UART Interfacing through RaspberryPi and RaspberryPi Pico

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Contents

Abstract—The process of serial communication between RaspberryPi Pico and RaspberryPi is explained by calculating the value of an unknown resistance in RaspberryPi Pico and sending the value to RaspberryPi through UART pins.

1 COMPONENTS

The component details are available in Table **??**.

Component	Value	Quantity
Resistor	220Ohm	1
Resistor	10K	1
RPi Pico	RP2040	1
Jumper Wires	FF	10
Jumper Wires	MF	10
Bread board		1
RPi	Model B Rev 3	1

2 Enabling UART in RaspberryPi

Problem 2.1. Connect the RaspberryPi to the desktop and power it on.

Problem 2.2. Open

```
sudo nano /boot/cmdline.txt
```

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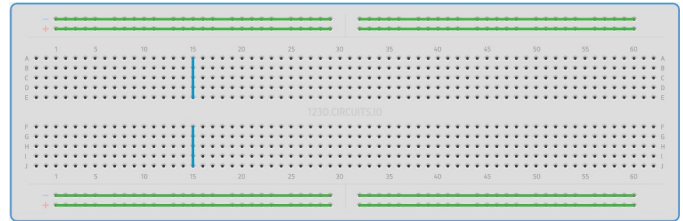
Fig. 3.1: Breadboard

and remove **console=serial0,115200** or **console=ttyAMA0,115200**. Don't delete anything else in the file. **Ctrl+X** and exit.

Problem 2.3. In order to enable GPIO serial port,

```
sudo nano /boot/config.txt
```

and add

```
enable_uart=1
```

at the end of the file. Reboot.

Use **/dev/ttyS0** in any code which accesses the Serial Port of RaspberryPi.

3 Measuring the Resistance

Problem 3.1. Connect the 5V pin of the RaspberryPi Pico to an extreme pin of the Breadboard shown in Fig. 3.1. Let this pin be Vcc.

Problem 3.2. Connect the GND pin of the RaspberryPi Pico to the opposite extreme pin of the Breadboard.

Problem 3.3. Let R_1 be the known resistor and R_2 be the unknown resistor. Connect R_1 and R_2 in series such that R_1 is connected to GND and R_2 is connected to Vcc as in Fig. 3.3

Problem 3.4. Connect the junction between the two resistors to the A0 pin on the RaspberryPi Pico.

Problem 3.5. Connect the RaspberryPi Pico to the RaspberryPi so that it is powered.
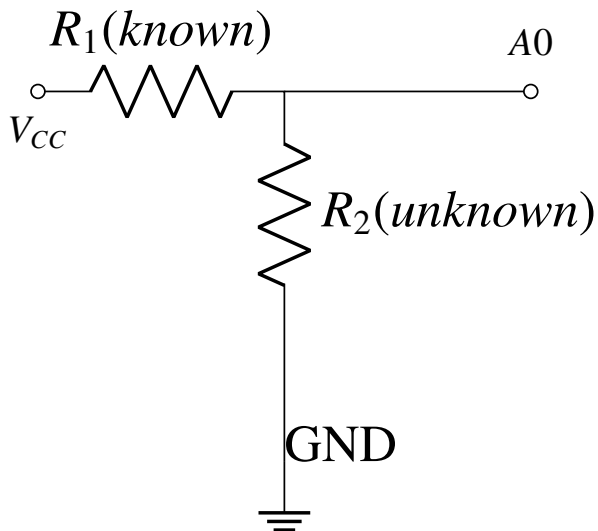
$R_1(known)$ $A0$

V_{CC}

$R_2(unknown)$

GND

Fig. 3.3

Problem 3.6. Open the Micro Python that is installed on RaspberryPi Pico and type the following code. Open the serial monitor to view the resistance.
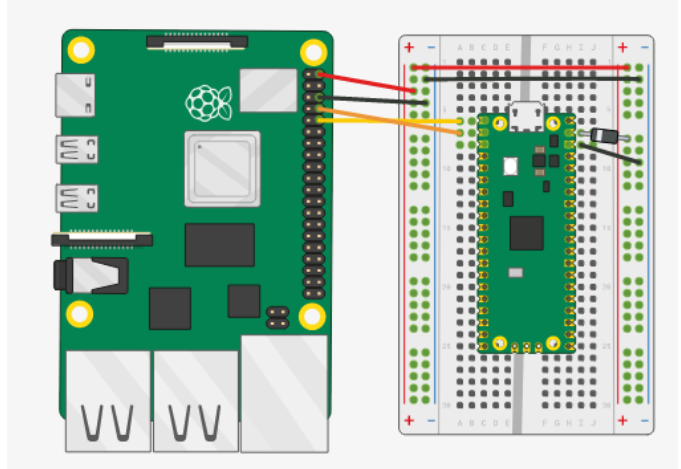
Solution:

```
import machine
import utime
R2 = 0
Vq = 0
V0 = 0
c = 3.3/(65535)
Vcc = 3.3
R1=219
A_value = machine.ADC(0)
while True:
    Vq=A_value.read_u16()*c
    R2=R1*(1/(((Vcc)/Vq))-1.0))
    utime.sleep(2)
    print(R2)
```

4 UART COMMUNICATION

The RaspberryPi Pico transmitting the resistance through it's serial port.

Problem 4.1. Connect the Pin 6 (not GPIO 6) of Pi to the GND pin of the RaspberryPi Pico.

Problem 4.2. Connect GPIO 15 pin (UART R_x) of Pi to the T_x pin of the RaspberryPi Pico.

Problem 4.3. Connect GPIO 14 pin (UART T_x) of Pi to the R_x pin of the RaspberryPi Pico.

Problem 4.4. Install the minicom package

```
sudo apt-get install minicom -y
```

Problem 4.5. Run the below command. You should see the resistance value displayed on the terminal.

```
minicom -b 115200 -o -D /dev/S0
```