# Raspberry Pi RFID Project

## Arquiteturas para Sistemas Embutidos

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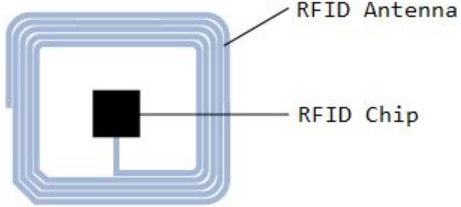
# Introduction

- Development of an application that reads an RFID tag and presents it's UI (Unique Identifier) in a LCD display.
- The following components where used:
  - Raspberry Pi 4 model B
  - LCD display with I2C interface
  - RFID Kit: that contains and RFID Reader and RFID tag
  - Jumper cables

- In order to install Raspberry Pi OS
  - Download Raspberry Pi imager and the image of the OS
  - Burn the OS image in the SD card with the help of the Raspberry Pi Imager software
  - All that was left was to boot device and install the Raspberry Pi OS

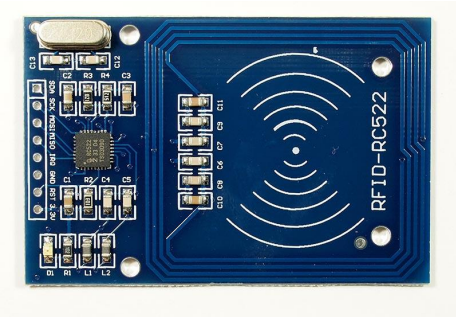
# RFID - Radio Frequency Identification

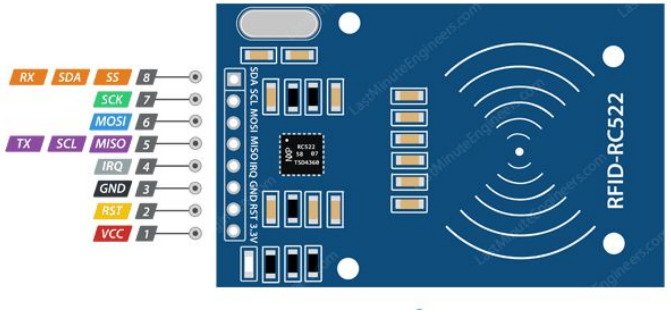
- Technology that allows transmission of information wirelessly, through the use of radio waves.
    - Information is stored in a tag and identified through radio waves
- An RFID tag consists of an integrated circuit with an antenna  to transmit/receive signals and a microchip to process information
- Reader converts radio waves to usable form of data and transfers it by a communication interface to a host computer system.




# RFID Reader/Writer RC522

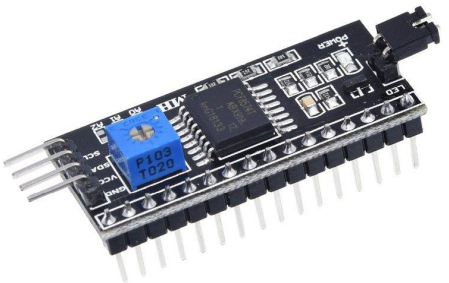
- The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags
- The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) or with communication over I2C and UART protocols.
- Communication between RC522 and Raspberry was made through SPI



# Display LCD

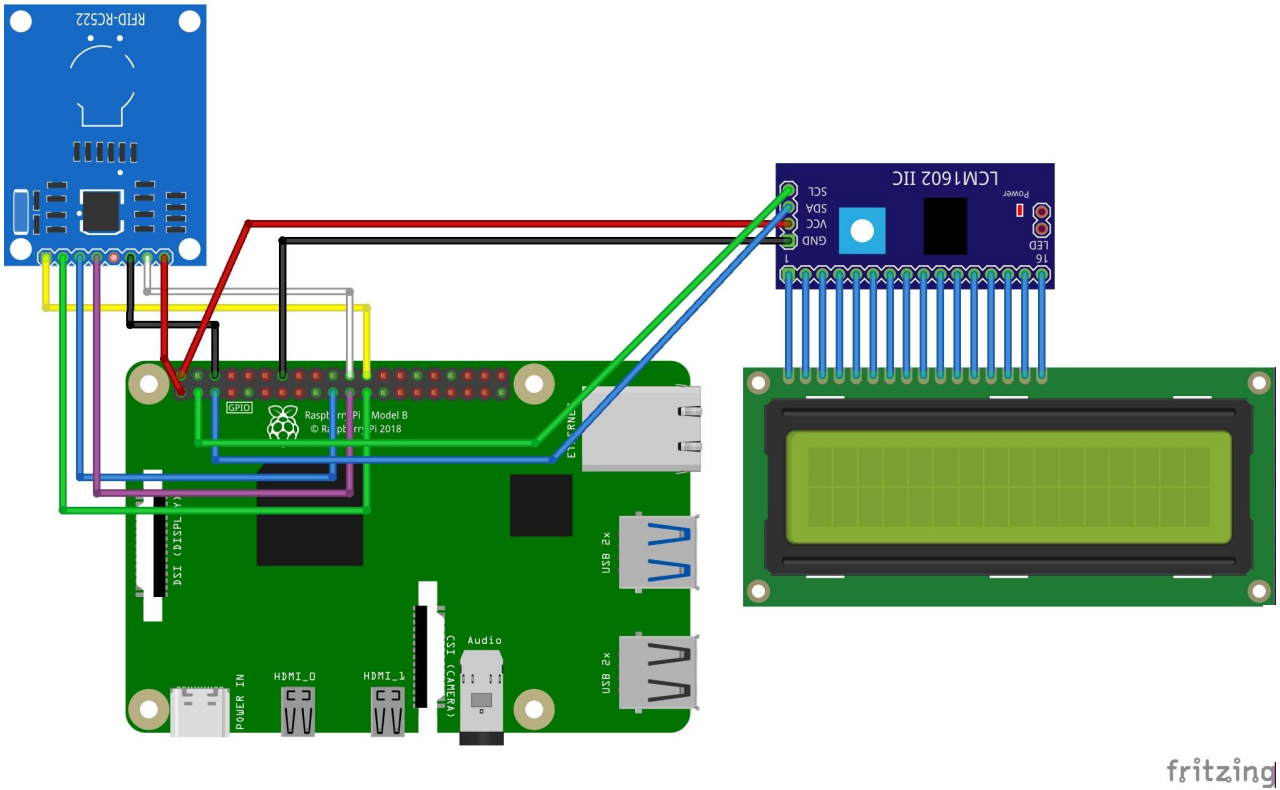
- Display LCD 16x2 com backlight azul interface  I2C:
  - **SDA, SCL, VCC, GND**
- Operating Voltage: 5V
- Parallel interface:
  - register select (RS)
  - Read/Write (R/W)
  - Enable pin
  - 8 data pins (D0 -D7)
  - display contrast pin (Vo),
  - power supply pins (+5V and GND)
  - LED Backlight (BkIt+ and BKIt-)



