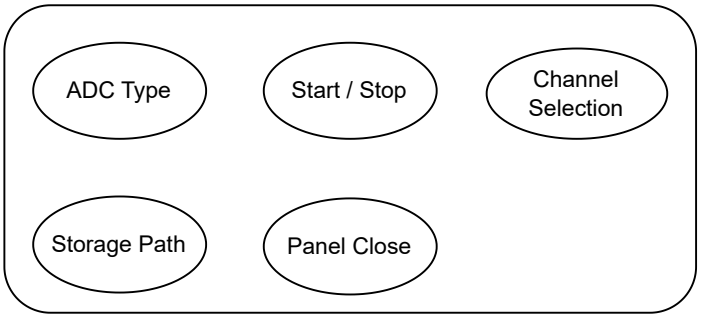
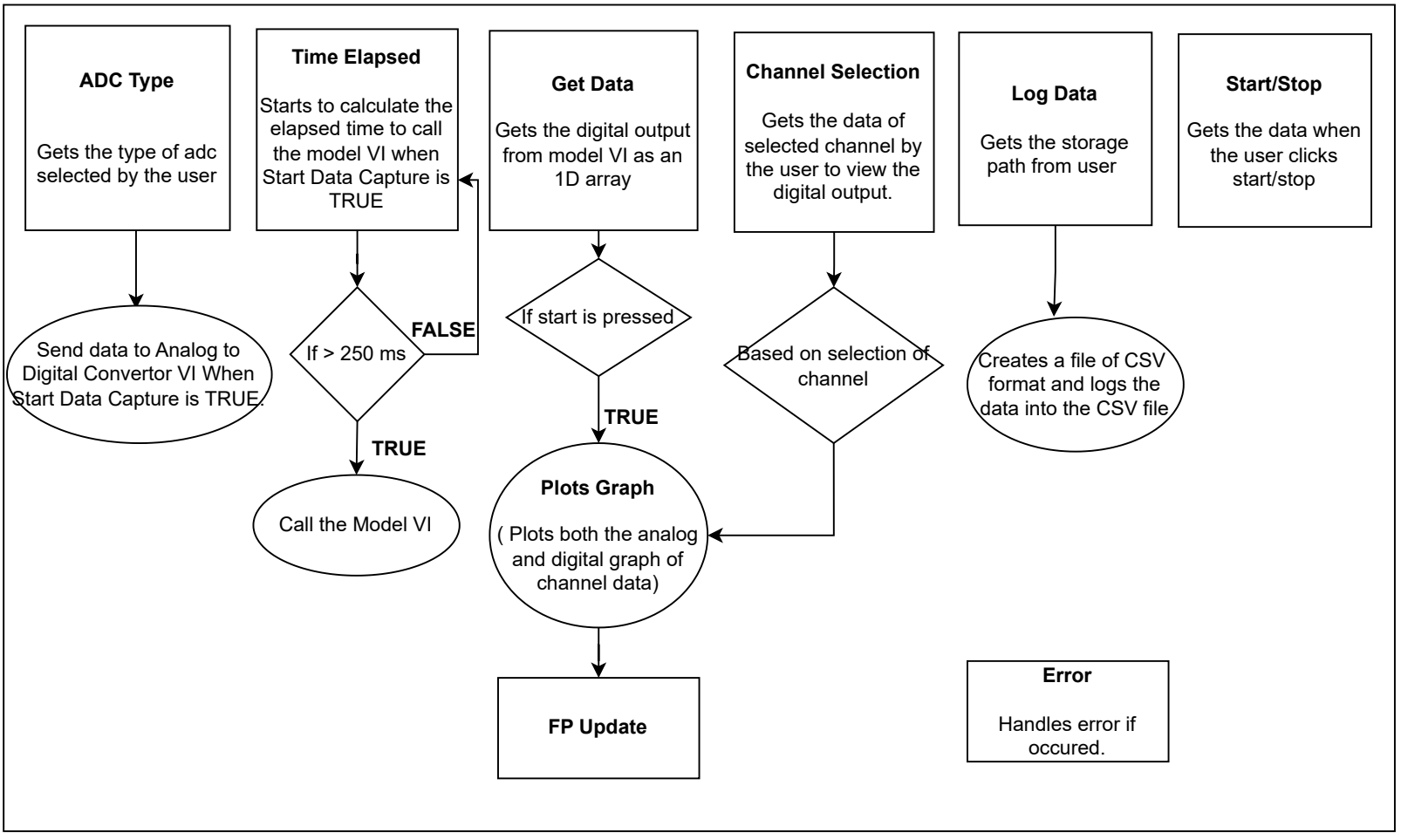
GUI

