جامعة حلب
كلية الهندسة الكهربائية والالكترونية
مخبر النظم الإلكترونية المتقدمة

Interfacing 16×2 LCD in Raspberry Pi using Python3 & Tk Tools

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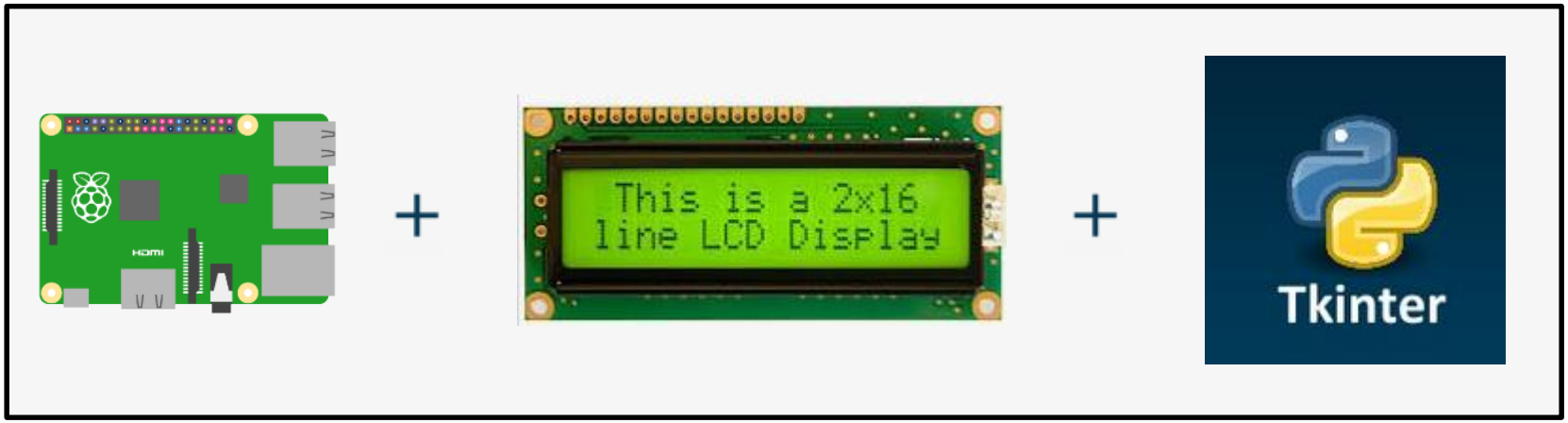
Introduction:

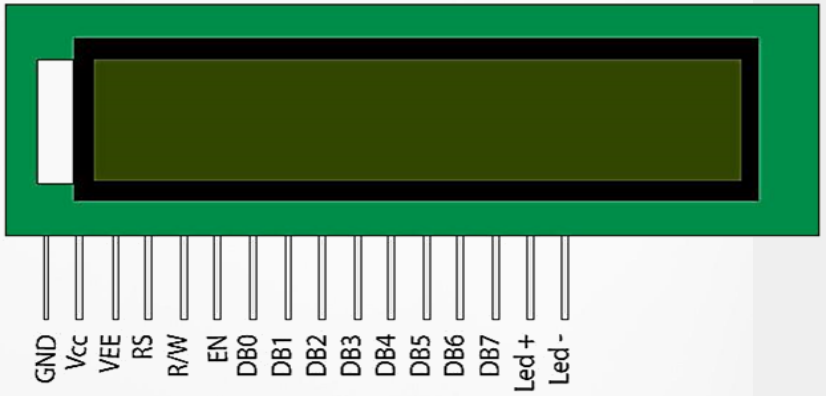
In this project, I go through the steps on how to set up a Raspberry Pi LCD 16X2 to display messages from the Pi Tkinter GUI.



LCD 16 × 2 Character

Pin No	Function	Name
1	Ground (0V)	Ground (GND)
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc /(VDD)
3	Contrast adjustment; through a variable resistor	V_{EE} /(V0)
4	Selects command register when low; and data register when high	Register Select (RS)
5	Low to write to the register; High to read from the register	Read/write(R/W)
6	Sends data to data pins when a high to low pulse is given	Enable (E)
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+ (A)
16	Backlight Ground (0V)	Led- (K)

16x2 LCD Pinout Diagram



LCD Library Installation

We need to install Adafruit's library for LCD (Adafruit_Python_CharLCD-master) and (Adafruit_Python_GPIO-master).

