Prototyping and Programming ESP32 Wearable Devices

DAY 3 : Wearable Devices Design Methods

Webinar Logistics

- Turn on your system sound to hear the streaming presentation.

- If you have technical problems, click "Help" or submit a question asking for assistance.

- Participate in 'Attendee Chat' by maximizing the chat widget in your dock.

Dr. Don Wilcher

Visit 'Lecturer Profile' in your console for more details.

Course Kits

Starter Kit M5GO IoT V2.6

Core2 ESP32 For AWS IoT EDUKIT

Agenda:

- What is Human Computer Interaction (HCI)?
- UI Design Basics
- M5Stack Demonstration Units
- Lab: Wearable Humidity-Temperature Detector Unit

Wearable Technologies :

"Progress in wearable technologies for monitoring is driven by the same factors that were behind the transition from desktop computing and communication tools to portable devices providing processing and ubiquitous connectivity, namely changes in social and economical factors" (Bonfiglio & De Rossi, 2011).
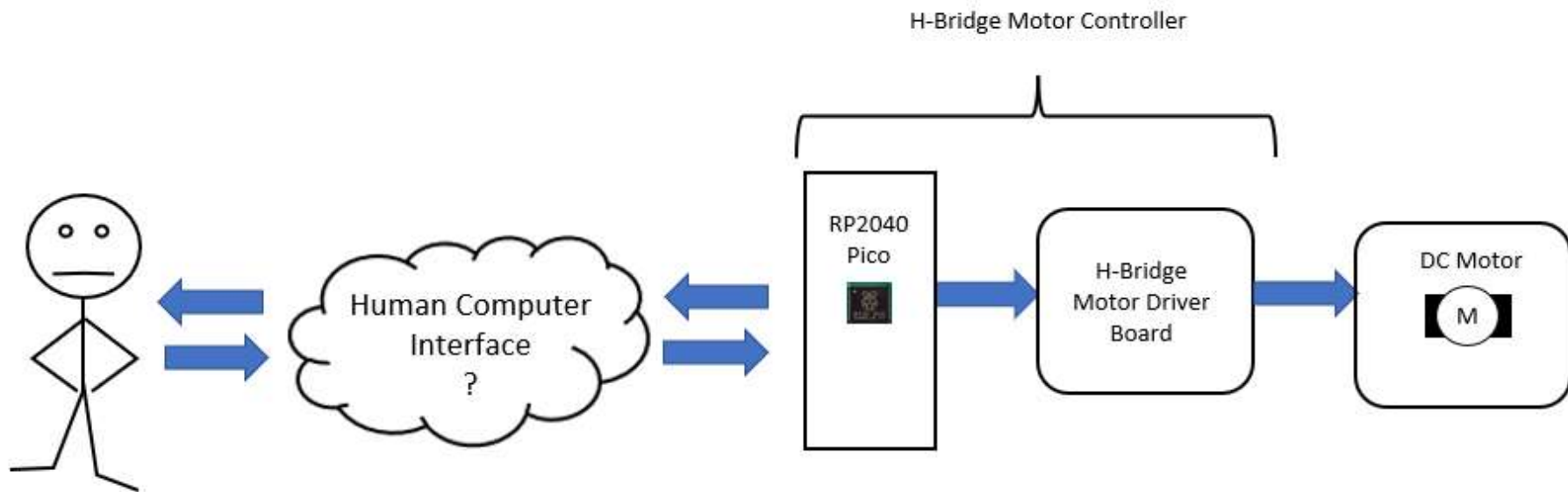
What is Human Computer Interaction (HCI)?

- A field of study that focuses on optimizing the interaction between the user and the computing device.
- Designing interactive computing device interfaces that satisfy the user's need.
- It is multidisciplinary subject that includes:
  a) computer science
  b) behavioral sciences
  c) cognitive science
  d) ergonomics or Human Factors
  e) design principles

Kanade, V. (2022, July 22). *What is hci (human-computer interaction)? Meaning, importance, examples, and goals*. https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-hci/

What is Human Computer Interaction (HCI)?..

What is Human Computer Interaction (HCI)?..

