Objectives

- Remotely control the threshold.
- Occupancy monitoring.
- Creating a simple interface to show noisy, quiet areas and occupancy of the zones.
Overview

A real-life scenario.
The threshold values can be directly sent from a mobile phone or a computer at the front desk of the library.
Values for each table are displayed on an LCD screen for the user.
If the sound level goes above the threshold, a red LED blinks indicating that the person sitting around it is being noisy.
Furthermore, we used the ultrasonic sensor to detect occupancy of the tables.
All of the data is reflected on the UI which is available to students online.
What’s New

New and simple UI to see quiet, noisy and vacant zones.
Occupancy detection.
Remote control of threshold.
Two-way communication.
Server Device With Propeller, Sound Sensor and Ultrasonic Sensor that is creating and managing the messages through the HTTP Server on Zone 2

HTTP Server and Website (Local IP) ESP8266

Access Point (AP) [Hotspot]

Client Device With Arduino, Sound Sensor

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Thingspeak (Internet)

The Browser on your mobile or Laptop to control the threshold values of the devices [Client Device]

Framework of the HTTP Server:

Zones in the Library

Front Desk of the Library

Wi-Fi Connections

Data Transfer

Data Transfer

Data Transfer
Client device 1: Arduino with ESP8266 as the client device which receives data from the server, changes the device threshold, checks for occupancy and sends live data to ThingSpeak.

Client and Server device 2: WiFi module on the propeller maintains the local HTTP server while the propeller checks for occupancy and sends live data to ThingSpeak.

Client Device 3: The computer or any mobile phone will act as the third client device which can send the threshold values to the server.
Occupancy Detection

- Ultrasonic sensor on propeller board will be placed on the tabletop.
- Monitor the occupancy of the tables.
- Send data to ThingSpeak to display on the UI.
Remote Threshold Control

- Device that sets the threshold has to be connected to the same access point as other devices.

- Can control the threshold of all the devices at the same time.

- The front desk sends data to server and server sends it to other clients.
For Noise
- **Green** – Quiet
- **Yellow** – moderate noisy
- **Red** – Very noisy

For Occupancy
- **Green** – Vacant
- **Red** – Occupied
Challenges Faced

• Power fluctuations cause ESP8266 to reset.
• Due to this ESP8266 sends garbage values to the serial port.
• Debugging the ESP8266 was difficult after connecting them with microcontroller
Advantages

- Improved the existing library occupancy detection system from wired to wireless.
- A perfect multifunction integral kit for each library table.
- No longer required to tune all the devices separately.
- Made it much easier for librarian to manage all the tables.
- More convenient for students to choose the study zone.
Demo for changing the threshold wirelessly from a mobile phone
Demo 1 for occupancy detection
Demo 2 for occupancy detection