POST-LAB IOT Projects using Python (CSE 4110) ASSIGNMENT

Date:

Experiment – 1

Aim of the Experiment:

Familiarization with Internet of Things (IoT) concepts and getting started with Raspberry Pi.

Objective:

1) Understanding IoT fundamentals, Architecture, protocols, Various Platforms, and Real time Examples.
2) To familiarize with Raspberry Pi Pico Microcontroller: The Brain of an Embedded System.
3) Understanding Python, Interpreted Languages, Variables, Keywords, Operators and Operands, Data Types in Python, Importing Libraries, Flow Control, Conditional Statement, Loops, Python vs. Other Languages, Applications of Python.
4) Familiarization with Online Simulator "WOKWI" and getting started with onboard LED blinking of Raspberry Pi Pico **ON for 2 seconds and OFF for 1 second.**
5) To build our first external circuit and control it from the Raspberry Pi Pico i.e. **ON for 3 seconds and OFF for 2 seconds.**
6) To implement a hardware setup to blink both on-board & external LED using Raspberry Pi Pico **ON for 5 seconds and OFF for 5 seconds.**

Components/Equipment Required:

Sl No.	Name of the Component/Equipement	Specification	Quantity
1	Raspberry Pi Pico	RP2040 microcontroller chip, 125MHz	1
2	Raspberry Pi Pico cable	USB Type A to Micro-B	1
3	Resistors (carbon type)	¼ watt (330Ω)	1
4	LED	3mm, Red	1
5	Breadboard	840 Tie points	1
6	Jumper Wire	----------	As per requirement

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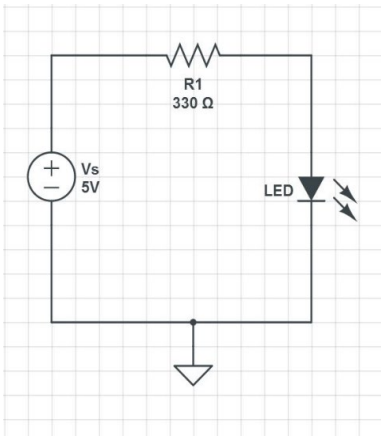
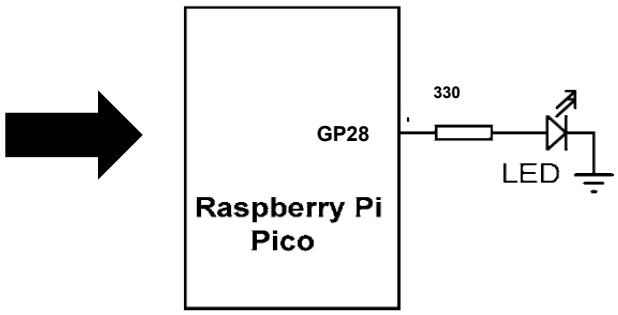
Experiment – 1

Circuit/Schematic Diagram:

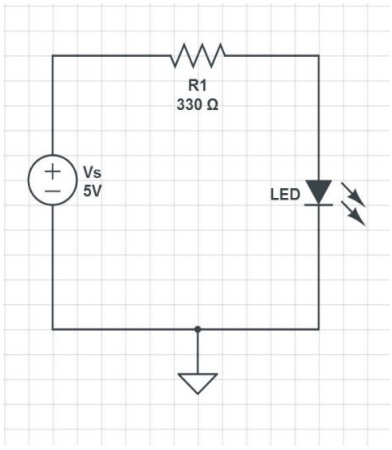
Objective 5

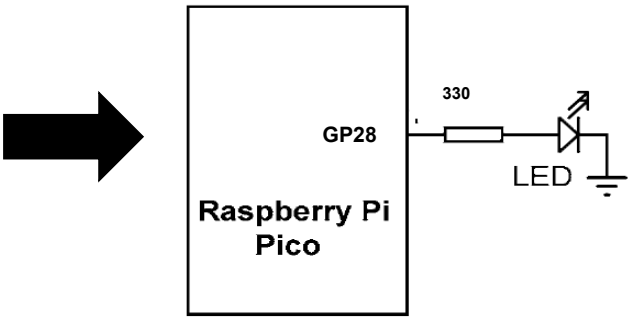




(Figure 1 : Simple LED Circuit for blinking an LED) (Figure 2: Hardware Implementation to blink an LED)

Objective 6





(Figure 3: Hardware Implementation to blink both on-board & external LED using Raspberry Pi Pico.)

