



CONESTOGA

Connect Life and Learning

CNTR8005 – HARDWARE/SOFTWARE INTERFACING

Project Name : Remote Controlled Curtain

Group Number : 1

Prepared By : Sinan Karaca
Mohammed Al-Bunde

Proposed to : Prof Allan Smith

Date : 24.11.2021

CONTENT

1. INTRODUCTION.....	3
2. SCOPE OF THE PROJECT	3
3. PROCEDURE	4
4. FLOW CHART OF SOLUTION.....	5
5. BLOCK DIAGRAM OF SOLUTION	6
6. COMPONENTS.....	6
7. CONCLUSION.....	7
8. REFERENCES	7

1. INTRODUCTION

The purpose of the project is to control curtain with stepper motor. User will be able to move the curtain to the demanded level with remote control. Also fully automated mode will adjust the level of the curtain automatically.

Adjusting the home curtains with the innovative approach will help to get rid of traditional curtain adjustment with hand. People may want to adjust the curtain fully automated with the light density or with a remote controller. It can be considered as part of smart home, it will bring the people more comfort and give the chance to get rid of time a time consuming task in home.

2. SCOPE OF THE PROJECT

The project is going to give a chance to control only one curtain at a time. In an average home, 5-6 curtains can be considered as in use. The project will control only one curtain, for other curtains the design must be changed.

For the fully automated function, the light sensor will be placed to measure the light density coming from outside. If the corresponding window doesn't take enough light to control curtain, the calibration must be done inside the software.

For the manual remote controller mode, the range is limited to 40 meter indoor range. Above 40 meter, some other components need to be considered.

The stepper motor has a kilogram limit to lift. For most of the home applications, the limit is plenty. For industrial purposes the design must be re-done.

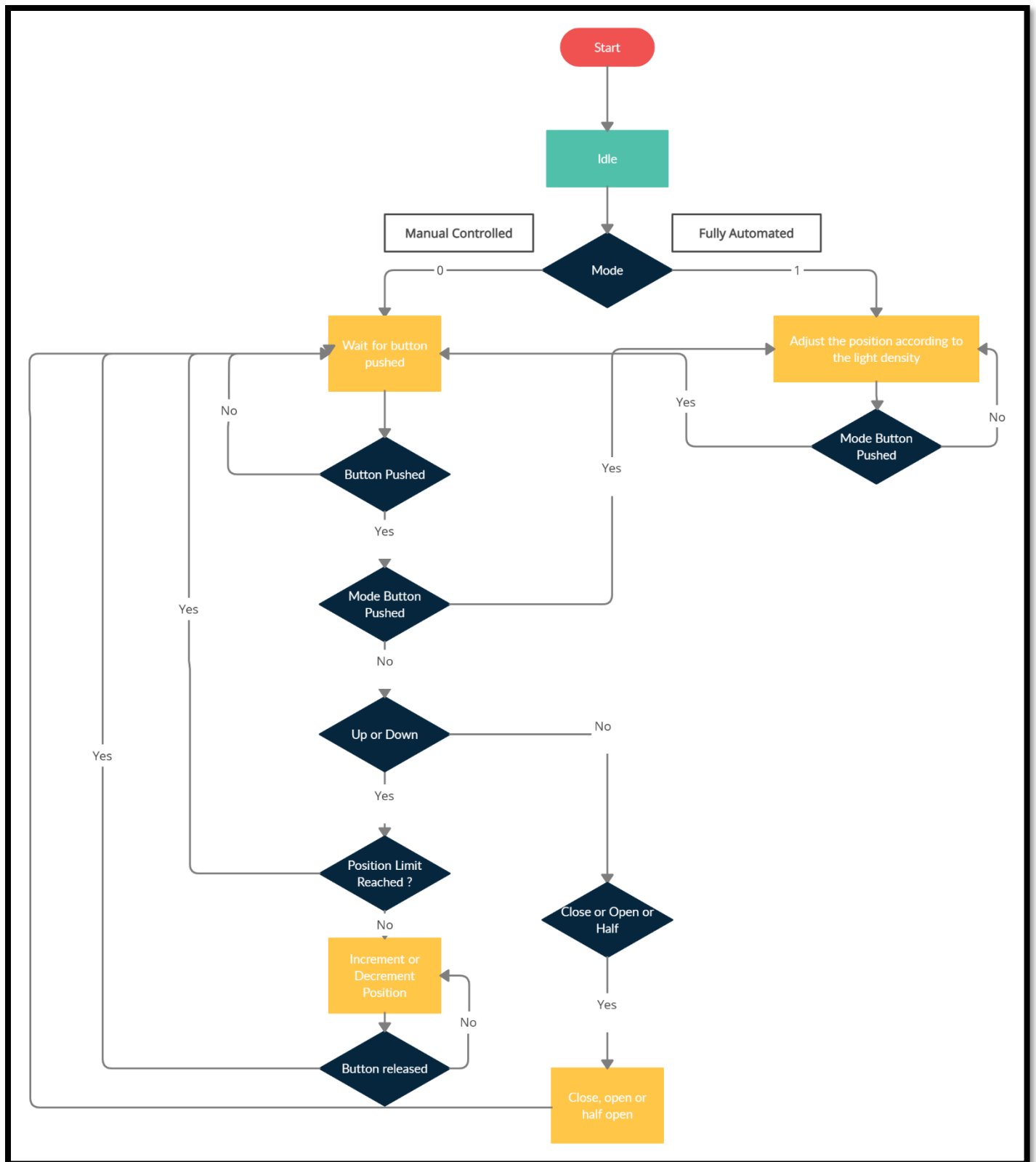
The mechanic integration design for the curtain can be applied only one curtain. For other curtains integration, other design must be done.

