User Guide for Haptic Knob C# V1.0

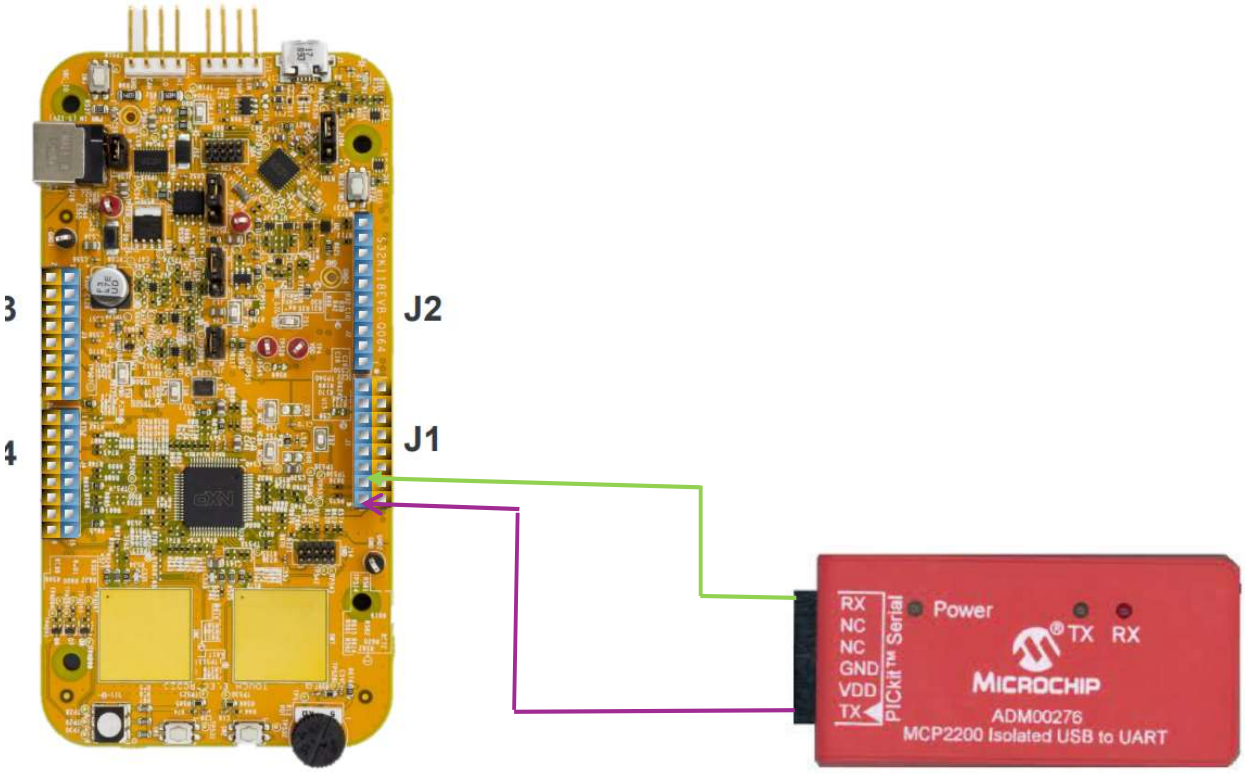
1. Introduction

This guide introduces the Visual Interface for Haptic Knob Control, an application designed for real-time data visualization and interaction with a Haptic Knob. The application not only displays live data from the Haptic Knob but also visually simulates the knob's behavior through animations. Additionally, it allows users to send commands back to the knob, enabling dynamic adjustments and control directly from the interface.

2.Initial steps and Hardware configuration

Connect the Hardware: Connect the S32K118 board to your computer using the Microchip MCP2200 USB to UART module. Attach the UART module to the PTA2 RX and PTA3 TX pins on the S32K118 board for communication.

Power the S32K118 Board: Ensure the board is powered appropriately.



3.Software configuration

Adjust settings within the application as necessary to match the specific hardware setup of the S32K118 board and MCP2200 module.

COM Port: Typically, the MCP2200 module is set to use COM6. If a different COM port is required, adjust the application settings accordingly.

Baud Rate: The default baud rate needs to be configured across three places if changes are necessary:

- In the application settings. (Figure 1)
- In the UART driver.

On the MCP2200 itself using the Microchip MCP2200 Configuration Utility, which can be accessed here(https://www.microchip.com/en-us/product/mcp2200). This utility allows for the adjustment of settings directly on the MCP2200 module.

