TEAM 5

Power window control system using Tiva C running FreeRTOS

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Submitted to:

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Role of each team member

Roles

- Ahmed Sameh
- Abdelrahman Ayman
- Osama Ali
- Amr Haitham
- Osama Ayman
- Saeed Ahmed

Roles

Ahmed Sameh

Hardware, manual/auto mechanism, Interrupts

Osama Ayman

Jam protection mechanism, state diagram

Osama Ali

Documentation, manual/auto mechanism/ Handling Corner Cases

Abdelrahman Ayman

Hardware, jam protection mechanism, Interrupts

Saeed Ahmed

Powerpoint, state diagram, manual/auto mechanism /Handling Corner Cases

Amr Haitham

Extra Task, Jam protection mechanism

Project description

Description

The Power Window Control System using Tiva C running FreeRTOS is a project that aims to implement a window control system for the front passenger door of a car. The project utilizes the Tiva C microcontroller and the FreeRTOS operating system to provide efficient and reliable control of the window.

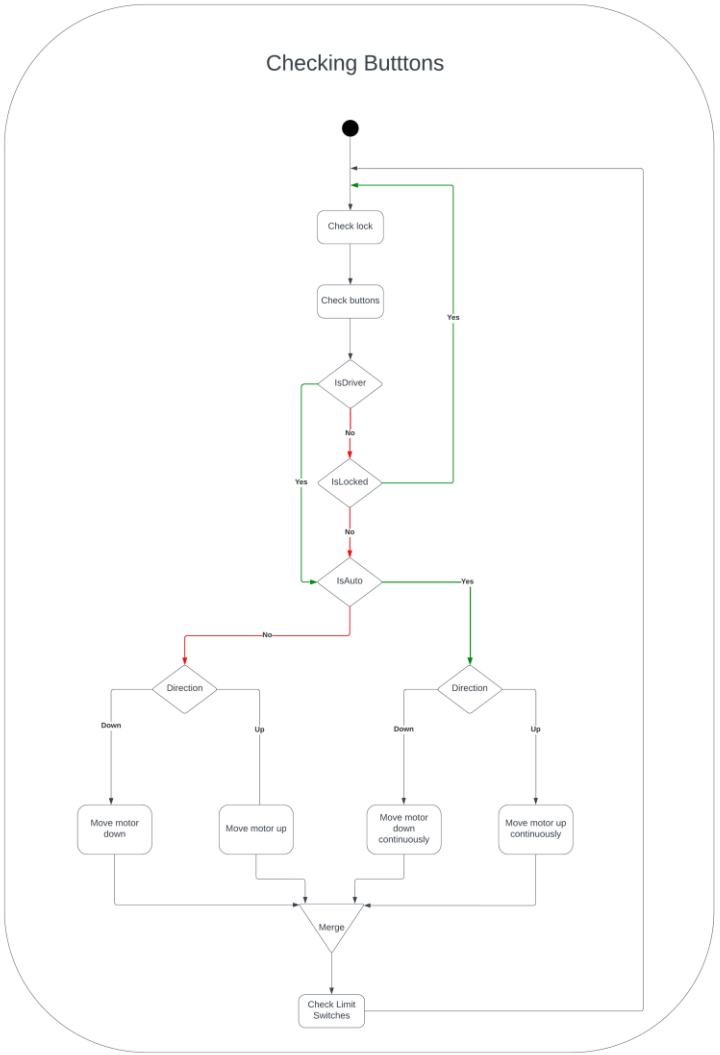
The system's scope includes the implementation of both the passenger and driver control panels, which can manually open and close the window. The system also features a one-touch auto open and close function for convenience. Additionally, a window lock function is implemented, which disables the opening and closing of all windows except for the driver's window.

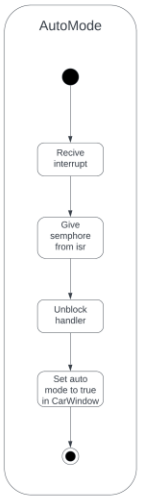
The system features obstacle detection using a push button to indicate jamming, which stops the power window and moves it downward for about 0.5 seconds during one-touch auto close operation.

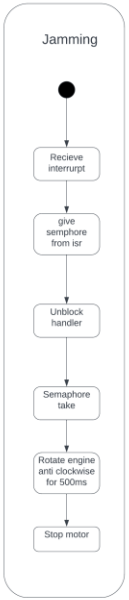
The project requires the implementation of two limit switches to limit the window motor's movement from the top and bottom limits of the window. The hardware used in the project includes the Tiva C microcontroller, top and bottom limit switches, a DC motor to indicate window operation, push buttons for window control, and an on/off switch to operate locking of the passenger panel from the driver panel.

The project's primary goal is to create a reliable and efficient window control system for the front passenger door of a car. The implementation of FreeRTOS ensures that the system operates efficiently, while the limit switches and obstacle detection provide safety features that prevent damage or injury.