The project is created for home based curtain automation, so the audience will be all the home holders.

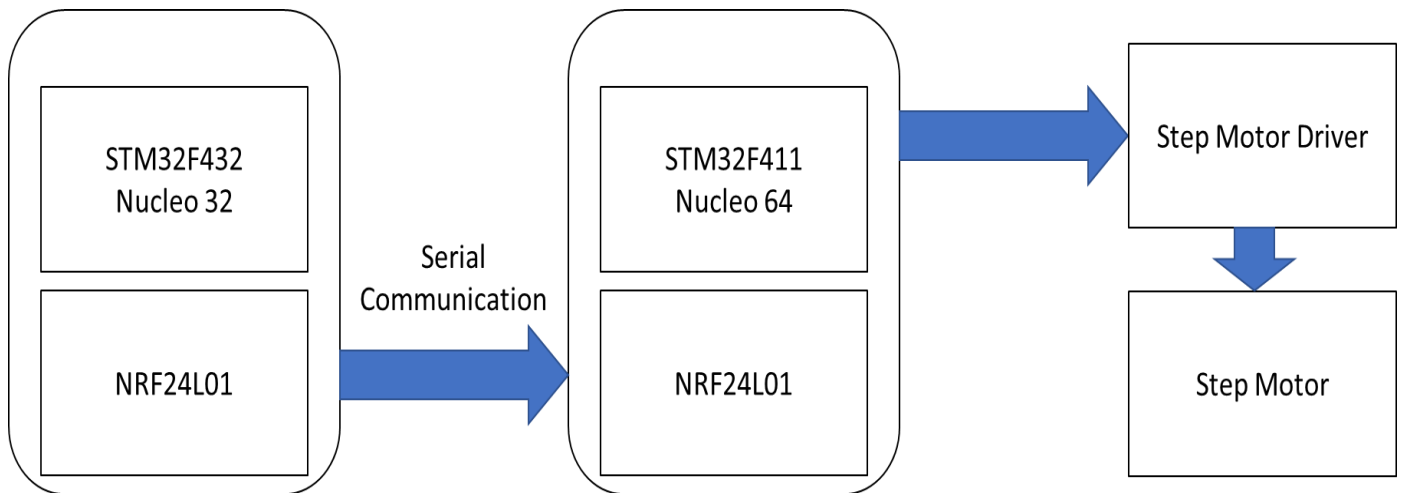
3. PROCEDURE

- The project will consist of 2 different devices, first device will be for receiving the signals and controlling the motor and second device will be for transmitting signals only.
- First device will have a PCB which has STM32F411, stepper motor driver and RF signal receiver NRF24L01.
- Second device will have a PCB which has STM32L432, RF signal transmitter NRF24L01 and 6 buttons.
- First device will be used as signal receiver, according to the coming signal from transmitter side. It will move the stepper motor to keep the curtain at the demanded level.
- Second device will be used as signal transmitter, there will be 6 buttons on it. Button 1 & 2 are for manual Up & Down, Button 3 & 4 & 5 are for full open, full close, half close, Button 6 is for mode changes.
- There will be 2 different operating modes, Mode 1 will be for manual operating and Buttons 1-5 will be activated from transmitter side. Mode 2 will be for fully automated, whenever the Button 6 is pushed, the motor will be worked according to the light density.
- Whenever UP & DOWN buttons pushed, the curtain will go up & down. The limits for UP & DOWN limits will be saved by measuring the position with the encoder of the motor. Full Open & Close & Half buttons will make adjust the curtain position to full close ,open or half.

4. FLOW CHART OF SOLUTION



5. BLOCK DIAGRAM OF SOLUTION



6. COMPONENTS

STM32F411 Nucleo 64 board

STM32L432 Nucleo 32 board

LV8712T TLM H

NRF24L01 and Antenna x 2

Stepper Motor

Battery for remote controller

7. CONCLUSION

Basic idea of the project is to control curtain with electricity with a remote controller. The addition value that we add is fully automated option which will be worked without touching any controller and curtain itself. The algorithm inside the STM32 will adjust the curtain level automatically by measuring light density from outside.

Also the advantage of the project is that STM32 is very capable board to make further updates. Such as voice based control, mobile application base control or any other internet communication based control. The prototype that I build could be considered as part of a whole home automation.

8. REFERENCES

- <https://how2electronics.com/interfacing-nrf24l01-transceiver-module-with-stm32/>
- <https://www.instructables.com/NRF24L01-on-STM32F103/>
- <https://stm32f4-discovery.net/2014/06/library-17-nrf24l01-stm32f4xx/>