HCI Origins

- Dates back to the 1980's when personal computing was rising.
- It was when desktop computers started appearing in homes and corporate offices, where HCI started appearing frequently.
- HCI's journey became more prevalent:
  - a) video games
  - b) Handheld games
  - b) word processors
  - c) calculators

Kanade, V. (2022, July 22). *What is hci (human-computer interaction)? Meaning, importance, examples, and goals*. https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-hci/

What is Human Computer Interaction (HCI)?..

HCI Origins

Pocket Electronic Games influenced by HCI

Digimon X Electronic Monster

Question 1

HCI dates back _____when personal computing was

_____.
   a) 1986, rising
   b) 1980, falling
   c) 1987, rising
   d) none of the above

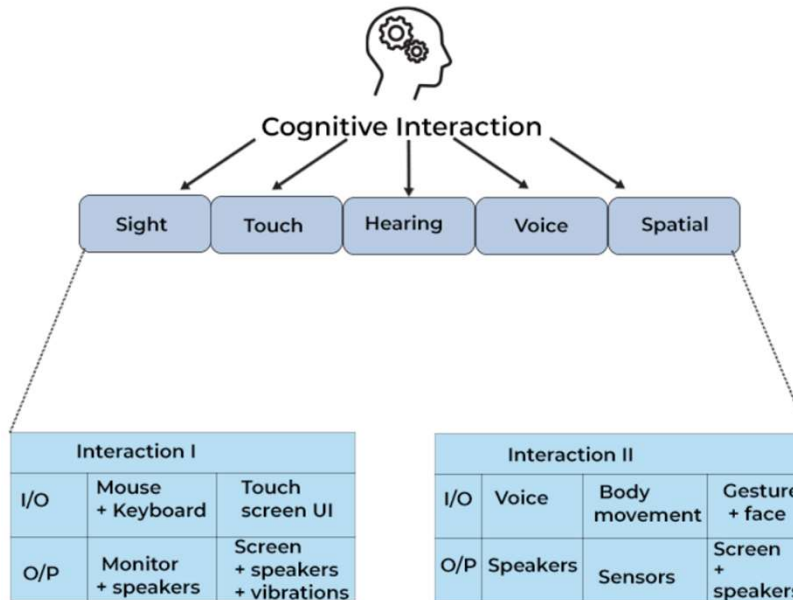# What is Human Computer Interaction (HCI)?..
HCI – User Interface

- With HCI, the key component is the user interface (UI).

- Various interface related aspects must be considered to ensure an interactive and engaging user experience.

- Interactive and engaging user experience interactions include:

a) touch

b) click

c) gesture

d) voice

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What is Human Computer Interaction (HCI)?. .

HUMAN-COMPUTER INTERACTION

Cognitive Interaction

| Sight | Touch | Hearing | Voice | Spatial |

Segway to:

➡️ UI Design Basics

Interaction I		
I/O	Mouse + Keyboard	Touch screen UI
O/P	Monitor + speakers	Screen + speakers + vibrations

Interaction II		
I/O	Voice	Body movement	Gesture + face
O/P	Speakers	Sensors	Screen + speakers

Human-Computer Interaction

Kanade, V. (2022, July 22). *What is hci (human-computer interaction)? Meaning, importance, examples, and goals*. https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-hci/

UI Design Basics

The following information is from the forth coming book title:

https://www.amazon.com/M5Stack-Electronic-Blueprints-interactive-applications/dp/1803230304/ref=sr_1_1?crid=OVYB3O0IQ5OU&keywords=dr.+don+wilcher&qid=1667169860&sprefix=%2Caps%2C191&sr=8-1

