In the name of God

UCTA2017 Project

Final Project

Final project is described. It will cover both the TA and course marks.

Use a Microcontroller (or discovery board) plus ESP8266 as hardware and implement a system that:

1) Uses UART protocol to receive 10 seconds of an 8-KHz, 8-bit depth sampled audio data. (Telephone line quality)
2) Makes a web server and waits for clients over Wi-Fi, then displays a simple HTML page, like figure 1.
3) Plays audio over DAC for headphones. (You may need a simple amplifier IC.)
4) Stored music won't be wiped after system reset. (Use Flash memory or other storages to store data)

UART protocol:

A PC application is sent to you for the project. this application will connect to a UART port and wait for your device. Application opens an audio file and waits for your device to send 'S' command to it. After that, application transmits [SAMPLE1] (1 byte) and waits for you to send 'N' command to it. Then it transmits [SAMPLE2] and again waits for 'N' command. When the device gets 8Khz*10Seconds = 80000 Samples, it waits for you to send 'N' then it transmits a [checksum] to you, and waits for another 'S' command:

Start of communication:

Device:	'S'
PC:	[Byte 1]
Device:	'N'

PC: [Byte 2]

Device: 'N'

PC: [Byte 3]

Device: 'N'

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PC: [Byte 79999]

Device: 'N'

PC: [Checksum]

End of communication.

You can find the UART parameters at the attached test project.

Web server:

Design a webpage:

1) Commands:
    a. Download audio
    b. Play
    c. Stop
    d. Volume 100
    e. Volume 50

    f. Volume 0

2) Appearance:

A simple HTTP will grant this part a full mark, but extra points will be devoted to more complicated designs.

3) Simple example:

A simple example is attached. Please pay attention to links. You can use links in web server (ESP) in order to send commands to microcontroller. For example, you can set "192.168.137.1/play" for the play button link. Then on ESP, whenever a client makes a HTTP get request for that link, you know that it means the user on client is clicked on "Play" button. You can inform main microcontroller of this event. Also please notice that after you informed main microcontroller you should send the main page again otherwise client browser shows a timeout error (or the server is not responding error).

Audio over DAC:

For many hands-free headphones, STM32Fxx DACs can handle the output current, therefore there is no need to implement an analog output circuit. However, it includes extra points.

Good luck.