Hello Friends, Welcome to the video tutorial on the Raspberry Pi.

In this tutorial we will learn how to interface port expander MCP23017 IC connected with led and switch.

Why we need port expander ICs . Port expander is used to increase GPIO pins of raspberry pi. Since only 26 GPIO pins are available on rpi. So, when we have to interface more than 26 IO devices. We ran out of pins. For that we need a port expander. Here we are using port expander MCP23017 IC.

Starting with the pins of MCP23017 IC. Here is the pin diagram of MCP23017 IC. It is 28 pin IC on which 2 ports each having 8 pins are available for GPIO. Communication between this ic and rpi is through I2c protocol. Before going through this tutorial go for I2c enabling tutorial available on the portal.

Now connect SCL, SDL pins of ic to SDL SCL pins on RPi. Remaining connection of ic is as shown in figure.

First experiment:

Interfacing an LED and a Switch to R-Pi using MCP23017 IC

Hardware required:

1. Breadboard : On which connections have to be made.
2. Mcp23017 Ic
3. Switch,330ohm resistor,led

Anode of led is connected to GPA0 and cathode to 330ohm resistor.

Other terminal of Resistor is connected to ground. Switch is connected to GPA7 and other terminal to ground.

Pin 9 (VDD) is connected to 5V

Pin 10 (VSS) is connected to Ground

Pin 12 (SCL) is connected to Pin 5 on the Pi GPIO

Pin 13 (SDA) is connected to Pin 3 on the Pi GPIO

Pin 18 (Reset) should be set high for normal operation so we connect

this to 5V.

Pins 15, 16 & 17 (A0-A2) determine the address assigned to this

device.

First define the problem statement

Turn on the LED for 1 second when button is pressed.

After connections next part is code. In order to access GPIO pins on MCP23017 we need to use smbus package. Be sure that I2c is enabled on raspbeerypi.

Code:

# LED connnected to GPA0

# Push button to GPA4

########### Import the libraries ###############

import smbus # module to access i2c based interfaces

import time

#define I2C connections

bus = smbus.SMBus(1)

DEVICE = 0x20 # 0x20 is address of slave MCP23017 IC on bus.

#Using this address bus communicates with MCP23017 IC Device

#This address in set by setting the A0,A1,A2 pins of IC to GND.

IODIRA = 0x00

OLATA = 0x14

GPIOA = 0x12

# all bits of IODIRA register are set to 0 meaning GPA pins are outputs

bus.write\_byte\_data(DEVICE,IODIRA,0x00)

# Set all 7 output bits of port A to 0

rw = bus.read\_byte\_data(DEVICE,GPIOA) & 0x00;

bus.write\_byte\_data(DEVICE,OLATA,rw)

try:

while True:

input = bus.read\_byte\_data(DEVICE,GPIOA) #read status of GPIO register i.e.

#switch status

if input & 0x80 == 0x80: # switch pressed i.e. input = True

rw = bus.read\_byte\_data(DEVICE,GPIOA) & 0x01

bus.write\_byte\_data(DEVICE,OLATA,rw)

time.sleep(1)

# Set all bits to zero

bus.write\_byte\_data(DEVICE,OLATA,0)

except KeyboardInterrupt:

pass

bus.write\_byte\_data(DEVICE,OLATA,0) # in case of keyboard

# interrupt set port A pins to zero