Submission deadlines:

- Demonstrate completion of project 2 during evening laboratory sessions on either Wednesday March 27, or Thursday March 28, from 6:30 pm to 8:30 pm in 302 EE West. You must sign up for a ten minute slot on either Wednesday or Thursday using SignUpGenius. You will receive an email message via your Penn State email address when the sign up sheet is available online at SignUpGenius. Slots are filled on a first-come, first-served basis.
- **Each** EE 200 student must complete this project and demonstrate their LabVIEW realization.

Project 2: (100 points)

Each EE 200 student must realize the finite state machine finite state machine for the multicolor LED glow baton realized in Problem Set 3, problems 9 and 10 using the LabVIEW programming environment and myDAQ, and demonstrate their system to the laboratory instructor during the grading session. To earn full credit you system must meet the hardware and software requirements specified below.

Hardware Specifications:

1. Use the myDAQ signal assignments in Table 1.

Signal Designation	myDAQ I/O designation
A	DIO 0
B	DIO 1
R	DIO 2
G	DIO 4
Y	DIO 5
R	DIO 6

Table 1: The myDAQ signal I/O assignments.

2. Use three tactile switches to generate the inputs A, B, and R. To reduce the possibility of electrical noise generating an erroneous input to the myDAQ, connect the three corresponding digital lines to 5 V through a 27 kΩ resistor, and use a switch to pull the logic level low when a button is pressed. Keep in mind that the inputs A, B, and R transition to a logical high state when the corresponding button is pressed.
3. Use green, yellow, and red LEDs to indicate the output signals G, Y, and R, respectively, where a lit LED indicates a logic-high signal. For each LED, limit current using a 330 Ω series resistor.
4. Clearly label the tactile switches that represent the control signals A, B, and R.

Software Specifications:

1. Complete the LabVIEW code provided with this project, which relaizes the FSM in LabVIEW using a multiple loop design pattern.
2. You must organize your files using a LabVIEW project. The project assignment includes a directory containing the partially completed project, control files, and VIs. Complete the code to obtain the project view in Figure 1.
3. Do not alter the front panel of the **Project 2(Main).vi** as shown in Figure 3, and complete the block diagram as shown in Figure 3. You will also need to complete the subVIs **Set State(FGV).vi**, **Transition State.vi**, and **myDAQ Action Engine.vi**.
4. The upper loop must read the digital input signals at a rate of 1.6 Hz and set the next state accordingly.
5. In the lower loop
   - Poll the reset input R every 10 ms to realize an asynchronous reset that sets the state to S0 and appropriately sets the LED states when the tactile switch representing R is pressed.
   - Poll the Stop Button on the front panel of **Project 2(Main).vi** every 10 ms. When the user presses the stop button, set the system state to S0 and appropriately set the LED states before stopping code execution.
6. Read and write the myDAQ digital lines using the DAQmx VIs; **do not** use the NI ELVISmx VIs.
7. If the status element of the error clustered wired to the subVI **Set State(FGV).vi** is true, this VI must set the state to S0 regardless of the present state or inputs.
8. If the status element of the error clustered wired to the subVI **Transition State.vi** is true, this VI must set the state output to S0 and both outputs to logic low, regardless of the input state or requested FGV action.
9. If either loop stops execution due to an error, the other loop must be stopped as well.

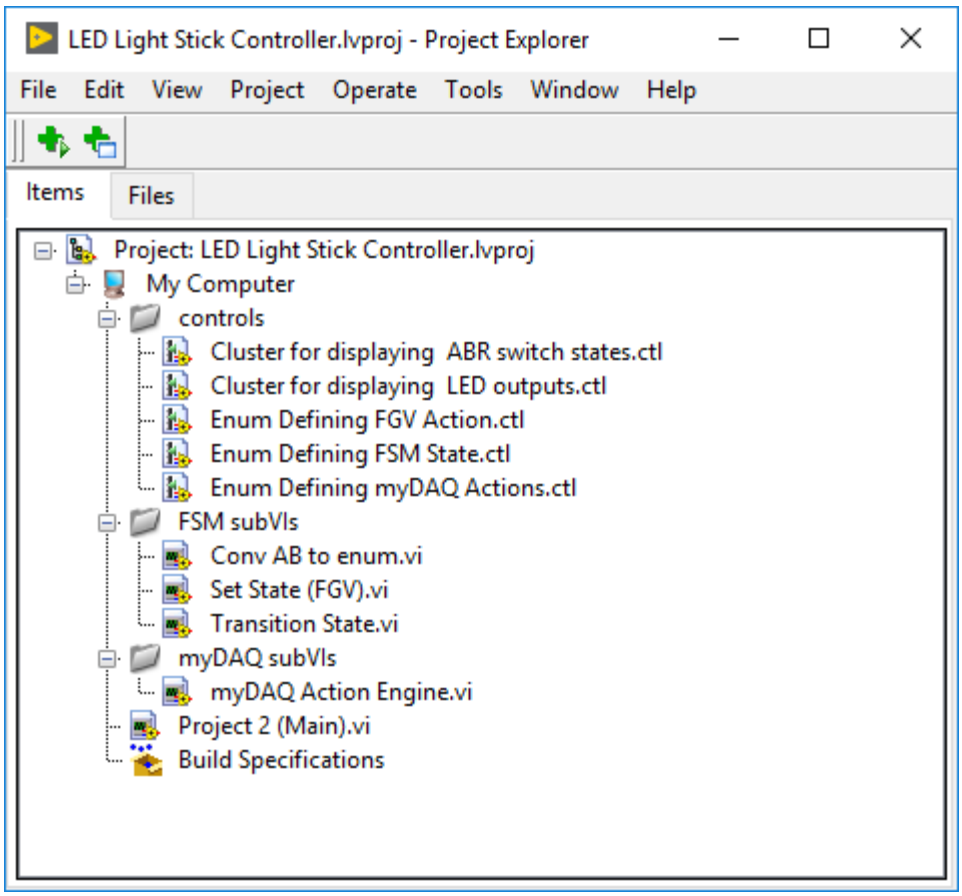

Figure 1: Required project view.

