SRA-VJTI

Eklavya 2022

Esp-32 Radio Transceiver

Acknowledgment

After a month long Eklavya mentorship program at SRA-VJTI we are grateful towards all the mentors and seniors who have guided us directly or indirectly. Thank you for giving us this opportunity and for all the resources shared so far

Mentors -

Chinmay Lonkar

Moteen Shah

Mentees -

Aryan Bawankar

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Project Description

Make a long range Transceiver using ESP32 boards and send control commands as well as messages over a long range. The nRF24L01 modules will send and receive messages over a certain range using radio signals. These will be connected to the devices via esp32 microcontroller.

Project Domain

Embedded C

Project Details

Module -

nRF24l01

nRF24L01 is a RF module transceiver used to send and receive data using SPI communication. Each module can send and receive data. Each module has a unique address and can communicate with 6 other modules.

It has -

- frequency generator
- beat controller
- power amplifier
- crystal oscillator modulator and demodulator

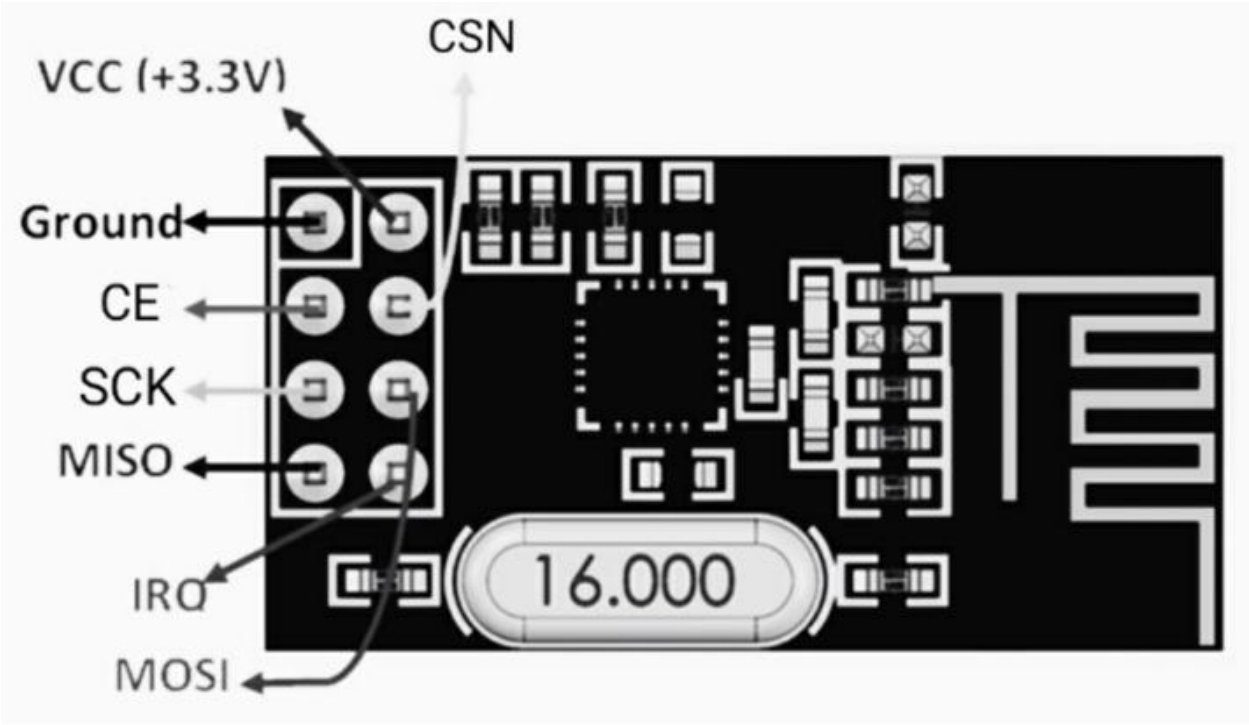
It operates in 3 modes-

- Transmittor
- Receiver
- Transceiver

Pin Configuration

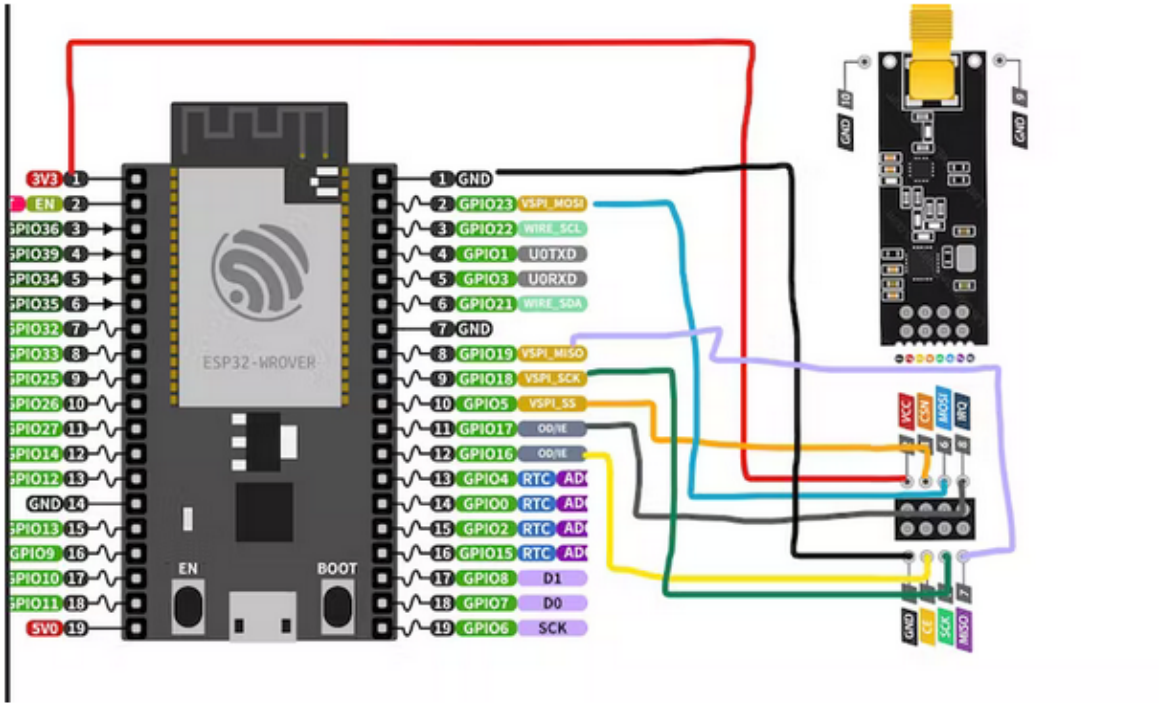
nRF24L01 has 8 pins for wireless transceiver module to establish communication with board and microcontroller(esp32 in our case).

The following diagram indicates all 8 pins -



Circuit Diagram

The connections to be done with esp32 microcontroller to establish communication -



Communication Protocol used -

SPI :

1. SPI is Serial Peripheral Interface. It is a synchronous type of communication protocol.
2. Dta is transferred serially.
3. It has 4 pins i.e

   SCK : Serial Clock: Clock wire for synchronous communication. The master controls the clock

using a frequency that the slave supports.

MOSI : Master Output Slave Input pin. This pin is for sending data from master to the slave. Most significant data first

MISO : Master Input Slave Output pin. This is used when slave sends data to the master. Least significant data first

CS : Chip/Slave select pin. This is used to select the slave. The master sets the CS line of the slave it wants to connect to, to low.

Process of data transfer by SPI

- The master initiates the communication by setting the clock signal.
- The master then sets the CS wire of the slave it wants to connect to, to *low* value.
- The data is transferred from the master to the slave through the MOSI line.

- If slave needs to respond to the master, it uses the MISO line.