UI Design Basics

- In developing M5Stack Core applications, the user interface or UI aids in the operation of the device.
- The M5Stack Core's liquid crystal display (LCD) is easy to layout graphics that convey information from electronic sensors that are attached to the programmable controller.
- The M5Stack Core's LCD dimensions are 320 x 230 pixels.
- There is a total of 73,600 pixels available to create a variety of unique UIs.
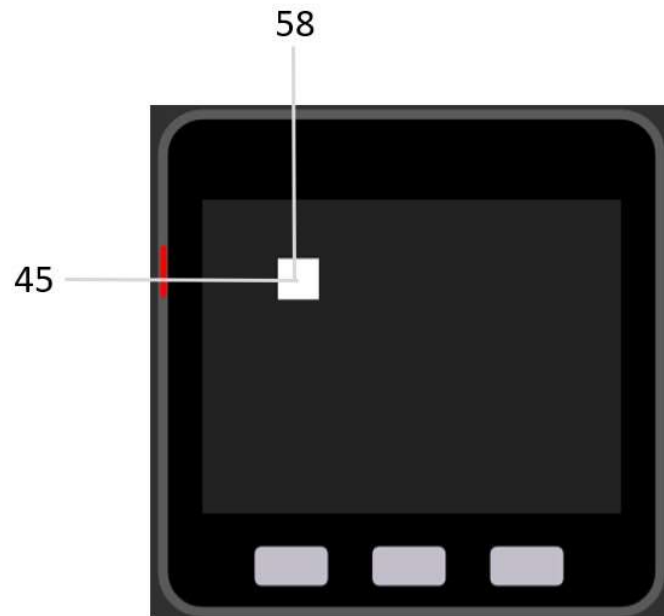
UI Design Basics. . .

- The pixels are electronic dots arranged using a Cartesian Coordinate System.
- When placing the images or controls, their locations can be managed using the Cartesian Coordinate System.
- You can move the image quite easily using the UiFlow programming tool.
- The UiFlow programming tool has a design layout area that allows a preview of the images and controls placed on the LCD.

UI Design Basics. . .

The following example illustrates the **xy** coordinates of **58,45** for the location of the square on the LCD.

Question 2

There is a total of 75,600 pixels available to create a variety of unique UIs.
a) True
b) False

UI Design Basics. . .

The x-data point is **58** and the y-data point is **45**. You can place the objects by dragging them to the specified location or entering them manually as follows.

rectangle0

name:	rectangle0
x:	58
y:	45
width:	30
height:	30
borderColor:	
backgroundColor:	
layer:	4

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UI Design Basics. . .

- You can obtain the properties box by clicking on the square.
- Once the properties box is visible on the UiFlow design layout area, x and y location data points may be entered as shown in the following image.

UI Design Basics. . .

Input Controls

- Input controls like buttons, text fields, checkboxes, radio buttons, dropdown lists, list boxes, toggles, and date fields, allow the user to interact (Kanade, 2022)with your M5Stack Core device easily.
- You should size the input controls for ease of use and be visible to see.
  - a) Overlayed objects should not be placed on the input controls.
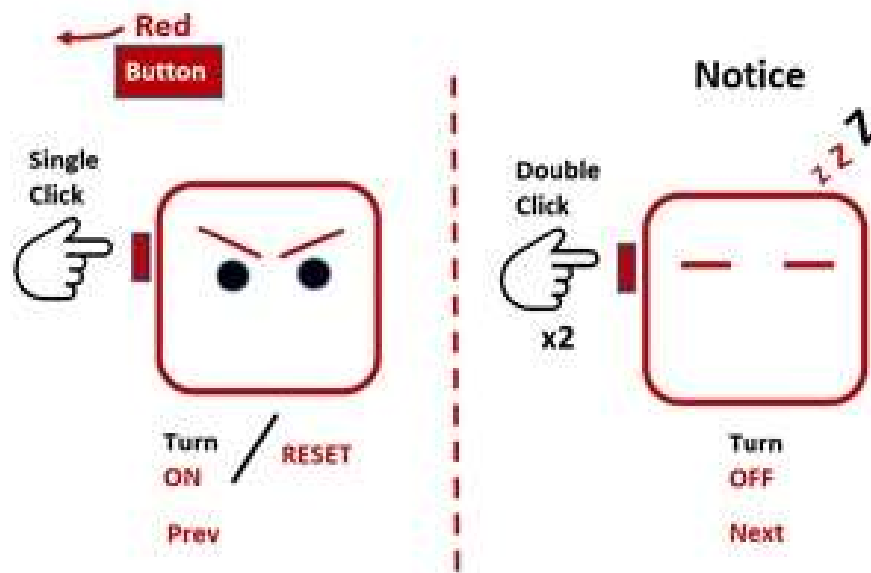 - b) Such information will make the input controls difficult to use.