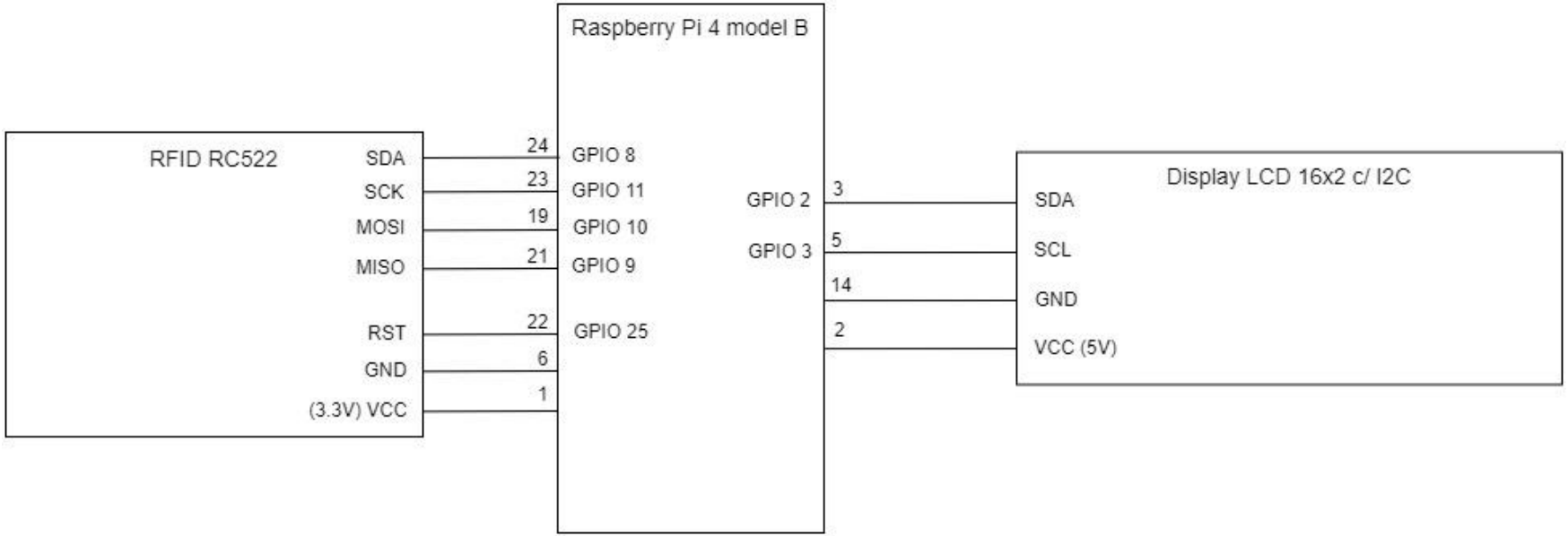
# Libraries installed

- **SPI-Py**
  - Library that provides functions to communicate with other SPI devices
  - Used for the communication between the reader and the host
- **MFRC522-python**
  - FRC522-Python is a simple Python implementation for the MFRC522 NFC Card Reader for the Raspberry Pi.
  - Works like a wrapper that allows to call operations, like for example read and write over the MFRC522
- **rpi_lcd**
  - This library supports LCD text displays (20x4, 16x2 and other) via $I^2C$ converter

# Project schematics



# Block diagram



# Demonstration

# Bibliography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