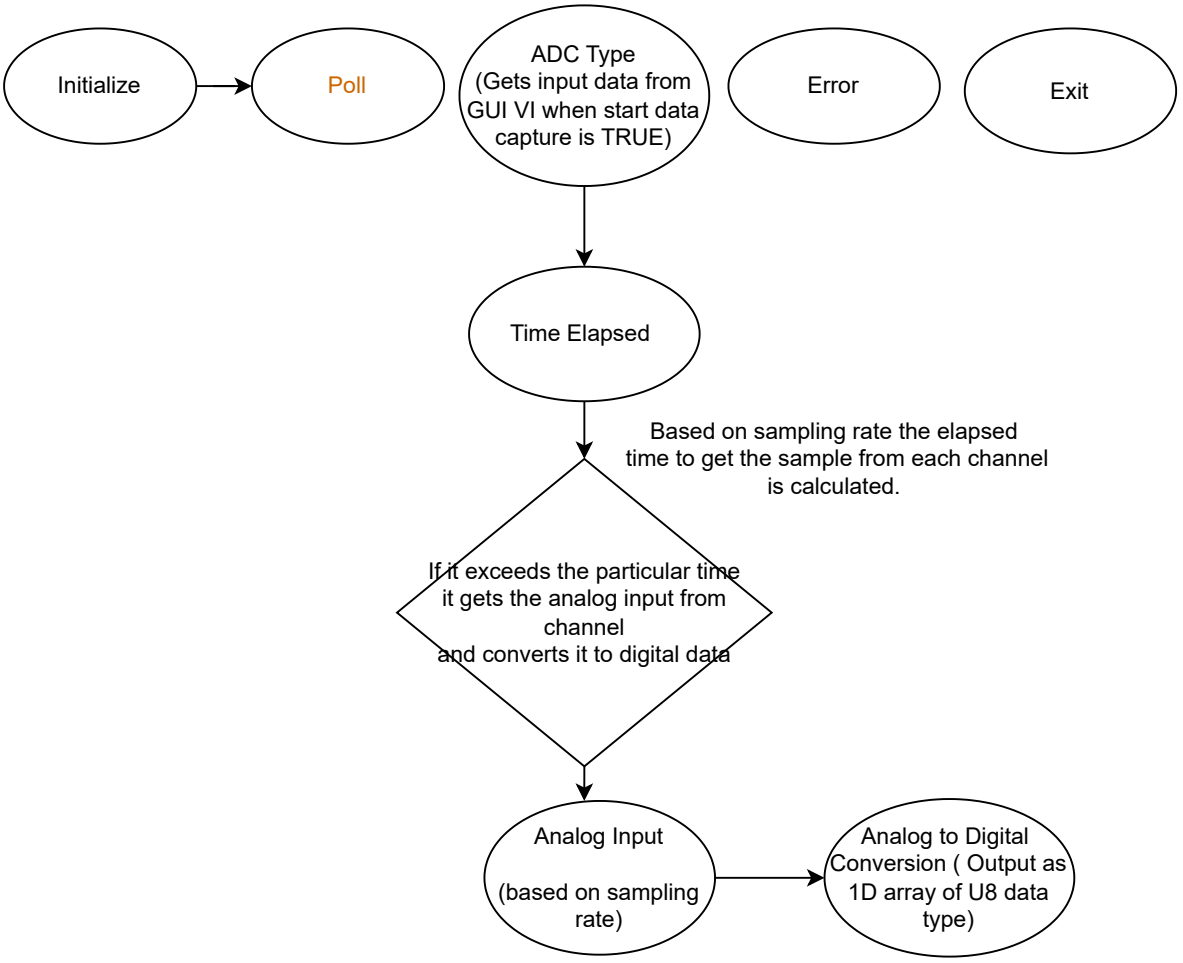
Producer loop



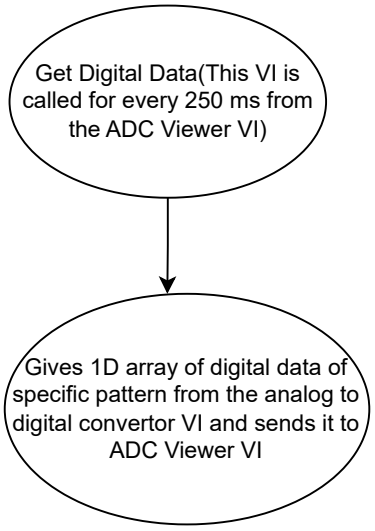
Consumer loop



Analog to Digital Convertor VI



Model VI



ADC Viewer:

Producer consumer architecture:

Producer loop:

Handles the events:

1. Start /Stop
2. Storage path
3. ADC Type
4. Channel

Consumer Loop:

States:

Initialize:

Initialization of control values

Start / Stop:

Gets the data from the producer loop when user clicks the Start/Stop data capture button

ADC Type:

Gets the data from producer loop when the user gives the input to no of channels, resolution (no of bits), sampling rate and range (Reference Voltage) based on which the type of adc is considered. Sends this data to the Analog to Digital Convertor VI when Start Data Capture is TRUE, where analog to digital conversion is done based on the input sampling rate and no of channels.

Selected Channel:

Gets the data of selected channel from producer loop for which the graph is plotted.

Time Elapsed:

Starts to calculate the elapsed time when Start Data Capture is TRUE and if the elapsed time is greater than 250 ms it calls the model VI to get a certain number of bytes as an 1D array of U8 datatype and resets the timer again to call the model VI for every 250 ms.

Get Data:

Gets the data from the model VI as a 1D array of U8 data type, then the U8 data is converted to digital data table, and it is plotted in digital waveform graph.

Log Data:

Logs the received digital data into a CSV file in the path specified by the user.

Plot Data:

Plots both the analog and digital data in the graph of selected channel.

FP Update:

Updates the front panel indicators when start data capture is true.

Exit:

Stops the running VI when panel close is pressed.

Error:

Handles the error if any occurred with a pop-up message asking the user whether to continue or stop the running VI.

