PACEMAKER
Hardware Hiding

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Introduction

Hardware Hiding is an important part of embedded systems design. It not only helps separate the inputs and outputs from the model, but it gives developers an easy way to change the hardware/peripheral components of their systems.

We are currently using the FRDMK64 as the microcontroller for our board.

Hardware Subsystem

All our input and output pins were placed in a Simulink subsystem, separate from the Stateflow. This makes the hardware components of the system explicit. So if we later wanted to use a different board from the FRDMK64, we could use the same Stateflow and would only need to change pinouts within the Hardware Subsystem.

Figure 1: Hardware subsystem is on the right

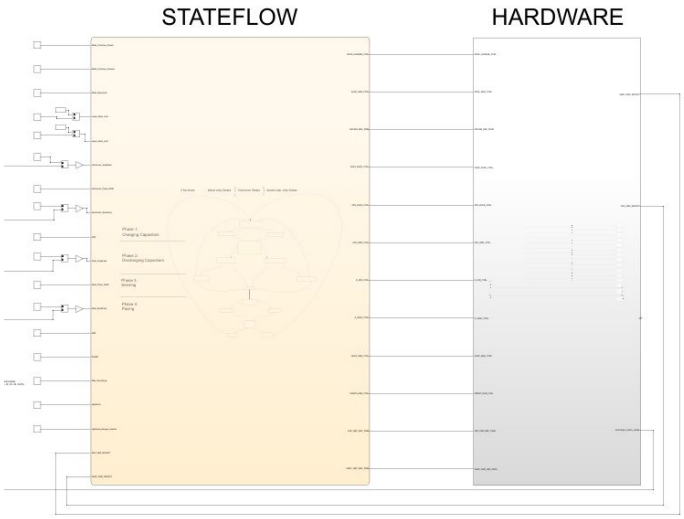
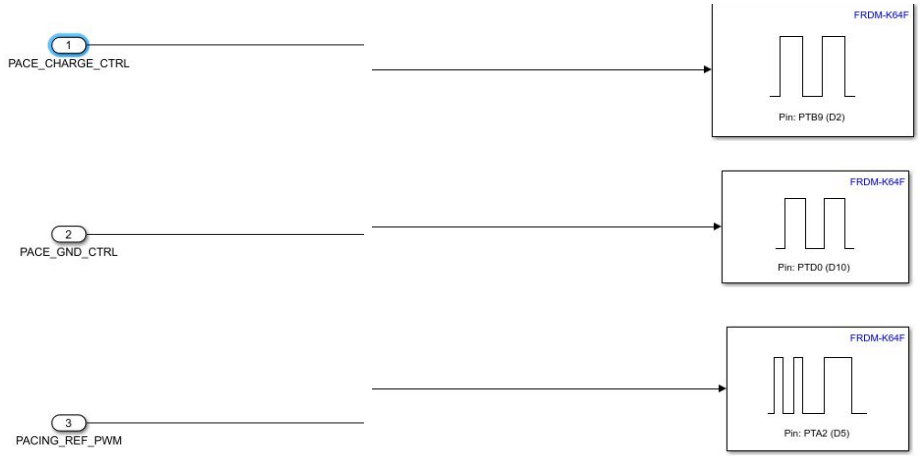


Figure 2: Inside Hardware Subsystem

Figure 3: Close up



Adding Voltage logic as a Programmable Parameter

Many of the pinouts were in PWM mode, and hence must be set to a percentage (between 0-100) rather than a voltage.

For example, say that one wanted to set the atrial amplitude voltage as 2.5 V, on our 5 V logic level FRDMK64 board. Then the PACING_REF_PWM pin (D5) would need to be set to 2.5/5.0 * 100 = 70.

However what if the voltage logic level was 3.3 V instead of 5.0 V, then we would need to set the pin PACING_REF_PWM (D5) to 2.5/3.3*100 = 76.

Hence in order to facilitate changes to a board of different logic levels, we made the voltage logic level a programmable input within the Hardware Subsystem.