Brandon Hillbom

ENSE452 Term Project Documentation

Project description

I will be developing an elevator control system that will simulate the operation of an elevator using the Cortex-M3 microcontroller. The system will include the functionality of controlling an elevator's movement between different floors using USART, responding to user input from the on board button, and implementing a Command Line Interface (CLI) for communication from within the elevator. The project will be implemented in C code and will incorporate FreeRTOS for task management.

Tasks

1. Elevator Control Task
    a. Responsible for updating and displaying the current floor status in the console window. This will have a delay in between moving floors to simulate the time it takes to move between floors. The current floor will be known by passing the current floor to the elevator control queue.
2. CLI Task
    a. Responsible for handling USART communication for the CLI interaction. It will listen for commands entered via USART and process the commands by communicating with the elevator control task to execute the user commands. This will be handled using a queue to avoid data races. Commands include:
        i. Signalling the elevator to pick you up
        ii. Open/close the doors
        iii. Select the floor to go to
3. Emergency Stop Task
    a. Responsible for interrupting the the elevator control task. This will stop the movement of the elevator until the button is clicked again thus releasing the emergency "switch"

Interrupt Service Routines

1. Emergency stop ISR
    a. Monitors the external microcontroller on board button presses simulating an emergency stop button. When pressed, it will trigger an emergency stop by innterrupting the elevator operation. This means it will have a higher priority than the elevator control task.
2. USART2 ISR
    a. Handles incoming ASCII values from the CLI that will signal the CLI task to process the data.

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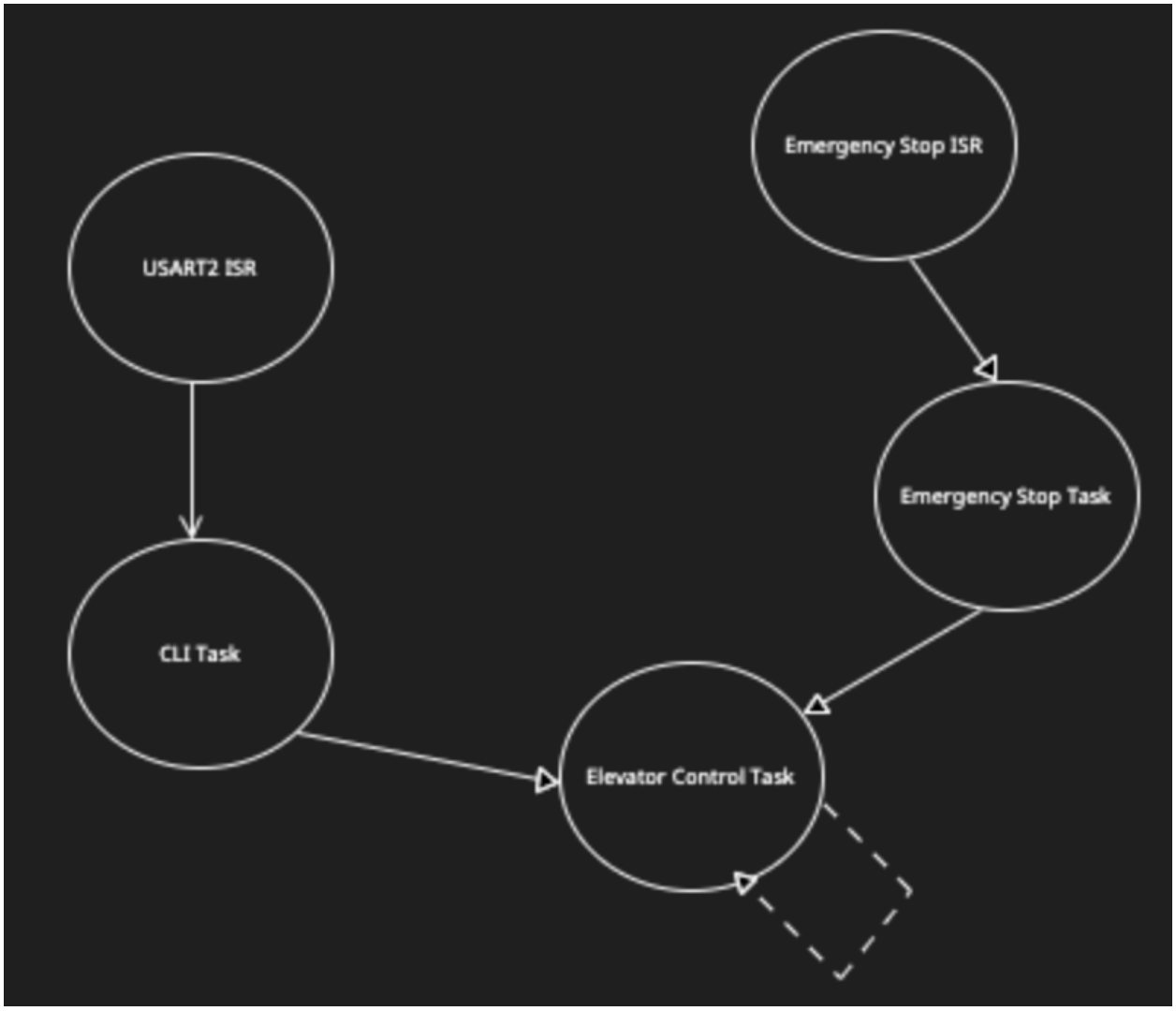
Task Diagram



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State Machine Diagram