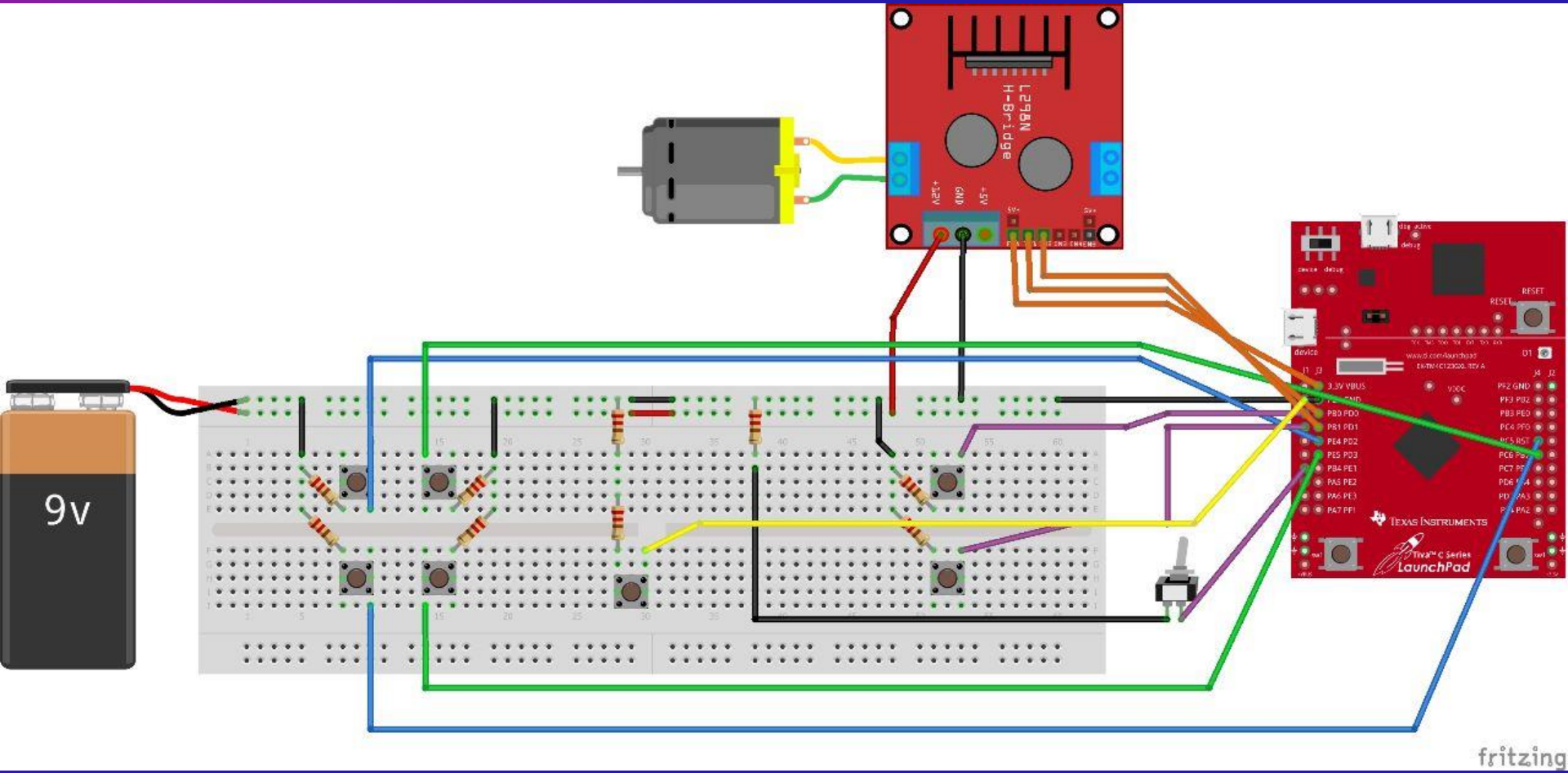
System Flowchart or state diagram.


Checking Butttons
Check lock
Check buttons
IsDriver
No
Yes
IsLocked
Yes
No
IsAuto
Yes
No
Direction
Down
Up
Direction
Down
Up
Move motor down
Move motor up
Move motor down continuously
Move motor up continuously
Merge
Check Limit Switches


AutoMode
Recive interrupt
Give semphore from isr
Unblock handler
Set auto mode to true in CarWindow


Jamming
Recieve interrurpt
give semphore from isr
Unblock handler
Semaphore take
Rotate engine anti clockwise for 500ms
Stop motor

Circuits topologies


L298N
H-Bridge
+12V
GND
+5V
9v
RESET
Texas Instruments
Tiva™ C Series
LaunchPad
fritzing

Handling Cases

Handling Corner Cases

1. Pressing close / open at the same time
2. If the driver disables the lock while passenger is pressing the button
3. If the driver enables the lock while passenger is pressing the button
4. Pressing open automatically then press close suddenly and vice versa.

1. No action
2. The priority is for the lock
3. The priority is for the lock
4. The window will stop

Thanks

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