Observation:

Objective 4

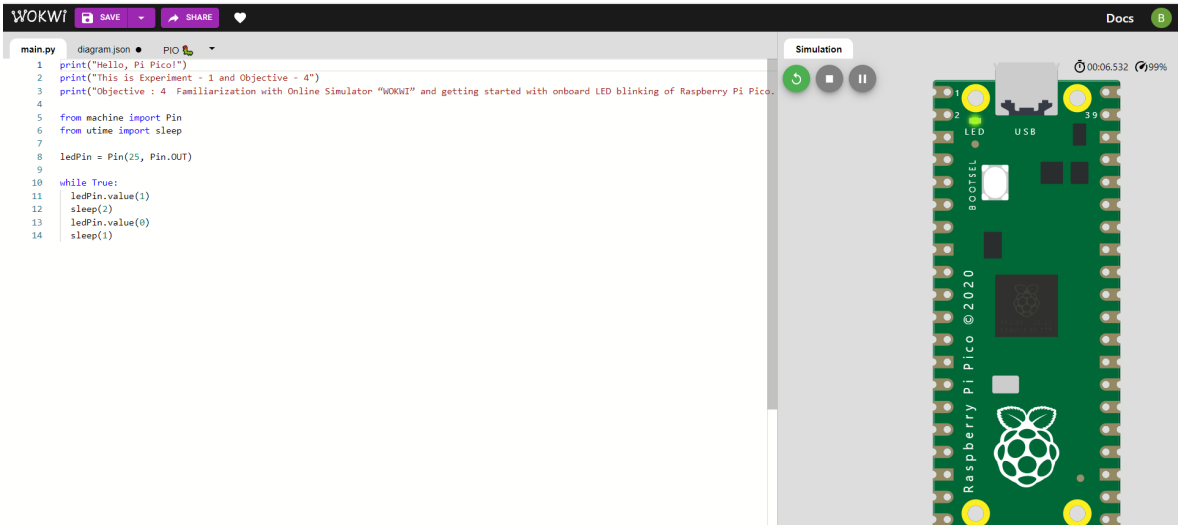


Figure 4: (Simulation based onboard LED blinking of Raspberry Pi Pico.)

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Experiment – 1

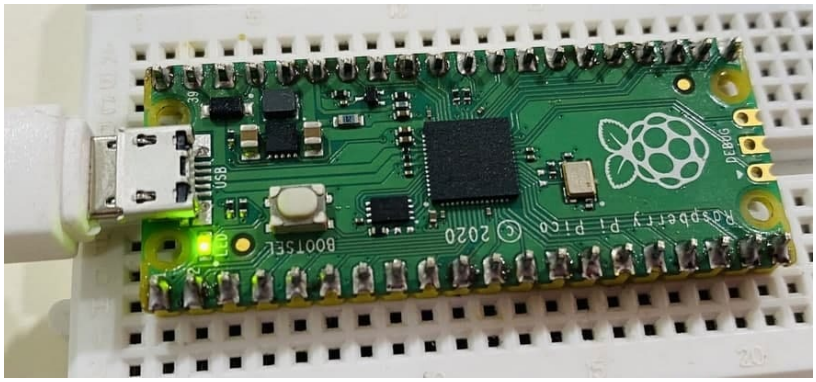

Figure 5: (Hardware Implementation based onboard LED blinking of Raspberry Pi Pico.)