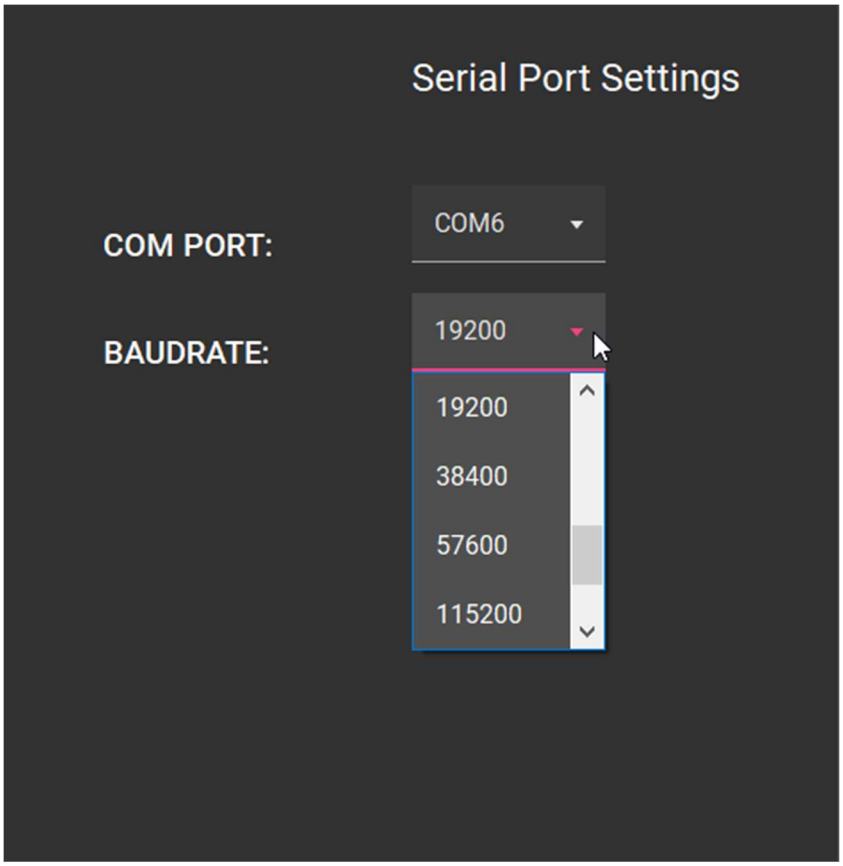


Figure 1

4.Using the application

Navigation Menu:

- **Main**: This is the default view when you open the application.
- **Knob Mods**: Access different operational modes of the Haptic Knob.
- **Settings**: Customize application settings and knob configurations.