To install the LCD library, follow the procedure.

1- Clone the Git directory in Raspberry Pi using following command in Terminal

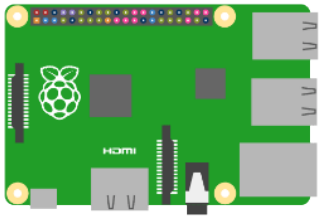
git clonehttps://github.com/adafruit/Adafruit_Python_CharLCD.git

2- Change the directory where the library is located.

cd ./Adafruit_Python_CharLCD

3- Install the setup

sudo python setup.py install



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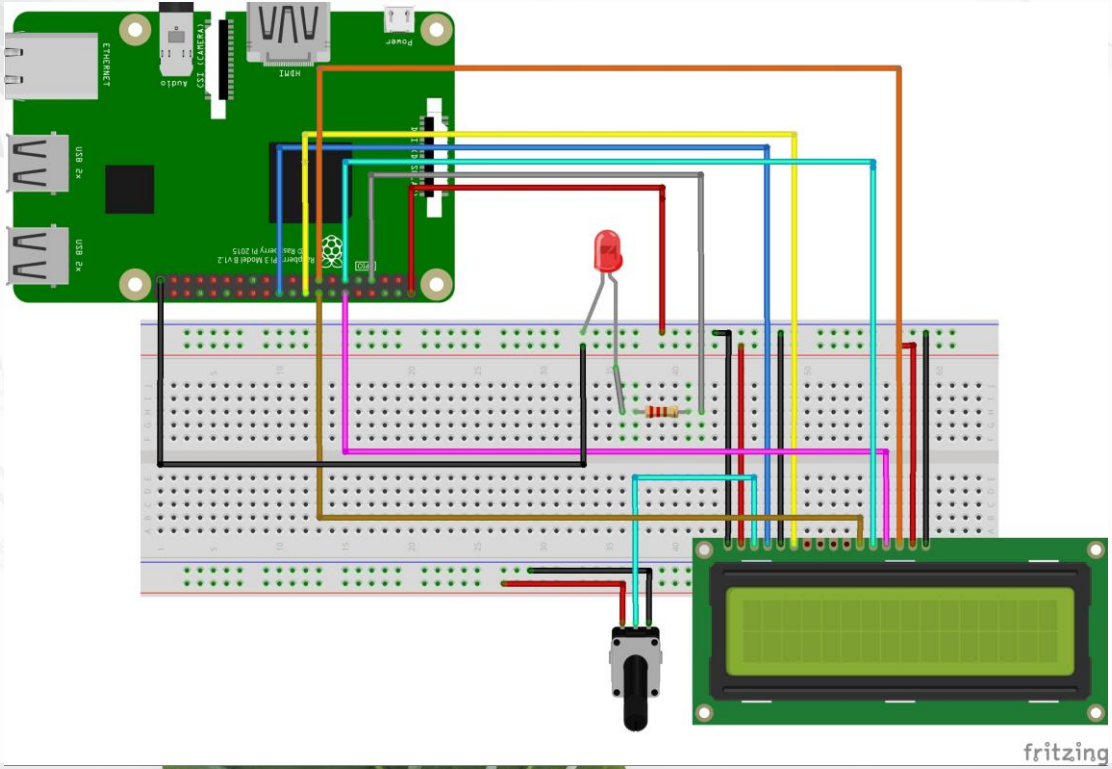
Hardware Design and Implementation

Connect the LCD as bellow:

1. Pin 1 (Ground) goes to the ground rail.
2. Pin 2 (VCC/5v) goes to the positive rail.
3. Pin 3 (V0) goes to the middle wire of the potentiometer.
4. Pin 4 (RS) goes to GPIO25 (Pin 22)
5. Pin 5 (RW) goes to the ground rail.
6. Pin 6 (EN) goes to GPIO24 (Pin 18)
7. Pin 11 (D4) goes to GPIO23 (Pin 16)
8. Pin 12 (D5) goes to GPIO17 (Pin 11)
9. Pin 13 (D6) goes to GPIO18 (Pin 12)
10. Pin 14 (D7) goes to GPIO22 (Pin 15)
11. Pin 15 (LED +) goes to the positive rail.
12. Pin 16 (LED -) goes to the ground rail.