Objective 5

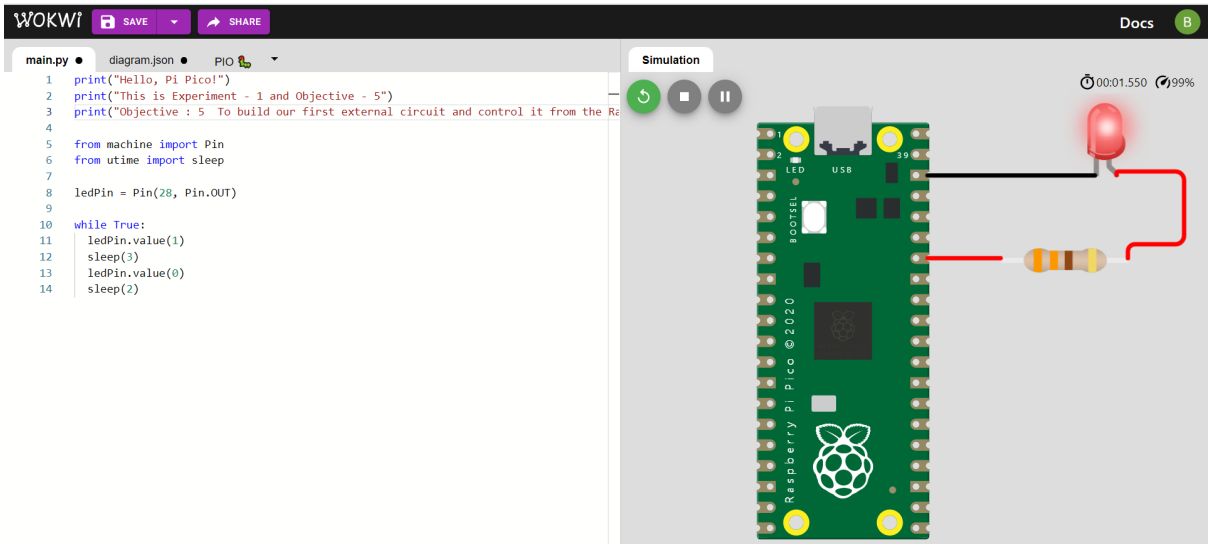

Figure 6: (Simulation based Simple External LED Circuit for blinking an LED using Raspberry Pi Pico)

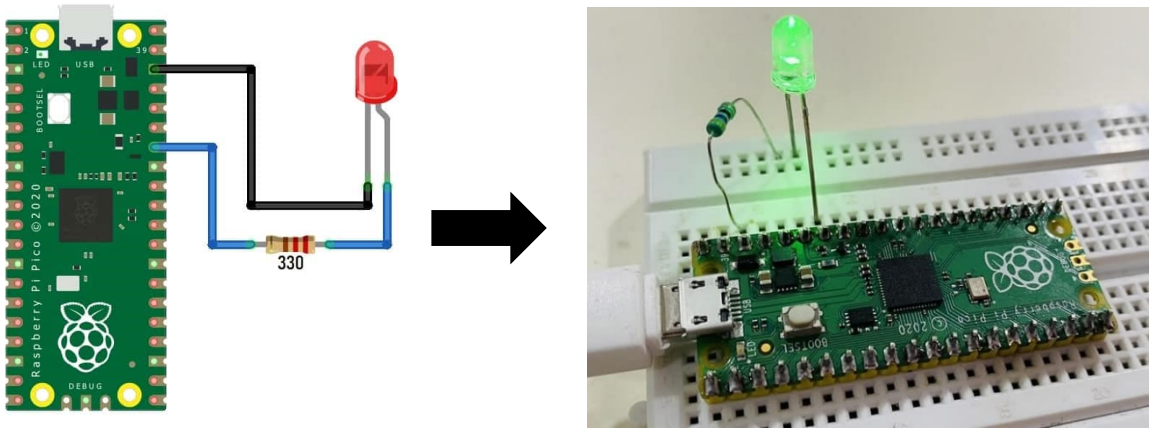

Figure 7: (Hardware Implementation based Simple External LED Circuit for blinking an LED using Raspberry Pi Pico)