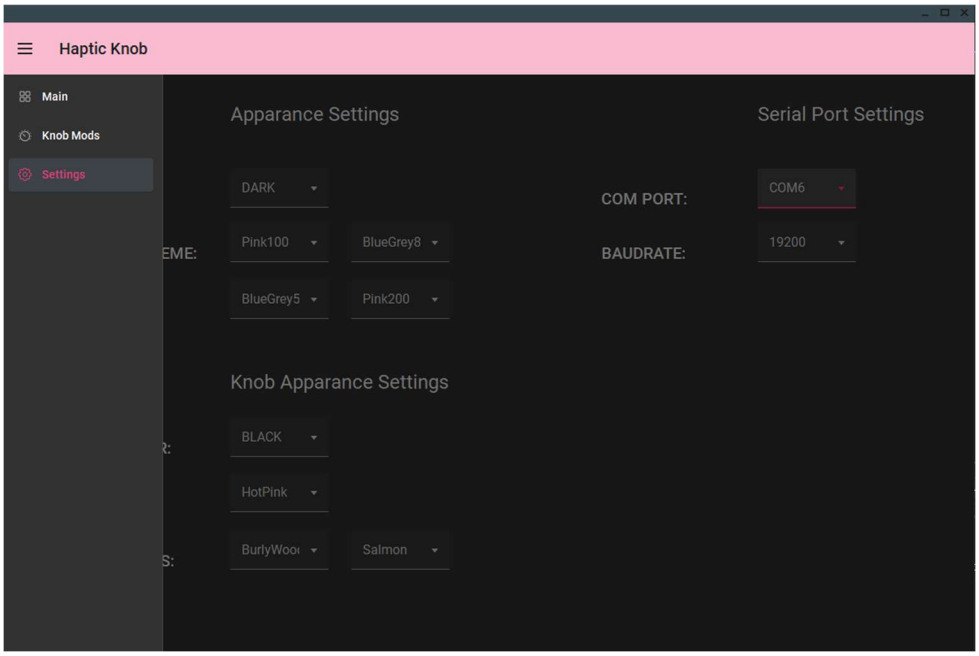


Figure 2

a) Main

Figure 3

- *Animation*
    - **Display**: Upon entering the Main view, you will see an animated representation of the Haptic Knob. This animation reflects the real-time status and movement of the knob, providing a visual interpretation of its current operational mode and activity.
- *Direction and Position*
    - **Indicators**: The application displays the rotation direction (clockwise or counterclockwise) and the current position of the knob in degrees (from 0 to 360).
- *Message Console*
    - **Text Box**: This area displays messages, warnings, or errors related to the operation of the Haptic Knob.
    - **Message Coloring**: Messages in the text box are color-coded for easy identification
    - **Clear Button**: This button clears all messages from the display.

b) Knob Mods

- *Sending Messages*
    - Text Box: This is where you can manually enter commands for testing purposes.
    - Send Button: After typing a message in the text box, click the 'SEND' button to transmit the message over serial communication to the Haptic Knob. This functionality is linked with the text box and is also intended for testing. Note that this feature is planned to be removed in a future version of the application.

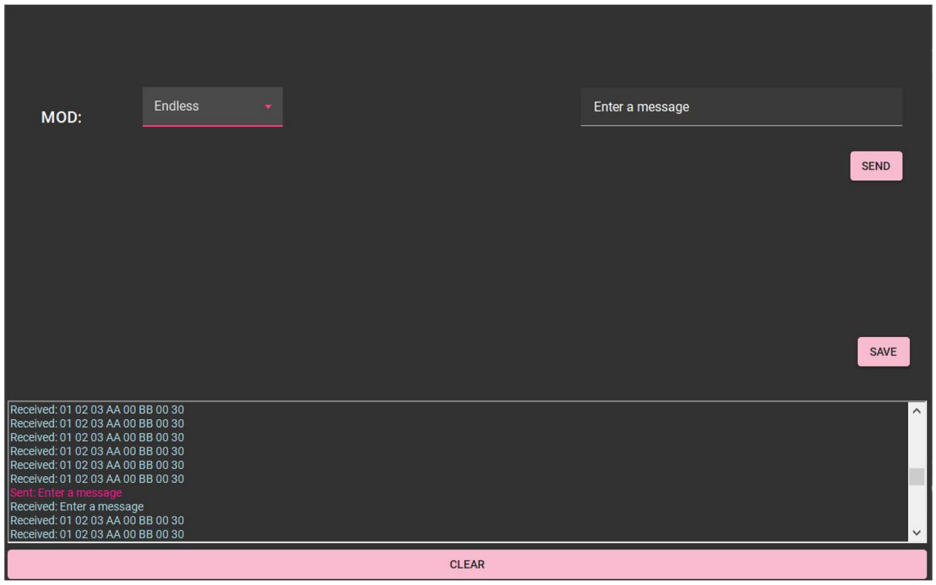


Figure 4

- *Selecting Modes*
    - Modes Dropdown: This dropdown menu allows you to select from four different operational modes for the Haptic Knob:
        - Endless
        - On/Off
        - 2 Limits
        - Return to Center

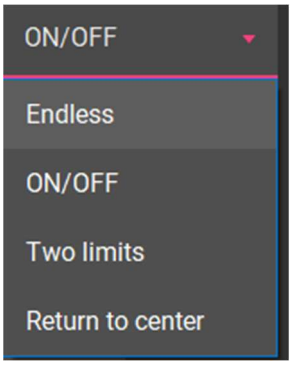


Figure 5

- Save Button: After selecting a mode, press 'SAVE' to apply. The application will automatically format and send the appropriate command to the Haptic Knob. The command will also be displayed in the text box, giving you a visual confirmation of what is being sent.

