

Modul Praktikum

INTERFACING PERIPHERAL

Kode Matakuliah: SKO21416

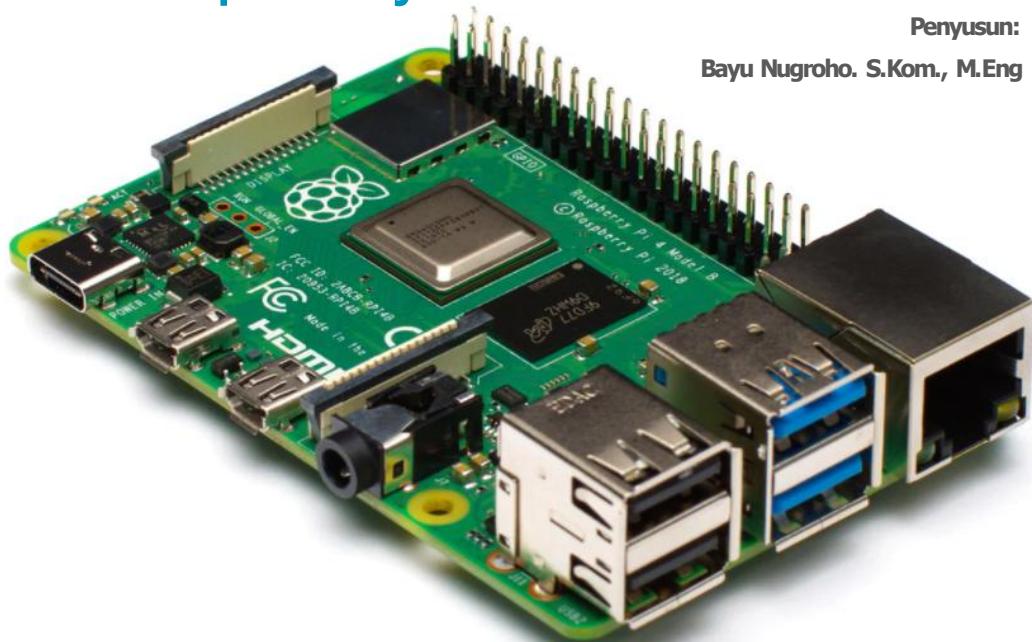


(Interface Programming)

The Raspberry Pi

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**PROGRAM STUDI SISTEM KOMPUTER
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2023**

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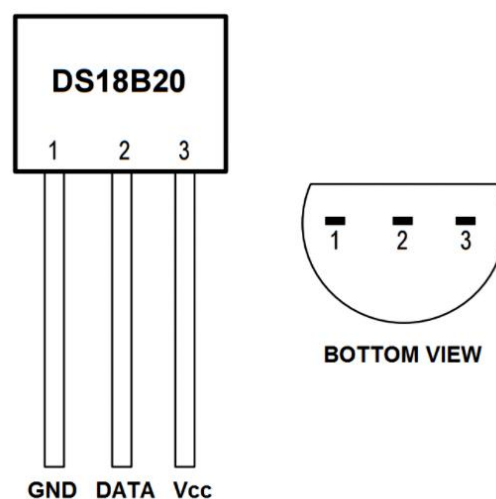
Modul 15

Interface The DS18B20 temperature sensor

1. DS18B20

Digital temperature sensors like the DS18B20 differ from analog thermistors in several important ways. In thermistors, changes in temperature cause changes in the resistance of a ceramic or polymer semiconducting material. Usually, the thermistor is set up in a voltage divider, and the voltage is measured between the thermistor and a known resistor. The voltage measurement is converted to resistance and then converted to a temperature value by the microcontroller. Digital temperature sensors are typically silicon based integrated circuits. Most contain the temperature sensor, an analog to digital converter (ADC), memory to temporarily store the temperature readings, and an interface that allows communication between the sensor and a microcontroller. Unlike analog temperature sensors, calculations are performed by the sensor, and the output is an actual temperature value. The DS18B20 communicates with the “One-Wire” communication protocol, a proprietary serial communication protocol that uses only one wire to transmit the temperature readings to the microcontroller.

