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#!/usr/bin/python
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# LCD Test Script
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# The wiring for the LCD is as follows:
# 1 : GND
# 2 : 5V
# 3 : Contrast (0-5V)*      - Sets the LCD Contrast
# 4 : RS (Register Select)  - GPIO pin 26 - Physical pin 37
# 5 : R/W (Read Write)     - GROUND THIS PIN
# 6 : Enable or Strobe      - GPIO pin 19 - Physical pin 35
# 7 : Data Bit 0            - NOT USED
# 8 : Data Bit 1            - NOT USED
# 9 : Data Bit 2            - NOT USED
# 10: Data Bit 3            - NOT USED
# 11: Data Bit 4            - GPIO pin 13 - Physical pin 33
# 12: Data Bit 5            - GPIO pin 06 - Physical pin 31
# 13: Data Bit 6            - GPIO pin 05 - Physical pin 29
# 14: Data Bit 7            - GPIO pin 11 - Physical pin 23
# 15: LCD Backlight         - +5V**
# 16: LCD Backlight         - GND
#import
import RPi.GPIO as GPIO
import time
# Define GPIO to LCD mapping
LCD_RS = 26
LCD_E  = 19
LCD_D4 = 13
LCD_D5 = 6
LCD_D6 = 5
LCD_D7 = 11
# Define some device constants
LCD_WIDTH = 40      # Maximum characters per line
LCD_CHR = True
LCD_CMD = False
# Do I need to change line 2 address for 40 char display?
LCD_LINE_1 = 0x80 # LCD RAM address for the 1st line
LCD_LINE_2 = 0xC0 # LCD RAM address for the 2nd line
# Timing constants
E_PULSE = 0.0005
E_DELAY = 0.0005
def main():
    # Main program block
    GPIO.setwarnings(False)
    GPIO.setmode(GPIO.BCM)      # Use BCM GPIO numbers
    GPIO.setup(LCD_E, GPIO.OUT) # E
    GPIO.setup(LCD_RS, GPIO.OUT) # RS
    GPIO.setup(LCD_D4, GPIO.OUT) # DB4
    GPIO.setup(LCD_D5, GPIO.OUT) # DB5
    GPIO.setup(LCD_D6, GPIO.OUT) # DB6
    GPIO.setup(LCD_D7, GPIO.OUT) # DB7
    # Initialise display
    lcd_init()
    while True:
        # Send some test
        lcd_string("Rasperry Pi",LCD_LINE_1)
        lcd_string("40x2 LCD Test",LCD_LINE_2)
        time.sleep(3) # 3 second delay
        # Send some text
        lcd_string("Another Example :)",LCD_LINE_1)
        lcd_string("Now do your own",LCD_LINE_2)
        time.sleep(3)
def lcd_init():
    # Initialise display
    lcd_byte(0x33,LCD_CMD) # 110011 Initialise
    lcd_byte(0x32,LCD_CMD) # 110010 Initialise
    lcd_byte(0x06,LCD_CMD) # 000110 Cursor move direction
    lcd_byte(0x0C,LCD_CMD) # 001100 Display On,Cursor Off, Blink Off
    lcd_byte(0x28,LCD_CMD) # 101000 Data length, number of lines, font size
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lcd_byte(0x01,LCD_CMD) # 000001 Clear display
time.sleep(E_DELAY)
def lcd_byte(bits, mode):
    # Send byte to data pins
    # bits = data
    # mode = True  for character
    #       False for command
    GPIO.output(LCD_RS, mode) # RS
    # High bits
    GPIO.output(LCD_D4, False)
    GPIO.output(LCD_D5, False)
    GPIO.output(LCD_D6, False)
    GPIO.output(LCD_D7, False)
    if bits&0x10==0x10:
        GPIO.output(LCD_D4, True)
    if bits&0x20==0x20:
        GPIO.output(LCD_D5, True)
    if bits&0x40==0x40:
        GPIO.output(LCD_D6, True)
    if bits&0x80==0x80:
        GPIO.output(LCD_D7, True)
    # Toggle 'Enable' pin
    lcd_toggle_enable()
    # Low bits
    GPIO.output(LCD_D4, False)
    GPIO.output(LCD_D5, False)
    GPIO.output(LCD_D6, False)
    GPIO.output(LCD_D7, False)
    if bits&0x01==0x01:
        GPIO.output(LCD_D4, True)
    if bits&0x02==0x02:
        GPIO.output(LCD_D5, True)
    if bits&0x04==0x04:
        GPIO.output(LCD_D6, True)
    if bits&0x08==0x08:
        GPIO.output(LCD_D7, True)
    # Toggle 'Enable' pin
    lcd_toggle_enable()
def lcd_toggle_enable():
    # Toggle enable
    time.sleep(E_DELAY)
    GPIO.output(LCD_E, True)
    time.sleep(E_PULSE)
    GPIO.output(LCD_E, False)
    time.sleep(E_DELAY)
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def lcd_string(message,line):
    # Send string to display
    message = message.ljust(LCD_WIDTH, " ")
    lcd_byte(line, LCD_CMD)
    for i in range(LCD_WIDTH):
        lcd_byte(ord(message[i]),LCD_CHR)
if __name__ == '__main__':
    try:
        main()
    except KeyboardInterrupt:
        pass
    finally:
        lcd_byte(0x01, LCD_CMD)
        lcd_string("Goodbye!",LCD_LINE_1)
        GPIO.cleanup()
```

From:
<https://wiki.alanwalker.uk/> - WalkerWiki - wiki.alanwalker.uk

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Last update: 2023/03/09 22:35