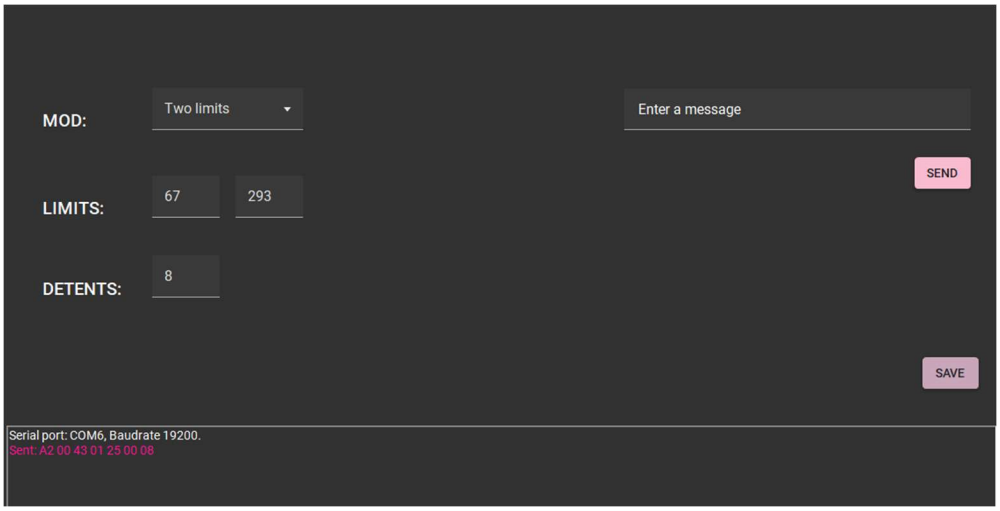


Figure 6

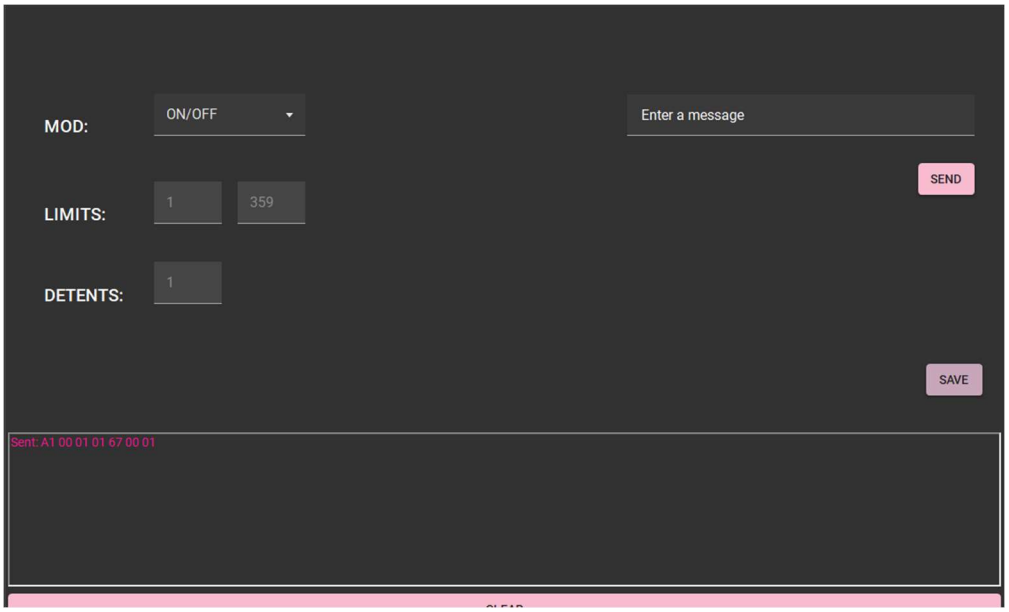


Figure 7

- *Clear Button*
    - This button clears the text from the text box.

c) Settings

1. **Appearance Settings**
    - **Theme**: Select the visual theme of the application interface
    - **Color Scheme**: Customize the color scheme of the application interface.
2. **Knob Appearance Settings**
    - **Text Color**: Choose the color of the text displayed on the knob's interface within the application.
    - **Indicator Color**: Select the color used for indicator.
    - **Fill Colors**: Set the colors for knob's graphical representation.
3. **Serial Port Settings**
    - **COM Port**: Select the COM port used for connecting to the Haptic Knob.

- **Baud Rate**: Choose the baud rate for communication. Ensure that this matches the baud rate configured on the MCP2200 module using the MCP2200 Configuration Utility to ensure reliable data transmission.

Applying and Retaining Settings

- **Immediate Application**: Changes made in the settings are applied immediately to the application and the Haptic Knob, allowing you to see and test modifications in real-time.
- **Persistence**: All settings are saved automatically and will persist even after the application is closed. This ensures that your custom configurations are maintained between sessions.

