

MEMO Number: UMBC-CPSTN-CCED-111724
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SUBJECT: Controller and Input Generator GUI for CCED

1. INTRODUCTION

This note applies to the portion of the Convolutional Code Encoder Decoder (CCED) that is to be installed onto the user's device (laptop or PC) and used to control the CCED. For ease of discussion, it will be referred to as the controller GUI (Graphical User Interface). Additionally, this note will discuss relevant decisions made during the design process.

2. DISCUSSION

2.1. Layout

Figure 1 below represents the current version of the controller GUI.

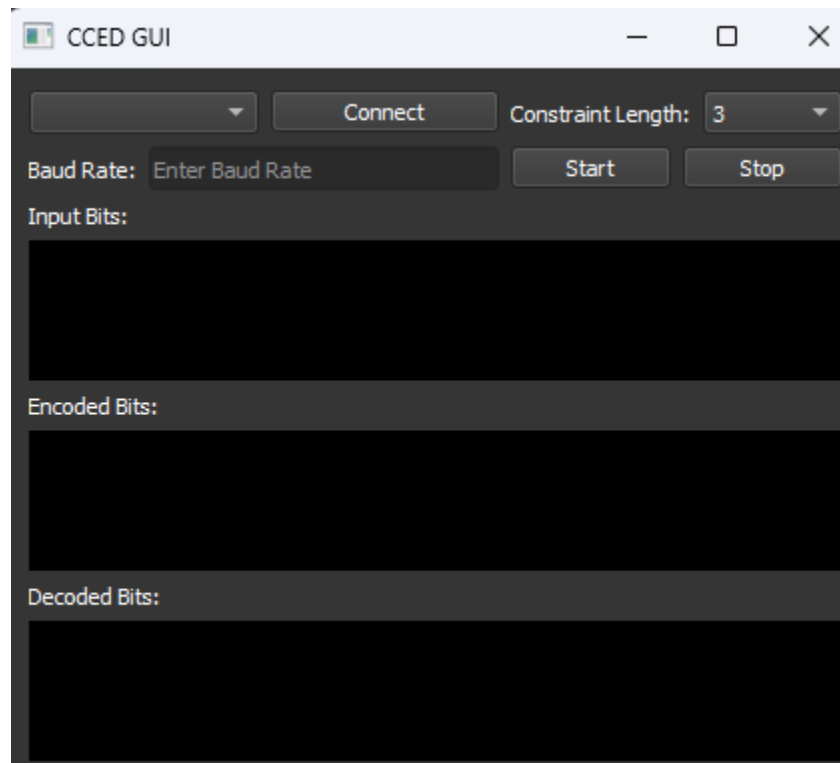


Figure 1: Controller GUI V0.1.1

The GUI contains three main sections: UART configuration settings, CCED control settings, and bitstream representation.

1. **UART Configuration Settings:**
 - Located in the upper left section, it contains a dropdown menu, a connect button, and a baud rate input field.
 - The dropdown allows the user to select the communication port from all available ports.
 - After a valid communication port and baud rate are entered, the connect button will send a message to the CCED FPGA to confirm proper communication.
 - The controller will then inform the user of the communication status via the window title.
 2. **CCED Control Settings:**
 - Located in the upper right section, it allows the user to start or stop bitstream communication. These functions are only enabled after communication is confirmed.
 - The constraint length is also set in this section and sent over with the message once communication is established.
 3. **Bitstream Representation:**
 - Located in the bottom section, it includes three large text boxes:
 - The first box represents the outgoing bitstream, which begins generation when the start button is pressed.
 - The second box shows the encoded bitstream.
 - The third box displays the decoded bitstream while highlighting in red any bits that differ from the initial bitstream.
 - When the device is stopped, the controller GUI generates a popup displaying the overall accuracy of the CCED.
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2.2. Code Structure

The code for the controller GUI is divided into three portions: UI Initialization, Function Definitions, and the Main Loop.

1. **UI Initialization:**
 - Describes the visual layout of the GUI using vertical layout box (vBox) and horizontal layout box (hBox) components from the PyQt5 library.
 - The vBox and hBox components define how items are arranged within the layout. Based on the order of initialization and the box to which they are attached, items will be displayed accordingly.
 - For example, the “Input Bits” label and the black text box that follows are both in the same vBox container. Since the label is declared first, it appears above the text box.
2. **Function Definitions:**
 - Specify the actions triggered by events tied to the UI elements initialized previously.
 - For example, the connect button uses the .clicked event to call the function that initiates the connection process.

3. **Main Loop:**

- A simple loop that sets up optional coloring configurations that do not affect functionality.
- It also calls the UARTGUI() function to display the window.