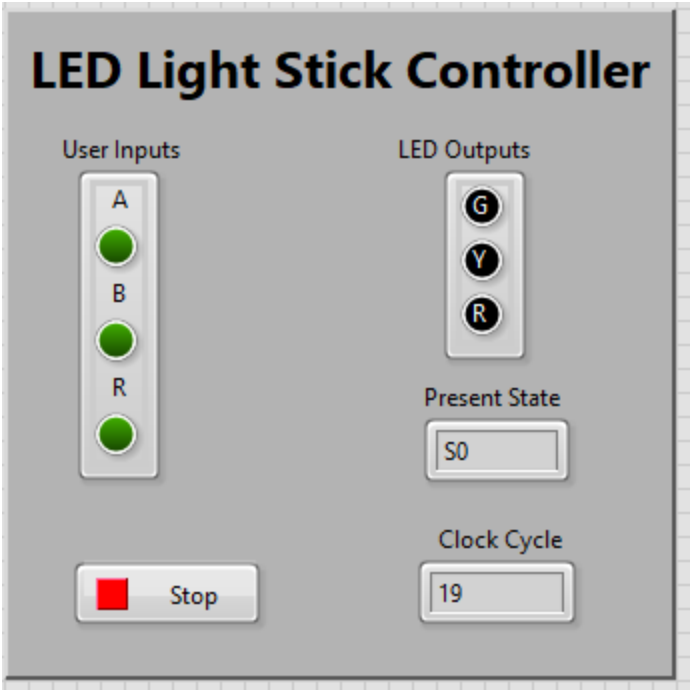

Figure 2: Required front panel for **Project 2(Main).vi**.

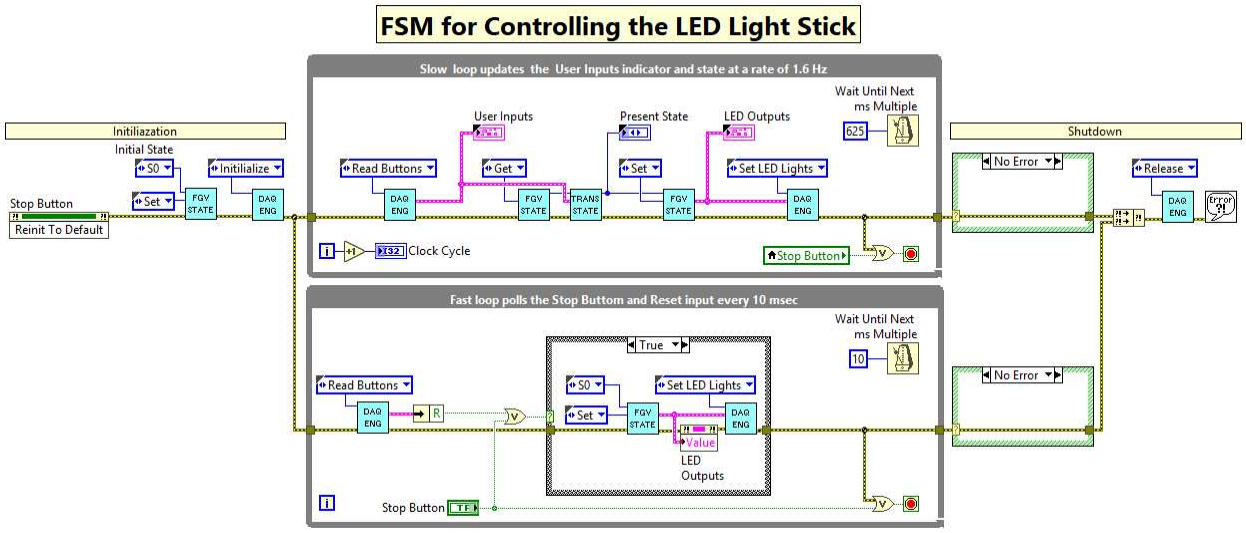

Figure 3: Required block diagram for **Project 2(Main).vi**.

Each student has approximately five minutes to demonstrate their circuit, and points are awarded as follows:

1. (10 points) Each tactile switch must be labeled with the corresponding signals A, B, and R. Use a post-it note or, alternatively, tape a piece of paper to the wiring connecting the switch or LED with the appropriate signal label.
2. (10 points) The LabVIEW project must appear as shown in Figure 1.
3. (10 points) The case structure within **Transition State.vi** must be completed using the subdiagram for S0 as a guide.
4. (10 points) Pressing the reset or stop button must return the system to state S0, with the corresponding output set, within 10 ms.
5. (10 points) If either loop stops execution due to an error, the other loop must be stopped as well.
6. (30 points) The system responds correctly to the inputs A, B, and R.
7. (20 points) Demonstrate your knowledge of how the code operates by answering a question presented by the instructor.