Analog to Digital Converter VI:

It starts running when start data capture is true and gets the adc type input from GUI for the conversion of analog to digital data.

Queue based state machine (states)

Initialize:

Initializes the value of controls

ADC Type:

Gets the data from the GUI VI for number of channels, resolution, sampling rate and range based on which the output 1D digital array of U8 datatype is generated.

Time Elpased :

Time elapsed is calculated based on the input sampling rate. If the time elapsed exceeds the particular time, then it gets the input analog data from that channel and switches over to next channel for getting further data.

Analog Input:

Gets the analog input data from the respective channel.

Analog to Digital Conversion:

Converts the analog input to digital output based on resolution (no of bits), range (Reference Voltage) and input voltage (analog value).

ADC Calculator:-

$$\text{Digital Output} = \frac{2^N \text{ x Analog Input Voltage}}{\text{Reference Voltage}}$$

↳ Convert this to Binary Equivalent

N = Number of bits in ADC converter

For Example:

1) INPUTS:

N (resolution) = 3, Analog input (V_in) = 5.5V, Ref_voltage (V_ref) = 8 V

OUTPUT:

Digital output = 5 numeric (decimal),

Binary equivalent of digital output = 101 (binary)

2) INPUTS:

N (resolution) = 10, Analog input (V_in) = 0.806V, Ref_voltage (V_ref) = 3.3 V

OUTPUT:

Digital output = 250 numeric (decimal),

Binary equivalent of digital output = 1111 1010 (binary)

Error:

Handles error if any occurred.

Exit:

Stops the running VI when panel close is pressed.\

Model VI

Get Digital Data:

This VI is called for every 250 ms from the GUI for getting the digital dat. It gets the output 1D array of U8 data type from analog to digital converter VI and sends it to the GUI VI.

UI MOCKUP:

ADC VIEWER VI: