SE 3K04
Documentation Report
Assignment 2

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Serial Communication

Using UART serial communication, the DCM component is constantly sending a UART transmission. When the full message is successfully received by the FRDMK64F board, the board checks the first 2 bytes of data to decide its next action. The first byte is used as verification, where we check for the value 16 to ensure the data is received properly and if it is in the right order. The second byte determines if the board should update its current parameters with the new ones received by the UART, send the ECG data to the DCM, stop sending ECG data, or send its current parameters to the DCM.

The UART transmission sends unsigned integers since all the parameters are non negative, so using the extra bit to represent a negative number is meaningless. All values are casted to *uint8* for storage convenience. While some numbers do not fit in uint8, we format the data using multiplication and division when sending and receiving data in order to fit values greater than 255 or decimal numbers in the uint8 data type. For example, when sending decimal numbers to the pacemaker, it is multiplied by 10 to make it a whole number, then when the pacemaker receives it, it is casted to single and divided by 10. For large numbers such as inputting 500ms VRP to the pacemaker, it is divided by 10, and when the pacemaker receives it, it casts to a bigger data type then multiplied by 10. Before the values are used in the main stateflow, they are properly type casted to double and single data types.

With the implementation of the "Pacemaker Parameters" screen on the DCM, the user (i.e. Doctor) is able to set the pacemaker parameters for each of the four modes. Two different sets of sliders will pop up depending on whether or not the mode is inhibited or not.

For AOO the screen will look like Figure 1. For VOO, "Atrial" sliders will be replaced by "Ventricular".

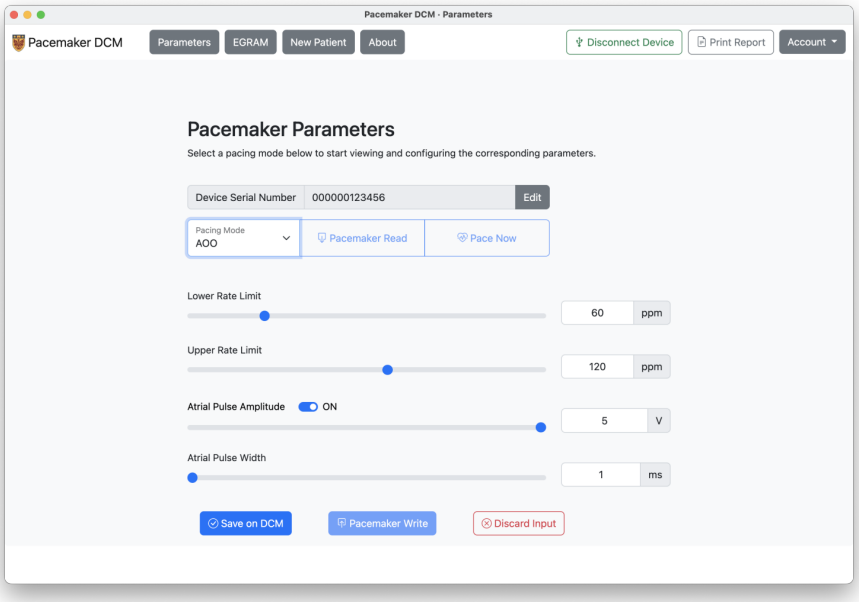

Figure 1: AOO Depicted

For VVI, the screen will look like Figure 2. For AAI, "Ventricular" sliders will be replaced by "Atrial".

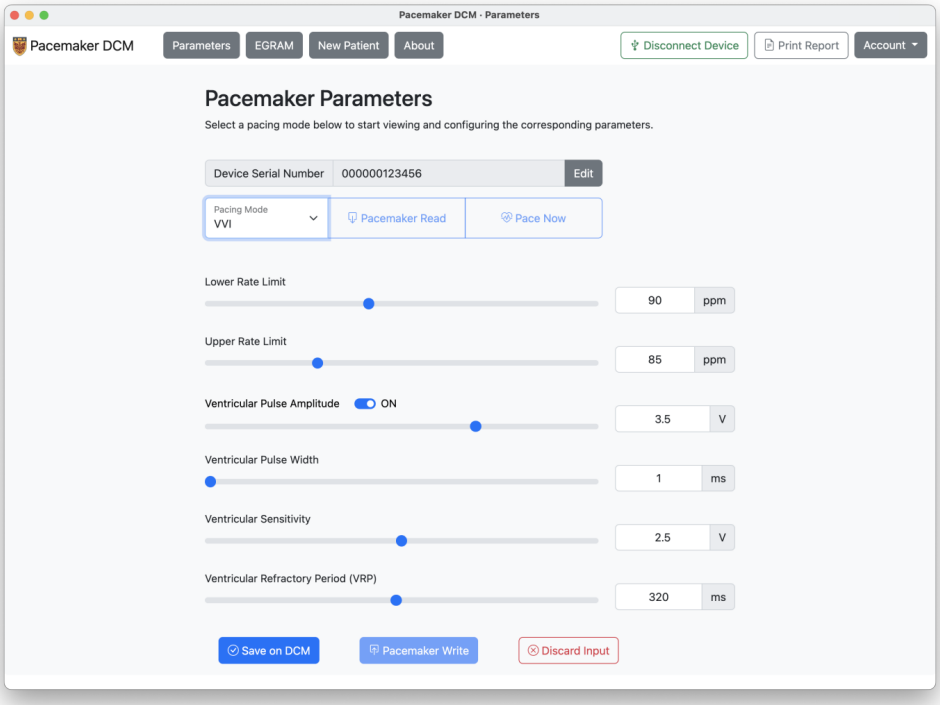

Figure 2: VVI Depicted

We have also implemented programmable parameters for Rate Adaptive Pacing modes on the DCM:

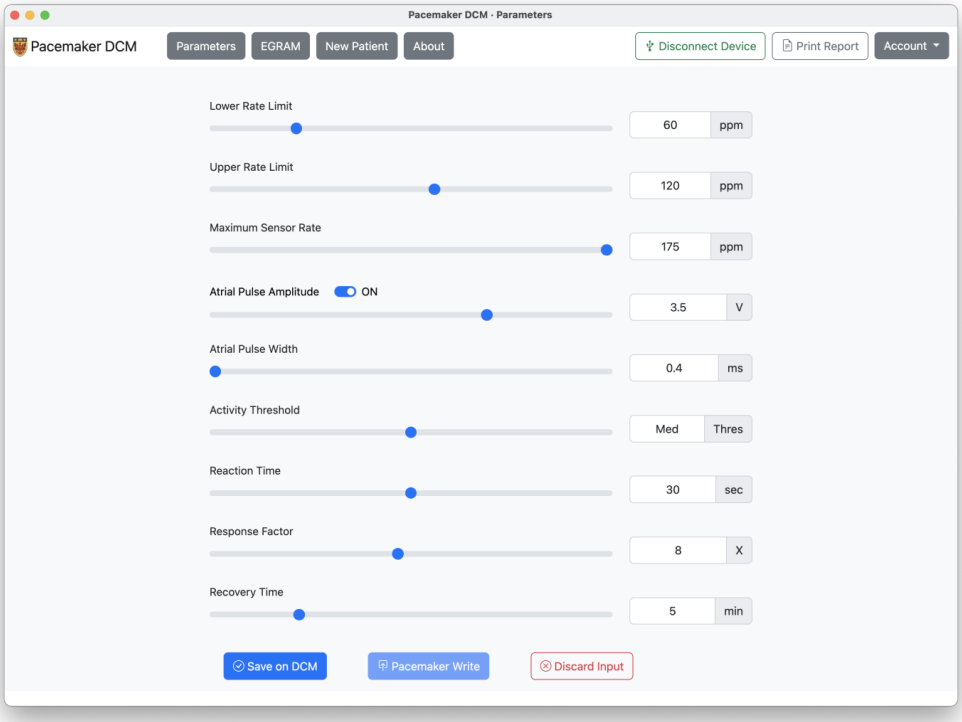

Figure 3: AOOR Depicted

DCM Functionality

The "Pacemaker Write" button (Figure 4) takes whatever value is shown on the DCM and writes that onto the actual Pacemaker Board.

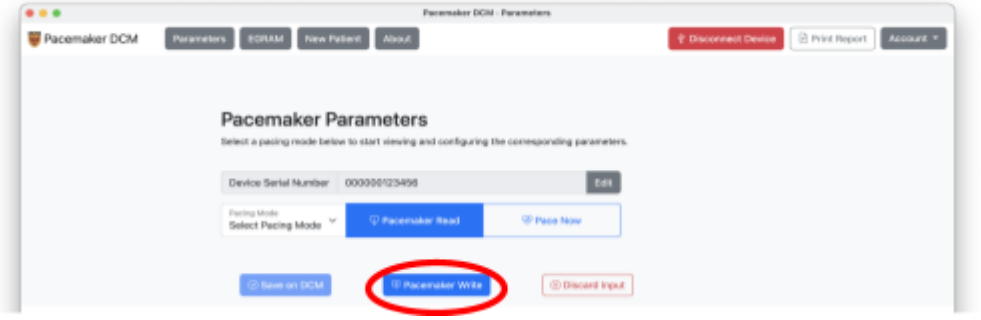

Figure 4: Pacemaker Write Button

The "Save on DCM" button (Figure 5) will store the input parameters on the DCM, so that if, for example, the application is closed and the user is prompted to log in again (See Figure 6), the same saved values will reappear.

