Principles of Embedded Systems - Final Project Proposal

“SMART FOOD ORDERING SYSTEM”
(Isha Sharma)

Introduction:
The aim of this project is to design and implement a Smart Food Ordering System that will provide a convenient and user-friendly interface for users to order food, like how you see present at the kiosks of restaurants.

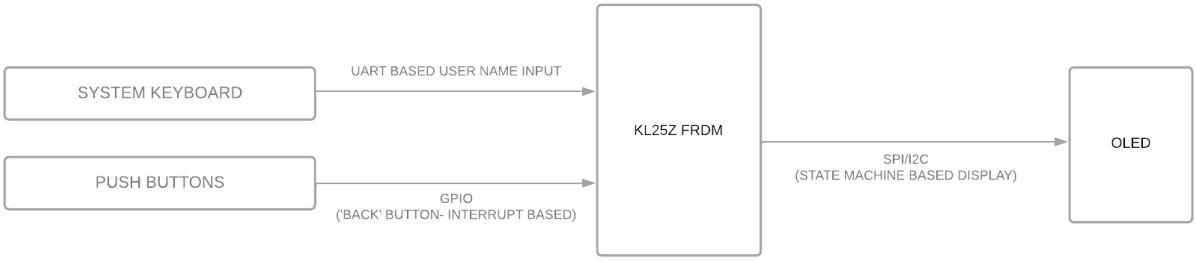
Technical Details:
The proposed Smart Food Ordering System will consist of the following components:

- OLED Display: The system will use an OLED display for the user interface. The display will be connected to the FRDM board using SPI or I2C communication protocol.

- User Input via button: The system will utilize buttons for user input, such as up, down, select, and back. The back button functionality will be interrupt-based to provide a smooth user experience.

- UART Communication: The system will use UART communication to take the user's name as input to add it to the order. The user will be prompted to enter their name on the OLED display, and the system will receive the input via UART communication.

- State Machine: The system will be based on a state machine, where each state represents a different screen on the OLED display. The state machine will transition between states based on user input.



Functionality:
The proposed Smart Food Ordering System will provide the following functionality:

- Welcome Screen: The system will display a welcome screen on the OLED display.

- User Name Input: The system will prompt the user to enter their name on the OLED display. The user will input their name using the system keyboard, and the system will receive the input via UART communication, save it and echo it back to the user.

- Cuisine Selection: The system will display a list of available cuisines on the OLED display. The user will be able to scroll through the list using the buttons and select their desired cuisine.

- Menu Selection: The system will display a menu for the selected cuisine on the OLED display. The user will be able to scroll through the menu using the buttons and select their desired items.

- Order Confirmation: The system will display a summary of the user's order on the OLED display, including the selected cuisine and menu items. The user will be prompted to confirm their order, and then prompt the user to go to a particular register for payment and receive his order.

Further answered questions:

1) What technologies will you use?
Ans:

- SPI/I2C for OLED
- UART for user name input
- Interrupt-based 'back' button functioning
- GPIO for the buttons
- State Machine based display where each state represents a different screen on the OLED display

2) What do you anticipate needing to learn in order to develop your project? What sources (KL25Z Reference Manual, Internet sites, etc.) do you plan to use to figure out how to do whatever it is you are attempting?
Ans:

- KL25Z Board Configuration: I will need to learn how to configure the board to interact with the OLED display, buttons, and UART communication.
- Interrupt Handling: As we plan to use interrupt-based back button functionality, I will need to learn how to handle interrupts on the KL25Z board.
- State Machine Implementation: I will need to better learn how to implement the state machine approach on the KL25Z board to handle the transitions between different screens on the OLED display.
- Debugging Techniques: Debugging the system may involve using debuggers or analyzing system logs, which may require learning how to use these tools.

To figure out how to do the above tasks, I plan to use the following sources:

- KL25Z Reference Manual and Datasheet: I will use the official KL25Z Reference Manual to understand the board's features and how to interface with it.
- Internet Sites: I will use online resources such as forums, tutorials, and technical documentation to gather information on implementing the project on the KL25Z board.
- Community Support: I will also seek help from online communities such as forums and developer communities that specialize in KL25Z development.

- Code Examples: I will explore available code examples to understand how to use the board's peripherals to interact with the OLED display, buttons, and UART communication.

3) Does your project require any additional hardware? If so, what will you acquire, and what is your plan for assembly?
Ans: I will be using an OLED display and buttons as additional hardware. The OLED display will serve as the user interface for the system, while the buttons will be used for user input.
To acquire these components, I will research and select the appropriate models that are compatible with my KL25Z FRDM board such as size and cost. Once I have identified the necessary components, I will order them online.
As for the assembly of the hardware, I will refer to the datasheets and user manuals for the KL25Z FRDM board, OLED display, and buttons to understand the pin configurations and communication protocols.
To ensure proper functionality, I will test the connections and code with a multimeter and debug any issues that arise. Overall, my plan for assembly is to follow the guidelines provided by the component datasheets and user manuals and verify the connections using appropriate testing methods.

4) Finally, what is your testing strategy for your project? Will you develop automated tests, will you use manual tests, or will you use a mixture of both?
Ans:
I plan to use manual testing as my primary testing strategy. This will involve running the system in a real-world scenario and manually verifying that it behaves as expected.
During manual testing, I will go through each of the system's features and test their functionality, starting with the basic features such as displaying the welcome screen and user name input. I will also test the system's error-handling capabilities by intentionally entering incorrect inputs and verifying that the system responds appropriately.
However, I do not plan to use automated testing as the primary testing strategy as manual testing can provide a more thorough understanding of the system's behavior in a real-world scenario.