M5Stack Demonstration Units
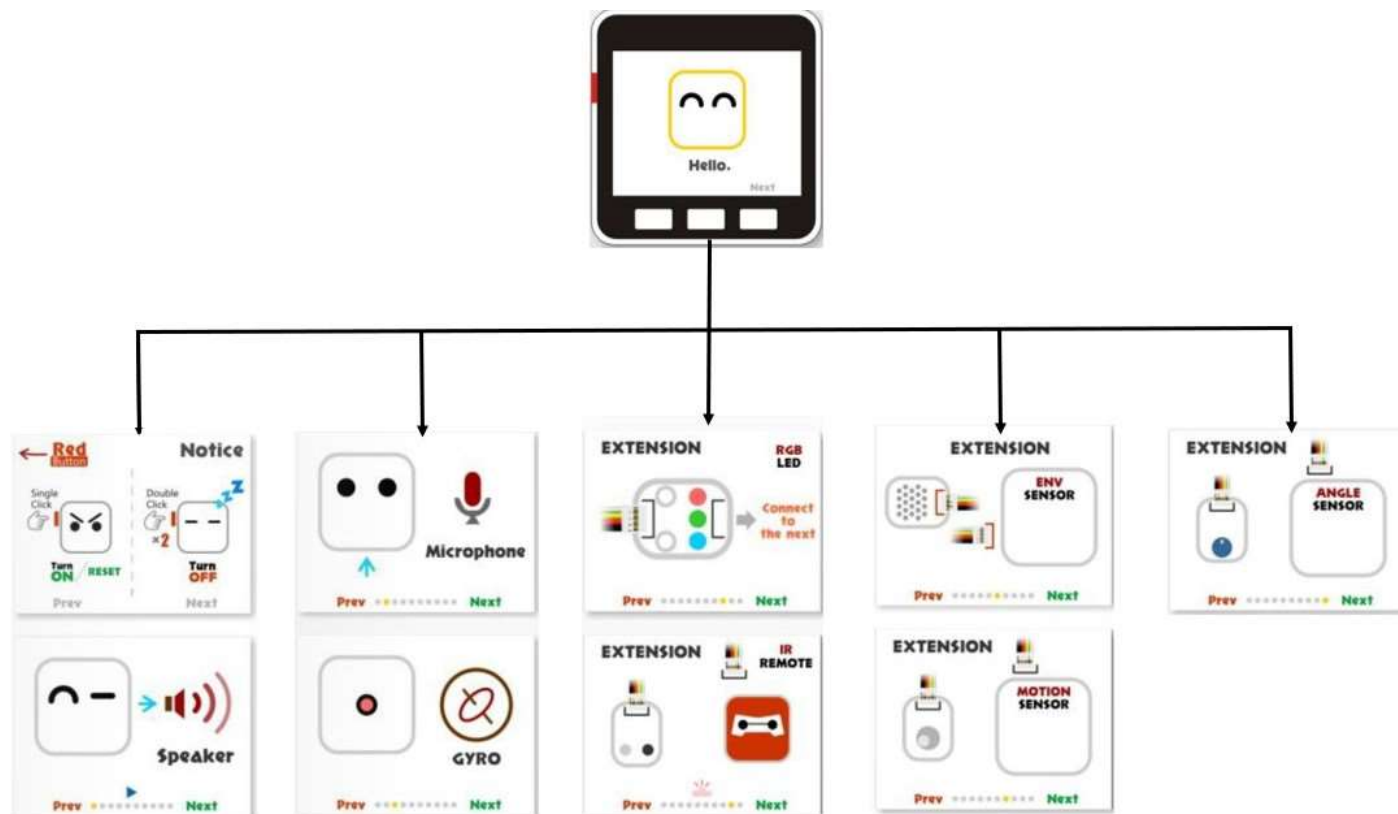
M5Stack Demonstration Units...

Examples of Functional UI Designs

Demo 1 ON/OFF. To turn off the M5Stack Core, a quick double press of the power button will accomplish this task as seen here.