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Experiment – 1

Objective 6

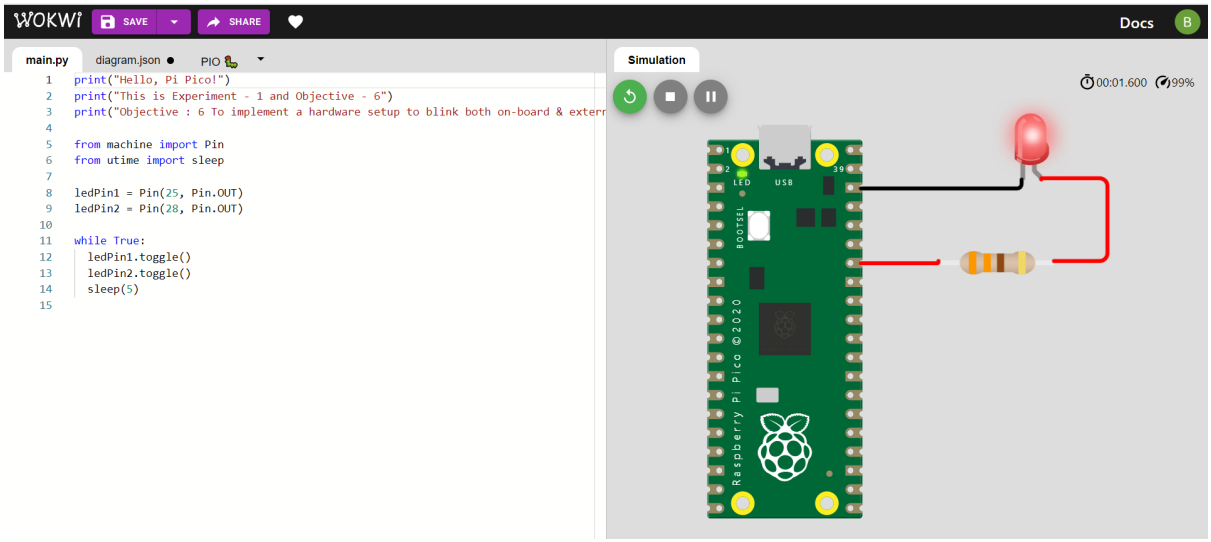

Figure 8: (Simulation based setup to blink both on-board & external LED using Raspberry Pi Pico.)