Figure 5: Save on DCM button

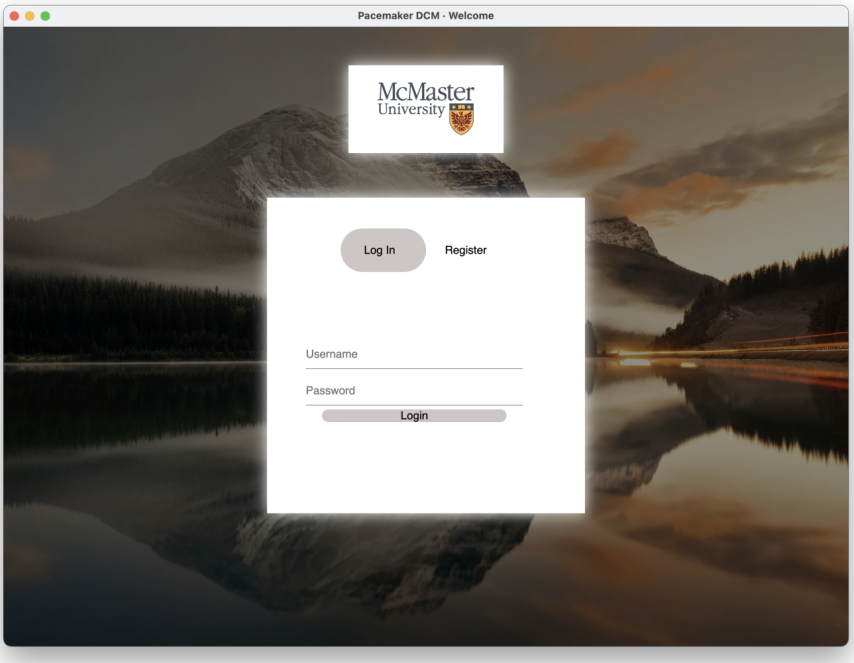

Figure 6: Log In Page

When the "Pacemaker Read" button (Figure 7) is clicked, the DCM will take whatever parameters are stored/saved on the FRDMK64F board, and apply those values to the DCM:

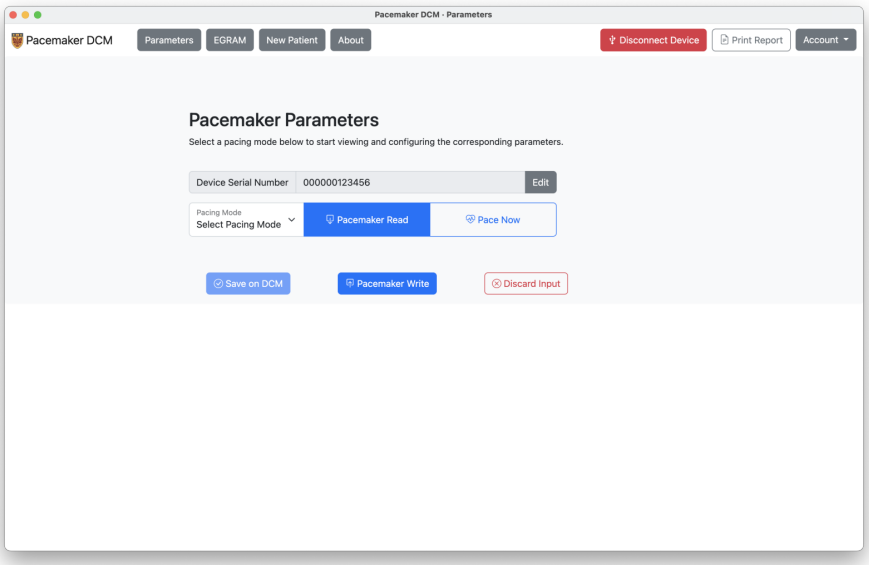

Figure 7: Pacemaker Read Button

One way to ensure that the pacemaker is storing the desired values from the DCM is by sending the desired parameters using the Pacemaker Write button, then clicking the Discard Input button to clear the screen. Clicking the Pacemaker Read button would then fetch the previously written data (As shown in Figure 8) and output it onto the DCM screen. When the values match the original inputted values, it can be seen that the parameters stored in the Pacemaker are what the user (Doctor) inputs onto the DCM.