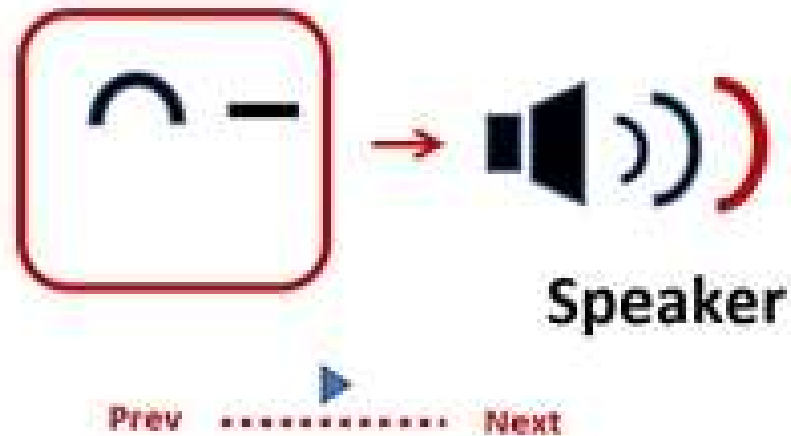Note: Use M5Burner to install the M5GO.py which has the Demo programs.

https://docs.m5stack.com/en/download

M5Stack Demonstration Units...

Examples of Functional UI Designs

Demo 2 Speaker. Press the center button on the M5Stack Core to hear a sound from the internal speaker
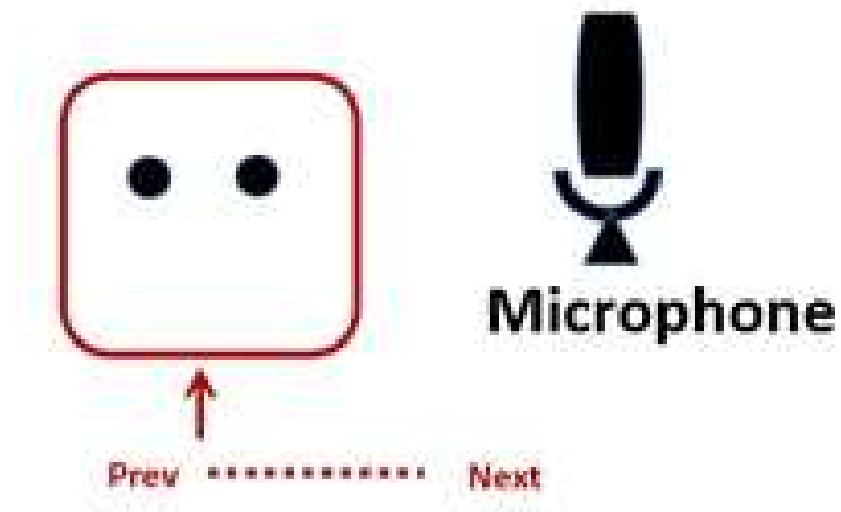
M5Stack Demonstration Units. . .

Examples of Functional UI Designs

Demo 3 Microphone. Speak into the pinhole microphone located on the side of the M5Stack Core. While speaking into the microphone, observe the line and sound wave images.
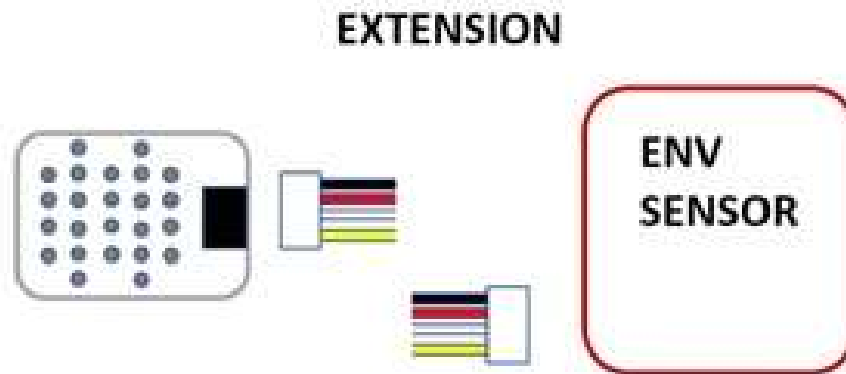
M5Stack Demonstration Units...

Examples of Functional UI Designs

Demo 7 Environment Sensor. The temperature and humidity levels will be displayed on the LCD upon connecting the sensor to extension port A of the M5Stack Core.

EXTENSION

ENV SENSOR

Prev ·············· Next

Note: The ENVII sensor is used, therefore the operation may be sporadic.

Question 3

What software is used to install the M5GO.py demo program?
  a) UiFlow
  b) M5Birmer
  c) M5Burner
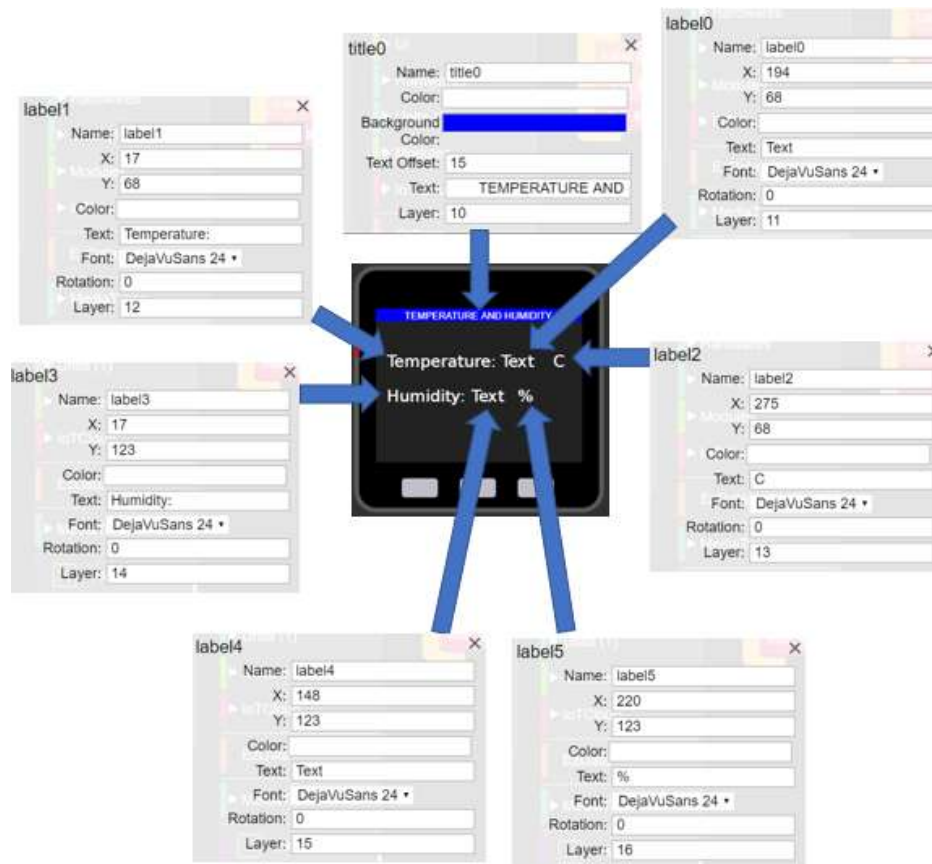 **d) none of the above**

Lab: Temperature and Humidity Detector

Lab: Temperature and Humidity Detector...

Big IDEAS (Learning Objectives):