The DS18B20 can be operated in what is known as parasite power mode. Normally the DS18B20 needs three wires for operation: the Vcc, ground, and data wires. In parasite mode, only the ground and data lines are used, and power is supplied through the data line



2. TEMPERATURE OUTPUT TO AN LCD

We'll be using a Python library called RPLCD to drive the LCD. The RPLCD library can be installed from the Python Package Index, or PIP. PIP might already be installed on your Pi, but if not, enter this at the command prompt to install it:

```
sudo apt-get install python-pip
```

After you get PIP installed, install the RPLCD library by entering:

```
sudo pip install RPLCD
```

Once you have the library installed, you can run this program to output the temperature to an LCD display:

```
import os
import glob
import time
from RPLCD import CharLCD

lcd = CharLCD(cols=16, rows=2, pin_rs=37, pin_e=35, pins_data=[33, 31, 29, 23])

os.system('modprobe w1-gpio')
os.system('modprobe w1-therm')

base_dir = '/sys/bus/w1/devices/'
device_folder = glob.glob(base_dir + '28*')[0]
device_file = device_folder + '/w1_slave'

def read_temp_raw():
    f = open(device_file, 'r')
    lines = f.readlines()
    f.close()
    return lines

#CELSIUS CALCULATION
```

```

def read_temp_c():
    lines = read_temp_raw()
    while lines[0].strip()[-3:] != 'YES':
        time.sleep(0.2)
        lines = read_temp_raw()
    equals_pos = lines[1].find('t=')
    if equals_pos != -1:
        temp_string = lines[1][equals_pos+2:]
        temp_c = int(temp_string) / 1000.0 # TEMP_STRING IS THE SENSOR
OUTPUT, MAKE SURE IT'S AN INTEGER TO DO THE MATH
        temp_c = str(round(temp_c, 1)) # ROUND THE RESULT TO 1 PLACE AFTER
THE DECIMAL, THEN CONVERT IT TO A STRING
    return temp_c

```

#FAHRENHEIT CALCULATION

```

def read_temp_f():
    lines = read_temp_raw()
    while lines[0].strip()[-3:] != 'YES':
        time.sleep(0.2)
        lines = read_temp_raw()
    equals_pos = lines[1].find('t=')
    if equals_pos != -1:
        temp_string = lines[1][equals_pos+2:]
        temp_f = (int(temp_string) / 1000.0) * 9.0 / 5.0 + 32.0 # TEMP_STRING IS
THE SENSOR OUTPUT, MAKE SURE IT'S AN INTEGER TO DO THE MATH
        temp_f = str(round(temp_f, 1)) # ROUND THE RESULT TO 1 PLACE AFTER
THE DECIMAL, THEN CONVERT IT TO A STRING
    return temp_f

```

while True:

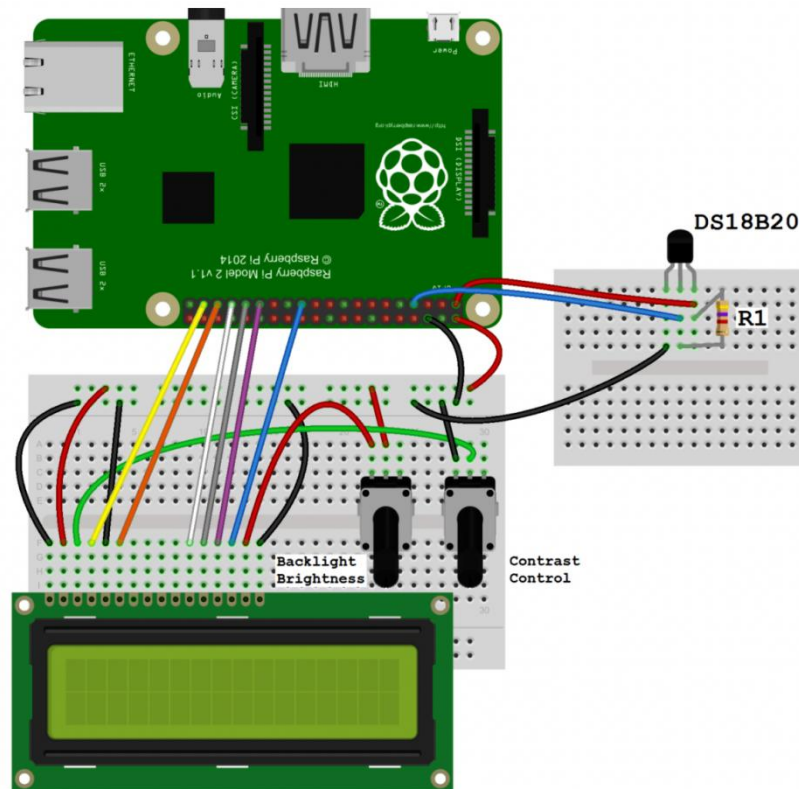
```

    lcd.cursor_pos = (0, 0)
    lcd.write_string("Temp: " + read_temp_c() + unichr(223) + "C")
    lcd.cursor_pos = (1, 0)
    lcd.write_string("Temp: " + read_temp_f() + unichr(223) + "F")

```

JOB SHEET 15

Lakukan perakitan komponen pada gambar di bawah ini dan gunakan script program Python untuk mendeteksi suhu ruangan yang ditampilkan ke LCD Display.



LAPORAN HASIL PERCOBAAN: