**EEE 313 INTRODUCTION TO EMBEDDED SYSTEMS**

**INTERM APPLICATION HOMEWORKS**

**(25P) Q3.**  Perform an application by using LEDs and one LCD with your Rpi, STM32 or Nano 33 board. The groups with 1, 2, and 3 students will use at least 1, 2, and 3 LEDs respectively.

**Purpose of Application:** Write your names on the first line of the LCD screen (e.g., first line: Kemal, Selami). You are free about the use of second line of the LCD screen and intended purpose (i.e, what you are trying to do for each situation) in your video capture and in this document.

**Circuit Diagram:** You are free to build your circuit for application. Draw your circuit in **Fritzing.**

**Restriction:** Neither the Arduino IDE nor the Arduino programming language will be used when performing this application. Use only Thonny IDE with MicroPhython/CircuitPython or STM32CubeIDE with C/C++.

**Homework Submission:** Record a videowith all the team members for your application. In your video content; explain your program codes, show your program to be compiled successfully, show your program to be uploaded to your board, show your circuit to be run successfully for each case. Note that no simulation study is requested.

The following files need to be uploaded to Teams.

1. This word document by completing the ANSWERS section (do not upload as pdf)
2. Your video file (Will be talked in English)
3. Fritzing circuit file
4. Application project folder created by IDE software. Include your source file

------------------------------------------------ANSWERS-----------------------------------------------

**Project Team :** Suat Deniz – Ata Güneş

**Your Board :** Jetson Nano Developer Kit

**Number of LEDs used :** 2

**Your Software IDE :** Python Text File

**Your Programming Language :** Python

**Application Purpose :** LCD Name Display with LED Indicators

The objective of this project is to create an interactive and visually engaging system utilizing the Jetson Nano developer kit. The primary focus is on displaying names on an LCD screen and providing dynamic feedback through LED indicators.

**Project Features:**

1. **LCD Name Display:**
   * The system will be capable of showcasing names on a connected LCD screen.
   * Each name will be displayed on a separate line, enhancing readability and organization.
2. **LED Indicators:**
   * Two LEDs will be integrated into the system to convey additional information.
   * *LED 1 (Red):* Lights up when a name is displayed on the first line of the LCD screen.
   * *LED 2 (Green):* Illuminates when a name is displayed on any line other than the first one.
3. **Interactive User Experience:**
   * Users can input names into the system, triggering the LCD display and LED feedback.
   * The real-time response of LEDs provides instant visual confirmation of the displayed name's position.
4. **Jetson Nano Integration:**
   * The Jetson Nano developer kit serves as the computing platform for the project.
   * Utilizing the power and capabilities of Jetson Nano, the system ensures seamless processing and efficient performance.

**Application Scenarios:**

1. **Name Tag System:**
   * Suitable for events or gatherings where individuals' names need to be prominently displayed.
   * LED indicators offer a quick glance at the position of the displayed name.
2. **Interactive Learning Displays:**
   * Ideal for educational settings where names of students or participants are showcased.
   * LED feedback assists in tracking and verifying the displayed information.
3. **Customization and Expansion:**
   * The project is designed to be easily expandable for future enhancements.
   * Customization options can be explored, such as incorporating additional LEDs or integrating with other external devices.

**Conclusion:**

This project combines the utility of displaying names on an LCD screen with the visual appeal of LED indicators, creating an interactive and versatile system. The Jetson Nano developer kit ensures robust performance, making it suitable for various applications ranging from events to educational environments.

**Fritzing Circuit Diagram:**

elektronik donanım, elektronik mühendisliği, elektronik bileşen, devre içeren bir resim

Açıklama otomatik olarak oluşturuldu

**Program codes:**

import Jetson.GPIO as GPIO

import time

ping\_pin = 7

led\_pin = 13

def setup():

# Initialize GPIO

GPIO.setmode(GPIO.BOARD)

GPIO.setup(led\_pin, GPIO.OUT)

GPIO.setup(ping\_pin, GPIO.OUT)

def loop():

while True:

# Trigger the PING))) sensor

GPIO.output(ping\_pin, GPIO.LOW)

time.sleep(0.000002)

GPIO.output(ping\_pin, GPIO.HIGH)

time.sleep(0.000005)

GPIO.output(ping\_pin, GPIO.LOW)

# Measure the duration of the pulse

GPIO.setup(ping\_pin, GPIO.IN)

duration = pulse\_in(ping\_pin, GPIO.HIGH)

# Convert the time into distance

distance\_cm = microseconds\_to\_centimeters(duration)

# Print the distance

print(f"Distance: {distance\_cm} cm")

# Turn on the LED if the object is too close

if distance\_cm < 100:

GPIO.output(led\_pin, GPIO.HIGH)

else:

GPIO.output(led\_pin, GPIO.LOW)

time.sleep(0.1)

def pulse\_in(pin, level, timeout=1000000):

start\_time = time.time()

while GPIO.input(pin) != level:

if (time.time() - start\_time) > timeout / 1000000.0:

return 0

start\_time = time.time()

while GPIO.input(pin) == level:

if (time.time() - start\_time) > timeout / 1000000.0:

return 0

pulse\_duration = (time.time() - start\_time) \* 1000000

return pulse\_duration

def microseconds\_to\_centimeters(microseconds):

# The speed of sound is 340 m/s or 29 microseconds per centimeter.

# The ping travels out and back, so to find the distance of the

# object we take half of the distance traveled.

return microseconds / 29 / 2

if \_name\_ == "\_main\_":

setup()

try:

loop()

except KeyboardInterrupt:

pass

finally:

  GPIO.cleanup()

metin, elektronik donanım, bilgisayar, multimedya içeren bir resim

Açıklama otomatik olarak oluşturuldu

**Photo for your circuit (only 1 photo):**

elektronik donanım, kablo, Elektrik kabloları, elektronik mühendisliği içeren bir resim

Açıklama otomatik olarak oluşturuldu