1. The participant will be able to develop Blockly Code software for the M5Core ESP32 controller.

2. The participant will be able to program add an electronic unit to a blockly code project.

3. The participant will be able to setup communication with the M5 Core ESP32 controller.

4. The participant will be able to build and program a Temperature and Humidity Dete.
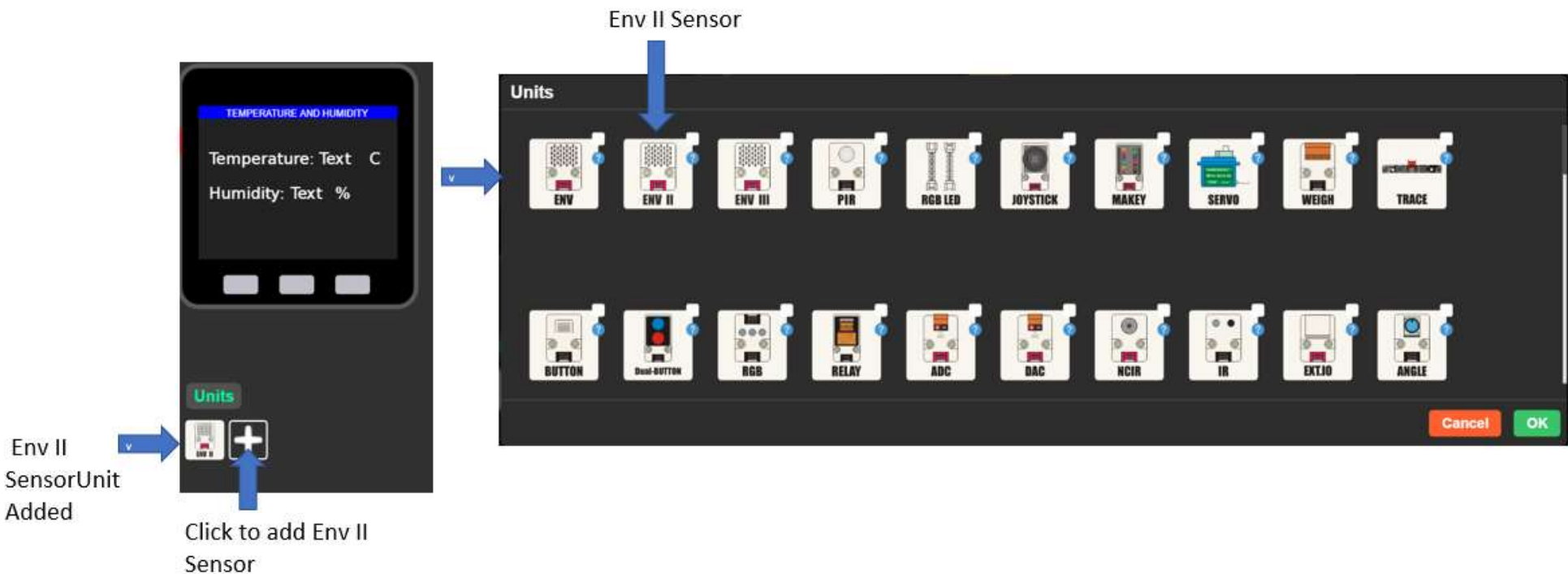
Lab: Temperature and Humidity Detector...

Temperature and Humidity Detector UI

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Lab: Temperature and Humidity Detector...

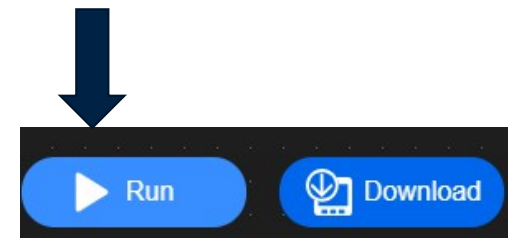## Adding an Env II Sensor to Block Code project

Lab: Temperature and Humidity Detector...

Temperature and Humidity Detector:
Blockly Code Blocks

Click Run Button to execute code blocks

Question 4

In reviewing slide 30, which label displays the temperature values.
  a)label0
  b)label2
  c)label4
  d)none of the above

Lab: Temperature and Humidity Detector

Operational Temperature and Humidity Detector

Lab: Temperature and Humidity Detector...

Temperature and Humidity Detector: YouTube Video

0:30

https://youtu.be/9y7WarCVM20

Question 5

In reviewing slide 32, the "Get env3_0 Temperature" code block will read various temperature levels.
   a) True
   b) False

Thank you for attending
Please consider the resources below:

Bonfiglio, A , & De Rossi, D.(Eds). (2011). *Wearable monitoring systems.* Springer

Grand View Research. (2022, October 30). *Wearable technology, market size, share & trends analysis reports by product.* https://www.grandviewresearch.com/industry-analysis/wearable-technology-market

Hartman, K. (2014). *Wearable electronics: Design, prototype, and wear your own interactive garments.* Maker Media.

Kanade, V. (2022, July 22). *What is hci (human-computer interaction)? Meaning, importance, examples, and goals.* https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-hci/

M5Stack Electronic Blueprints:
https://www.amazon.com/M5Stack-Electronic-Blueprints-interactive-applications/dp/1803230304/ref=sr_1_1?crid=OVYB3O0IQ5OU&keywords=dr.+don+wilcher&qid=1667169860&sprefix=%2Caps%2C191&sr=8-1

Nash, M. (2017). Hci design and age groups. *HOHONU,15*, 39-43.

UiFlow Code download website:
https://shop.m5stack.com/pages/download.

Thank You

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