THE DOOR BELL

INTERNET OF THINGS

Time: 60 mins

Introduction

In this class, the student/s will learn how to create a doorbell and experiment with its ringtones and device attributes.

New Commands Introduced

- #define BUTTON_PIN 18   Configures the pin number for the devices

- Serial.begin(115200);   Runs the setup continuously when the supply is on

- pinMode(BUTTON_PIN, INPUT_PULLUP);   Mentions the pins as input pin with HIGH state

- pinMode(LED_PIN, OUTPUT);   Mentions the pins as output pins for LED

- int buttonState = digitalRead(BUTTON_PIN);   Reads the state of the button

- tone(BUZZER_PIN, 10000);   Mentions the pins as output pins for LED

- digitalWrite(LED_PIN, HIGH);   Turns the LED on

Vocabulary

- **Doorbell** is an electrical device with a button near the outside door of a house or apartment that makes a noise when pressed, to let the people inside know someone is there
- A **buzzer or beeper** is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.
- **Push button** are the switches which detect when being pressed or pushed and send signals.

Learning Objectives

Student/s should be able to:
- ***Recall*** how LEDs can be blinked by programming ESP32.
- ***Demonstrate*** how to connect the devices including ESP32, buzzer and push button.
- ***Explain*** how to ring a bell and experiment with the ringtones.

Activities

Class Narrative: *(3 mins)*

- Brief the student/s that the IOT kingdom has doors which open with IOT components.

Concept Introduction Activity: *(4 mins)*

- Let the student/s observe that the bell rings on clicking the button.

- Explain how different components can be connected to create a doorbell.

- Using the slides, explain that the student/s will learn:

    ○ to **connect the devices**

    ○ to **ring the doorbell**

    ○ to experiment with Doorbell

Activity 1: Connect the Components *(16 mins)*

Teacher Activity: *(8 mins)*

- Explain how buzzers and push buttons work and explain their pins.

- Explain the applications of buzzers and push buttons.

- Introduce and explain connecting the devices to create a doorbell.

Student Activity: *(8 mins)*

- Guide the student/s to connect the devices to create a doorbell.

Activity 2: Ring the Door Bell *(10 mins)*

- Explain how we will ring the bell by configuring the pins, pin mode.
- Explain how we will switch on the buzzer on pushing the button, glow LED and then stop the buzzer and the LED.

Student Activity: *(10 mins)*

- Guide the student/s to ring the door bell by configuring and coding ESP32.

Activity 3: Experiment with Door Bell*(12 mins)*

- Explain how to input different frequencies and delay to ring and stop the bell.

- Demonstrate and experiment with playing different ringtones.

  Student Activity: *(6 mins)*

- Guide the students to experiment to generate different ring tones.

Introduce the Post class project: *(2 min)*

- Find the vulnerability in a small API in a company's website that can be used to fetch their user's data without access or authorization.

Test and Summarize the class learnings: *(5 mins)*

- Check for understanding through quizzes and summarize learning after respective activities.

- Summarize the overall class learning towards the end of the class.

Additional activities:

- Encourage the student/s to perform an IDOR attack by modifying the request parameters, properties and code for the toy website using Burp Suite.

- Encourage the student/s to modify the Toy Store website to accept important information from the server side and not rely on clients input for sensitive data.

State the Next Class Objective: *(1 min)*

- In the next class, student/s will learn to deploy viruses in a computer or a website.

U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-19

Links Table		
Activity	Activity Name	Link
Class Presentation	THE DOOR BELL	https://s3-whjr-curriculum-uploads.whjr.online/ccba17c9-0de7-47f8-8419-0c99cf321ba7.html
Explore Activity	THE DOOR BELL	https://wokwi.com/projects/384167212

		861366273
Student Activity 1	Connect the Components	https://wokwi.com/projects/3840904986 41588225
Teacher Reference: Student Activity 1 Solution	Connect the Components	https://wokwi.com/projects/3840902497 44224257
Teacher Activity 2	Ring the Door Bell	https://wokwi.com/projects/3840910499 65084673
Teacher Reference: Teacher Activity 2 Solution	Ring the Door Bell	https://wokwi.com/projects/3840914089 27302657
Student Activity 2	Ring the Door Bell	https://wokwi.com/projects/3840910499 65084673
Teacher Reference: Student Activity 2 Solution	Ring the Door Bell	https://wokwi.com/projects/3840914089 27302657
Student Activity 3	Experiment with Door Bell	https://wokwi.com/projects/3840915442 12497409
Teacher Reference: Student Activity 3 Solution	Experiment with Door Bell	https://wokwi.com/projects/3840906424 93651969
Student's Additional Activity 1	Control LED On Button Press	https://wokwi.com/projects/3847986180 94313473
Teacher Reference: Student's Additional Activity 1 Solution	Control LED On Button Press	https://wokwi.com/projects/3845313254 67868161
Student's Additional Activity 2	Add Sound to Glowing LED's	https://wokwi.com/projects/3847997849 44537601
Teacher Reference: Student's Additional Activity 2 Solution	Add Sound to Glowing LED's	https://wokwi.com/projects/3847993208 88805377
Post Class Project	Create a Tone Player	https://wokwi.com/projects/3841691240 31859713
Teacher Reference: Post Class Project Solution	Create a Tone Player	https://wokwi.com/projects/3841672128 61366273