Hardware Design and Implementation



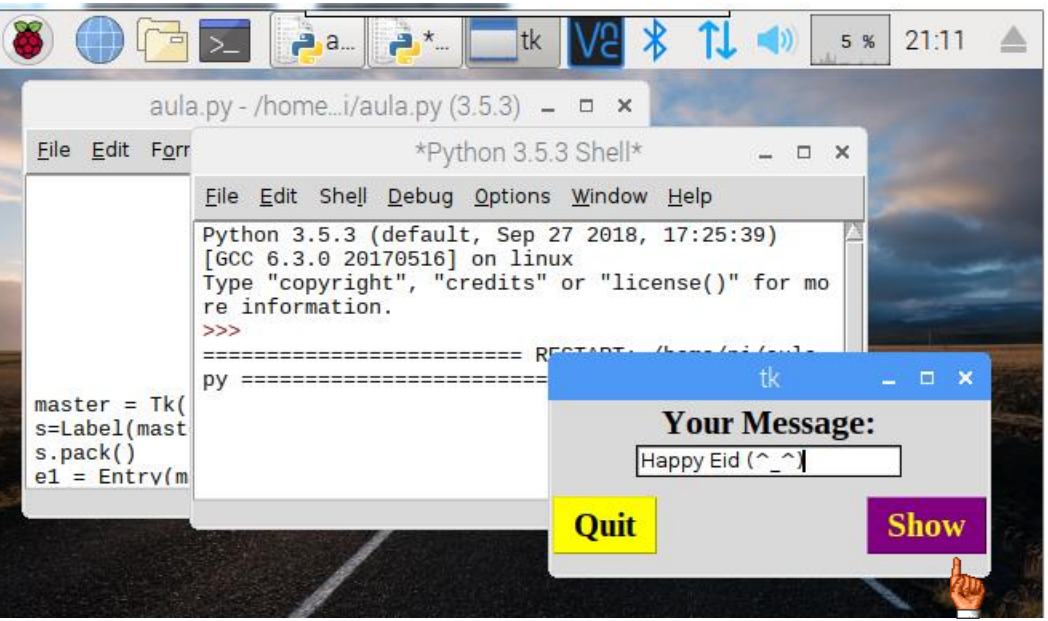
Python Tkinter

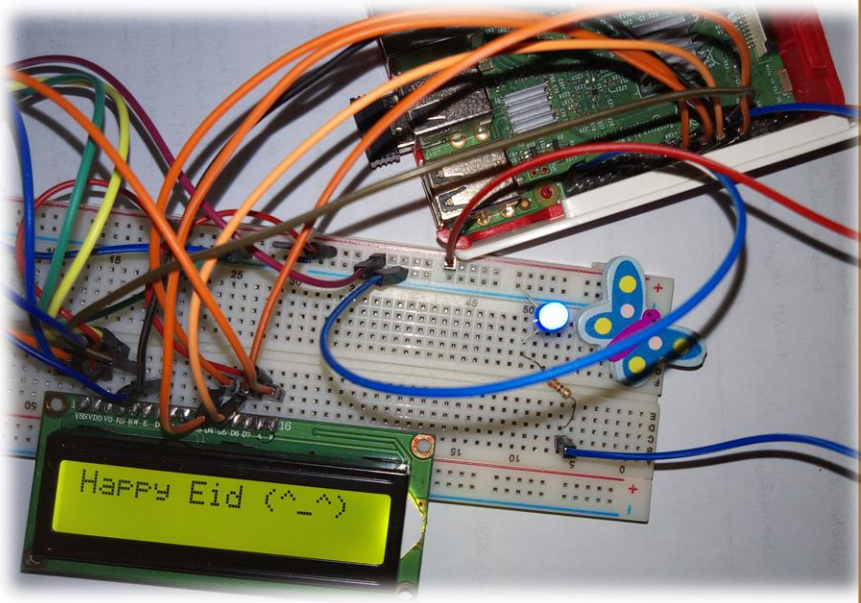
You can start Python3 from the command line
(with python3) then **import tkinter**.
If you get an error message then exit out of Python3 and call
sudo apt-get install python3-tk to install it.