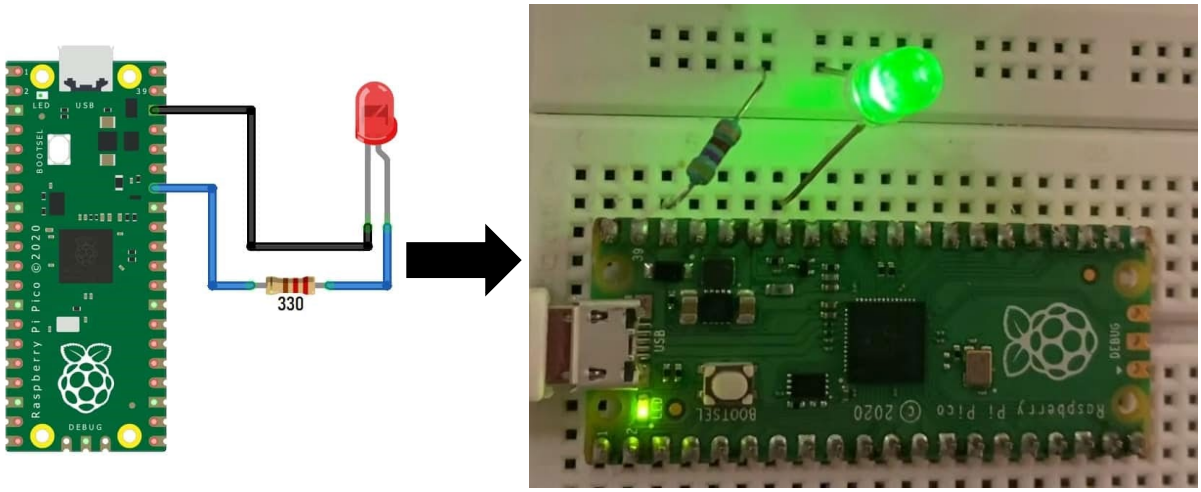

Figure 9: (Hardware Implementation based setup to blink both on-board & external LED using Raspberry Pi Pico.)

Codes:

Objective 4

```
print("Hello, Pi Pico!")
print("This is Experiment - 1 and Objective - 4")
print("Objective : 4  Familiarization with Online Simulator “WOKWI” and getting started with onboard LED blinking of Raspberry Pi Pico.  ")

from machine import Pin
from utime import sleep

ledPin = Pin(25, Pin.OUT)
```

Experiment – 1

```
while True:
  ledPin.value(1)
  sleep(2)
  ledPin.value(0)
  sleep(1)
```

Objective 5

```
print("Hello, Pi Pico!")
print("This is Experiment - 1 and Objective - 5")
print("Objective : 5  To build our first external circuit and control it from
the Raspberry Pi Pico i.e. ON for 3 seconds and OFF for 2 seconds. ")

from machine import Pin
from utime import sleep

ledPin = Pin(28, Pin.OUT)

while True:
  ledPin.value(1)
  sleep(3)
  ledPin.value(0)
  sleep(2)
```

Objective 6

```
print("Hello, Pi Pico!")
print("This is Experiment - 1 and Objective - 6")
print("Objective : 6 To implement a hardware setup to blink both on-board &
external LED using Raspberry Pi Pico ON for 5 seconds and OFF for 5 seconds.")

from machine import Pin
from utime import sleep

ledPin1 = Pin(25, Pin.OUT)
ledPin2 = Pin(28, Pin.OUT)

while True:
  ledPin1.toggle()
  ledPin2.toggle()
  sleep(5)
```

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Experiment – 1

Conclusion:

Precautions:

Post Experiment Questionnaire:

1) What do you mean by Raspberry Pi?
2) What is GPIO (General Purpose Input/Output)?
3) State differences between Arduino and Raspberry Pi.
4) Is Raspberry Pico 5V tolerant?
5) Does Raspberry Pi Pico have voltage regulator?
6) How does Raspberry Pi Pico get power?
7) Can you power the Raspberry Pi Pico with battery?
8) Are Pico pins 5V tolerant?
9) Does PI Pico have a 5V output?
10) How much current does PI Pico draw?
11) Can you power Raspberry Pi Pico from GPIO?
12) You've accidentally connected +5V to your RP2040-based microcontroller. Is the pin dead?
13) What OS does Raspberry Pi Pico run?
14) Is Raspberry Pi Pico board design files being open-source, along with all the provided software?
15) Should you buy a Raspberry Pi Pico or a Raspberry Pi Zero?
16) Can you overclock Raspberry Pi Pico?
17) Is it supported in the Arduino or other third-party programming environments?
18) What low-power modes are there in Raspberry Pi Pico?
19) Can you run machine learning tools in Raspberry Pi Pico?
20) What is an UF2 file?
21) Why use micro-USB instead of USB-C on the Raspberry Pi Pico board?
22) Why is there no reset button in Raspberry Pi Pico? Constantly unplugging and plugging in is a pain!

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Experiment – 1

23) Can you use your Raspberry Pi to develop for the Raspberry Pi Pico?

24) What are GPIO 23,24,25 and 29 used for on the Raspberry Pi Pico board?

25) What is the maximum current rating of the GPIOs?

Name of the Student

Registration No

Semester

Branch, Section