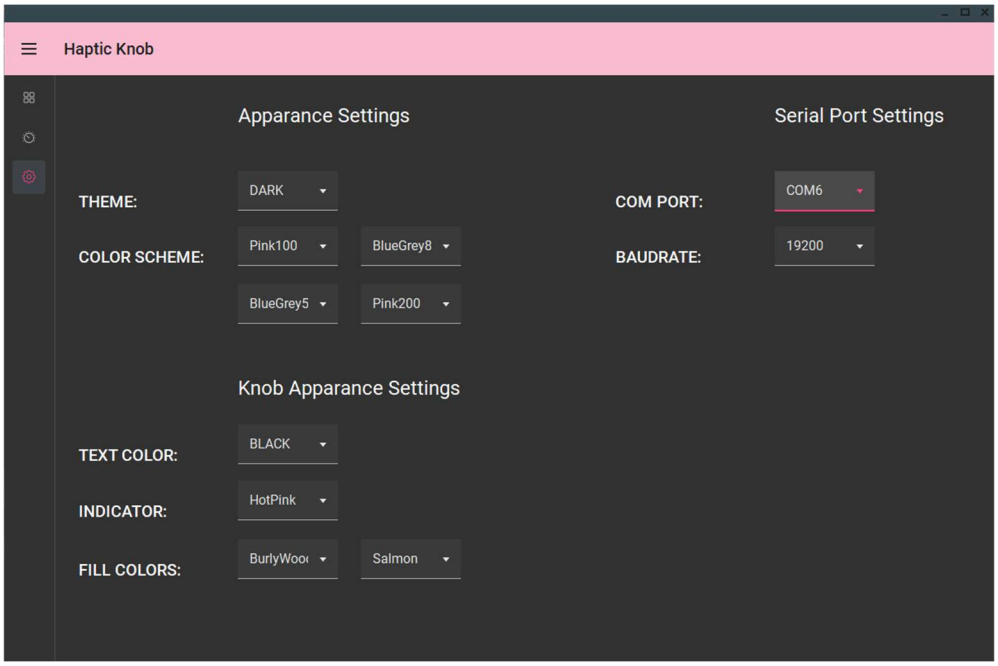


Figure 8

5. Project Structure Overview

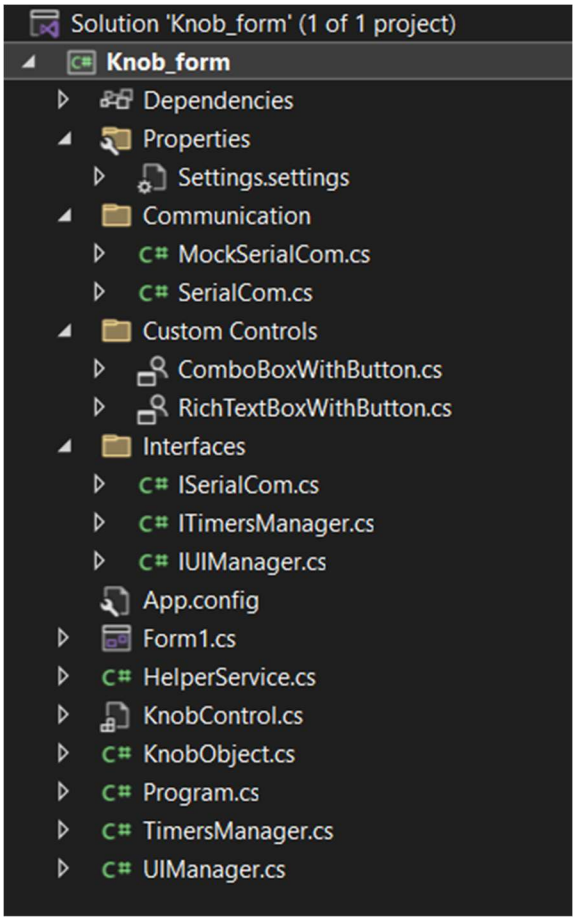


Figure 9

Communication:

MockSerialCom: simulates data transmissions for testing the application without actual hardware. It uses a timer to periodically invoke a callback with predefined serial data messages.

SerialCom: handles all aspects of serial port communication including opening, closing, sending, and receiving data over the serial port.

HelperService is responsible for configuring the visibility, state, and content of UI components related to the haptic knob settings. It also includes methods for general utility functions like calculating the complementary angle and converting byte arrays to hexadecimal strings.

TimersManager implements the ITimersManager interface and manages two specific timers: one for the knob and another for an indicator. This class facilitates periodic updates to the application's UI components to create dynamic visual effects like animations.

KnobObject class acts as a data model for the haptic knob, storing key attributes such as handshake data, direction, and position. The constructor takes a string containing serialized data, parses it, and populates the object's properties.

6.Contact Information

If you have any questions, need further assistance, or encounter any issues while using the Haptic Knob Visual Interface application, please feel free to reach out:

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