Python Tkinter

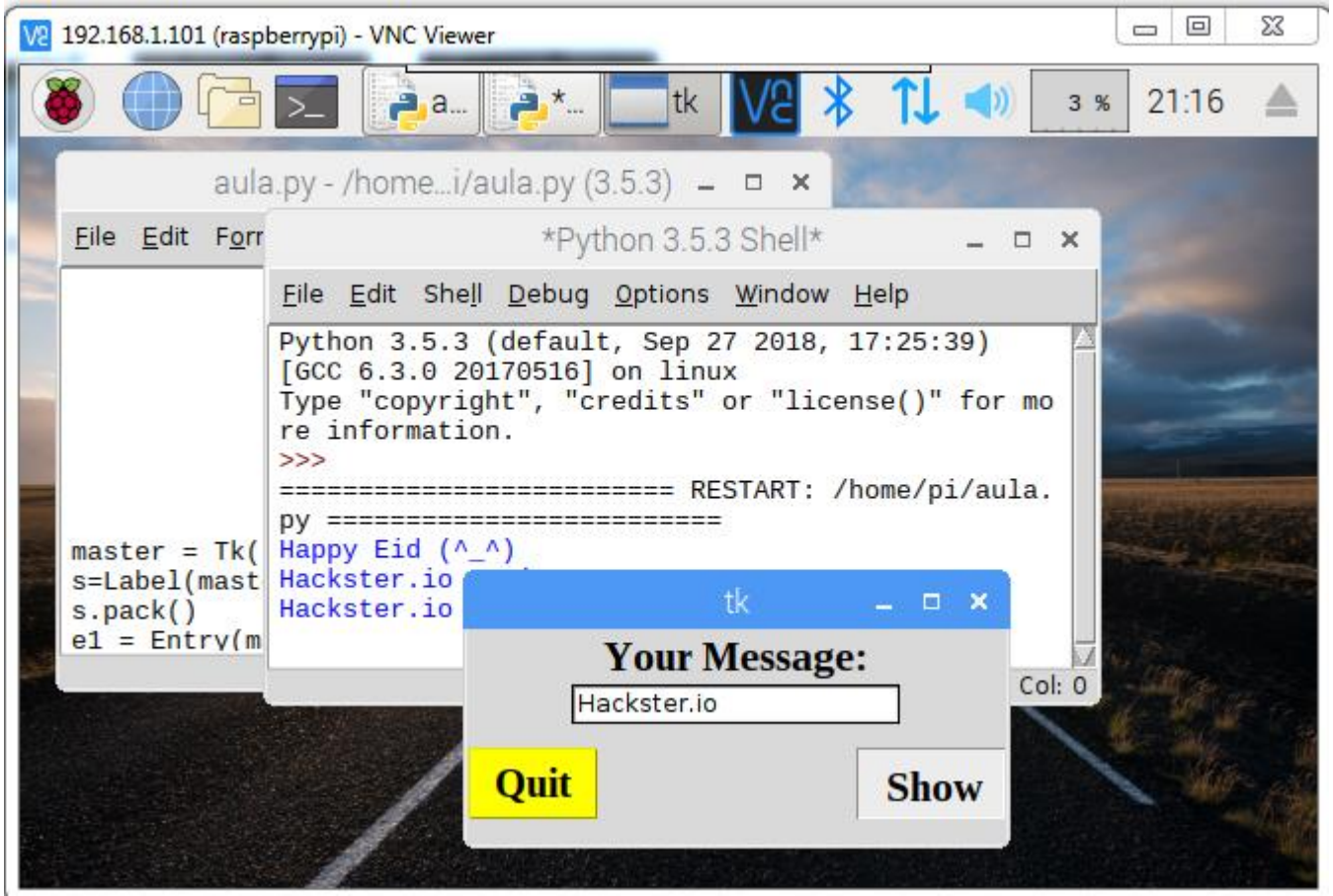
- Entry widgets are the basic widgets of Tkinter used to get input, i.e. text strings, from the user of an application. This widget allows the user to enter a single line of text. If the user enters a string, which is longer than the available display space of the widget, the content will be scrolled. This means that the string cannot be seen in its entirety. The arrow keys can be used to move to the invisible parts of the string. If you want to enter multiple lines of text, you have to use the text widget. An entry widget is also limited to single font.
  The syntax of an entry widget looks like this:
  w = Entry(master, option, ...)
  "master" represents the parent window, where the entry widget should be placed. Like other widgets, it's possible to further influence the rendering of the widget by using options. The comma separated list of options can be empty.
- The Button widget is a standard Tkinter widget, which is used for various kinds of buttons. A button is a widget which is designed for the user to interact with, i.e. if the button is pressed by mouse click some action might be started. They can also contain text and images like labels. While labels can display text in various fonts, a button can only display text in a single font. The text of a button can span more than one line.