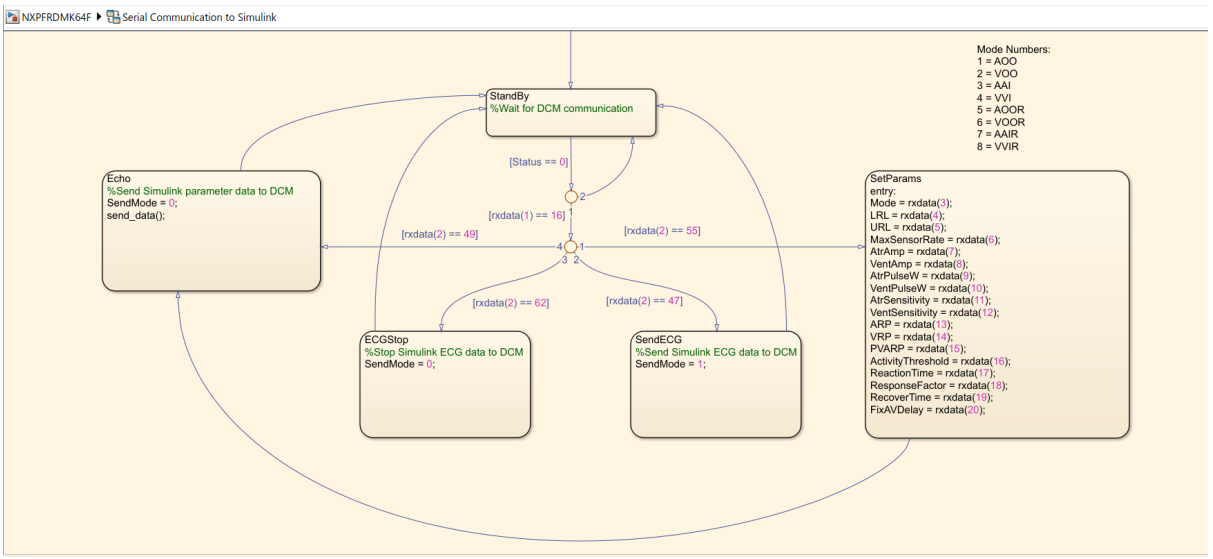

Figure 8: Serial Communication Stateflow

If needed, the current page can be printed or saved as a pdf using the Print report button at the top right of the screen (Figure 9), a quick way to save Egram data or the parameters that are currently set.

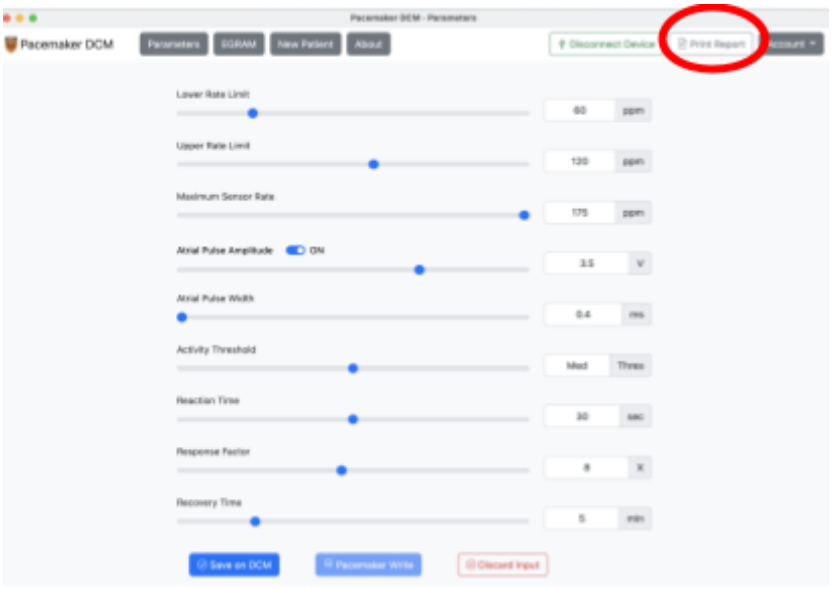

Figure 9: Print Report Button