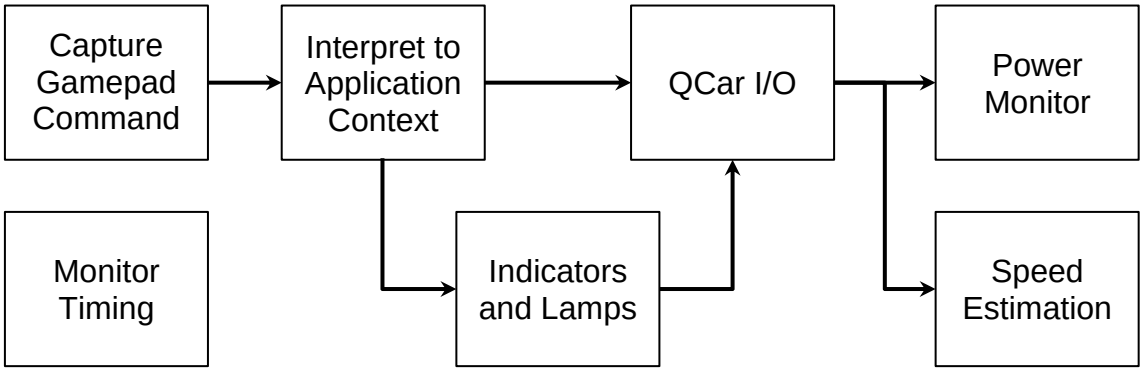

Figure 1. Component diagram

In addition, a timing module will be monitoring the entire application's performance. The Simulink implementation is displayed in Figure 2 below.

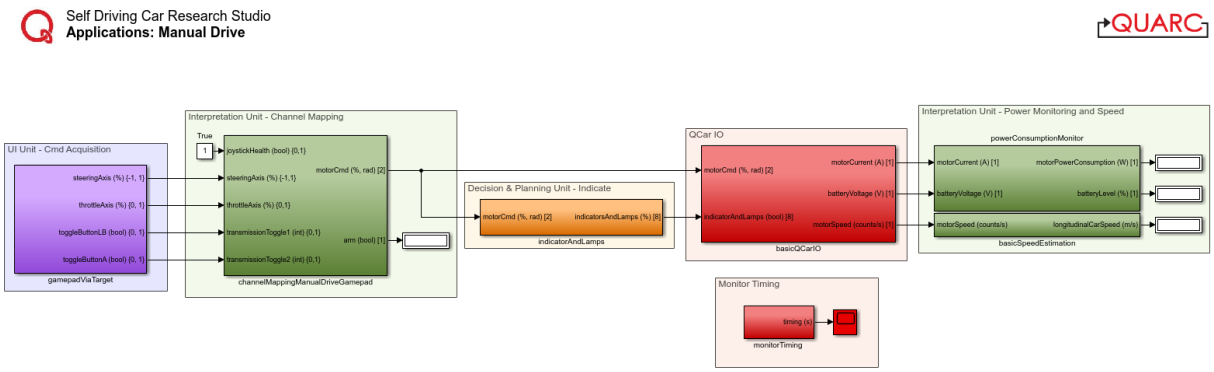

Figure 2. Simulink implementation of Manual Drive

II. Running the example

Check the user guide **IV - Software - Simulink** for details on deploying Simulink models to the QCar as applications.

Before running this example, connect the **Logitech F710 Gamepad** (provided with the **Self-Driving Car Research Studio**) USB dongle to one of the USB 3.0 ports on the QCar. Open a terminal to the platform (see the user guide **III - Connectivity** for more information on remote/direct setups). In the terminal, type the following command:

```
ls -l /dev/input/by-id
```

Look for the output with the following line in it and take note of the event number Y.

```
usb-Logitech_Wireless_Gamepad_F710_XXXXXXX 4-event-joystick -> ../eventY
```

Add **1** to the event number, and use the result as the **Controller Number** in the **Game Controller** block within the **gamepadViaTarget** subsystem. For example, if the terminal shows the output in Figure 3, use **5** as the controller number (**4+1**).

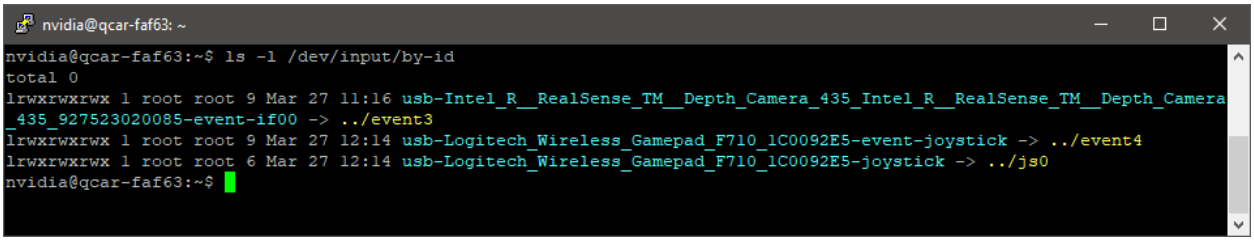

Figure 3. QCar terminal output displaying the joystick event number

III. Details

1. Driving manually is mapped to the following gamepad sticks/buttons:

    a. **Left Button LB** for Arm - QCar will be armed when this is pressed (**1**), and steering/throttle will not respond when it is released (**0**).

    b. **Left Stick** for steering - stick all the way to the left position is +ve, steering the wheels left as well.

    Note: The LED light next to the **MODE** button on the gamepad must be **OFF** to use the Left Stick for control. If that LED light is on, press the MODE button again to toggle it OFF.

c. **Right Throttle RT** for throttle - pressed all the way represents 100% command. Let the throttle go for 0% command.

   Note: Throttle is scaled by 20% for better manual control then saturated to 20% in the **basicQCarIO** subsystem for safety.

d. **Button A** for reverse - hold this button and use the steering/throttle commands to drive backwards.

NOTE: The switch at the back of the F710 gamepad must be in the **X** position for the above mentioned control to work. If the switch is in the **D** position, move the switch back to the **X** position.

2. The LEDs are in the following states

   a. **Headlamps** are always on. The reverse indicators (white) are on in Reverse.
   b. **Brake lamps** are on when the absolute speed of the vehicle is decreasing.
   c. **Left/right indicators** turn on when the corresponding steering is over a threshold.