Experiment Result

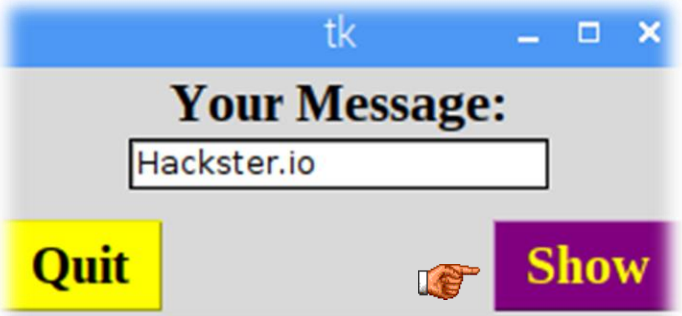


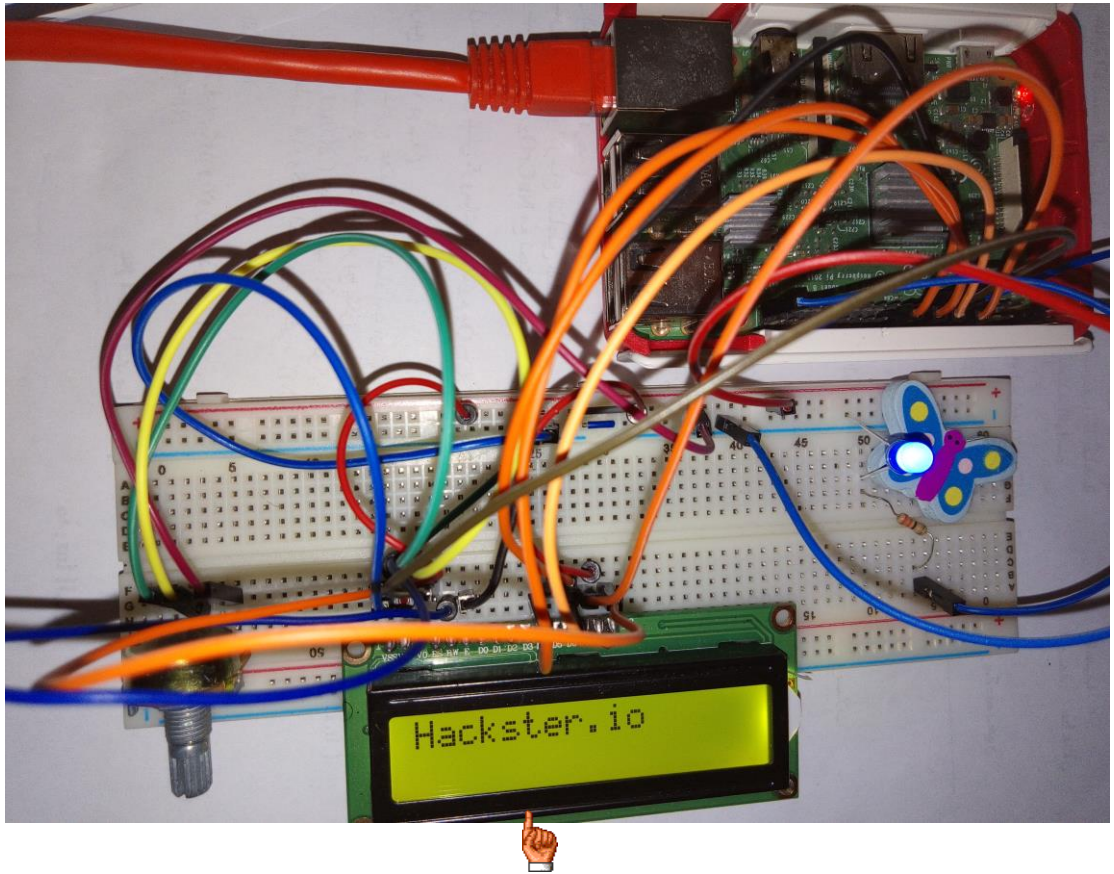


Experiment Result



Experiment Result





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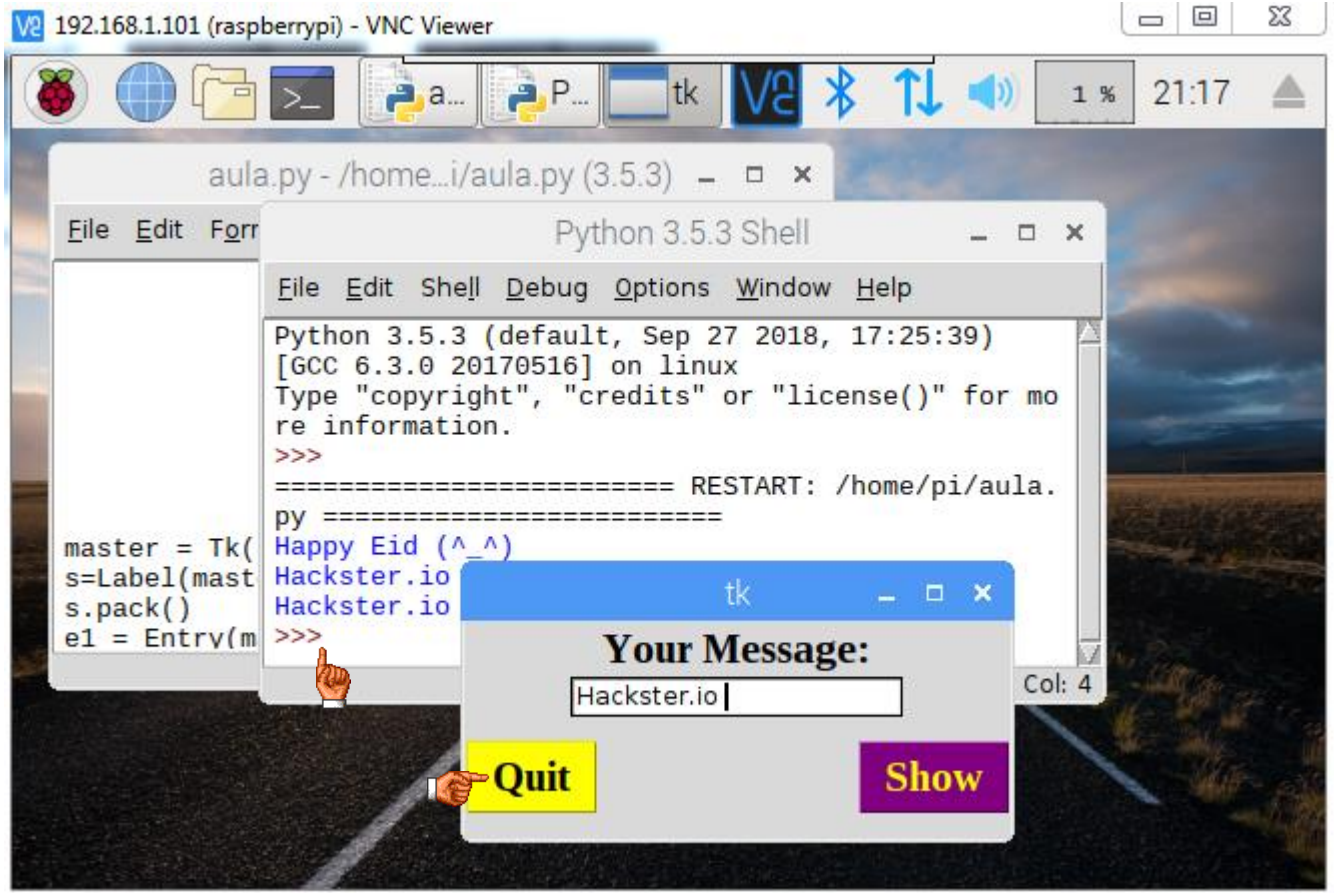
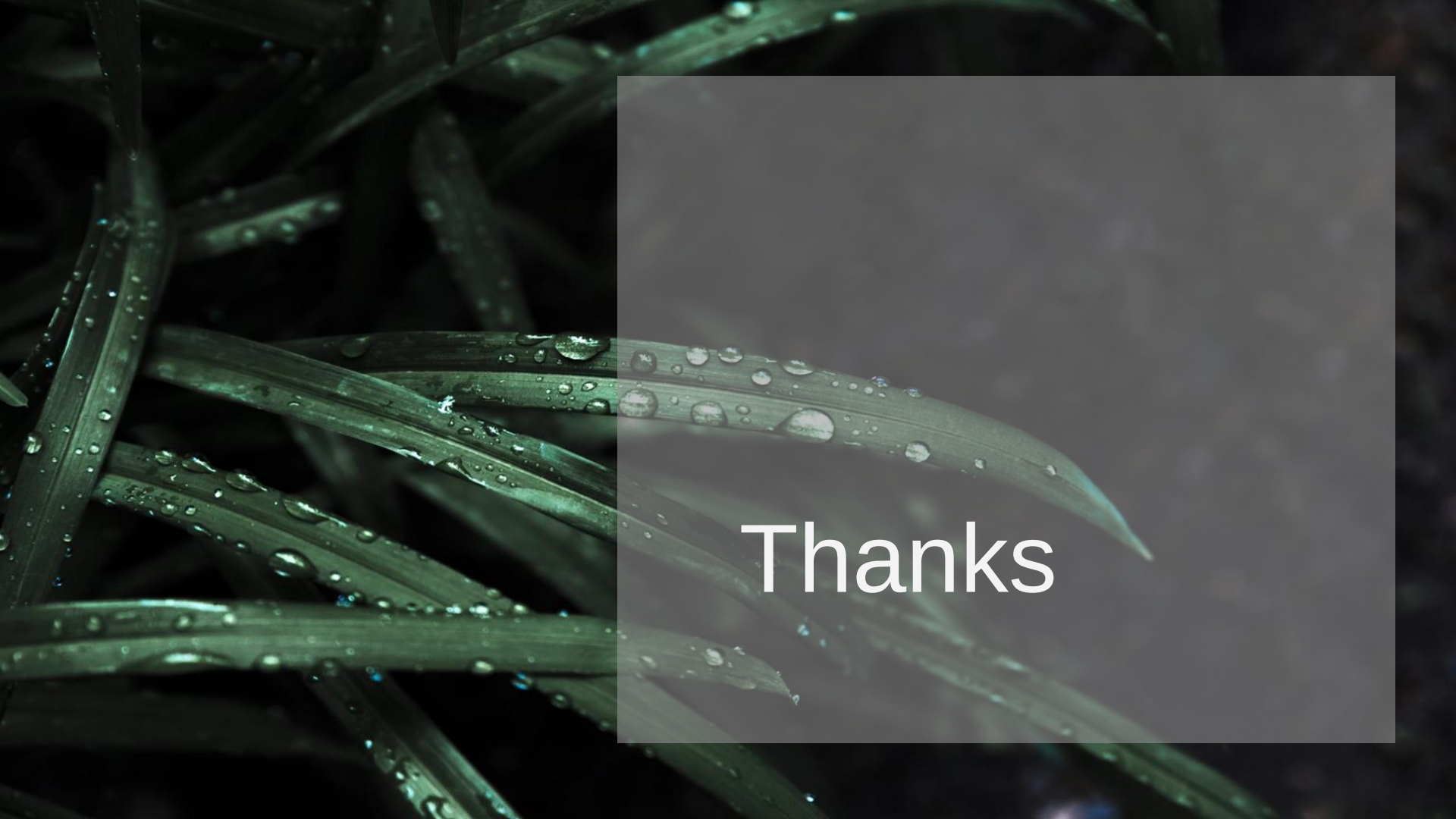


References:

1. https://github.com/adafruit
2. https://www.adafruit.com/
3. https://pimylifeup.com/raspberry-pi-lcd-16x2/
4. https://www.python-course.eu/tkinter_buttons.php
5. https://www.python-course.eu/tkinter_entry_widgets.php
6. https://iotguider.in/raspberrypi/16x2-character-lcd-in-raspberry-pi-using-python/


Thanks