Design Proposal

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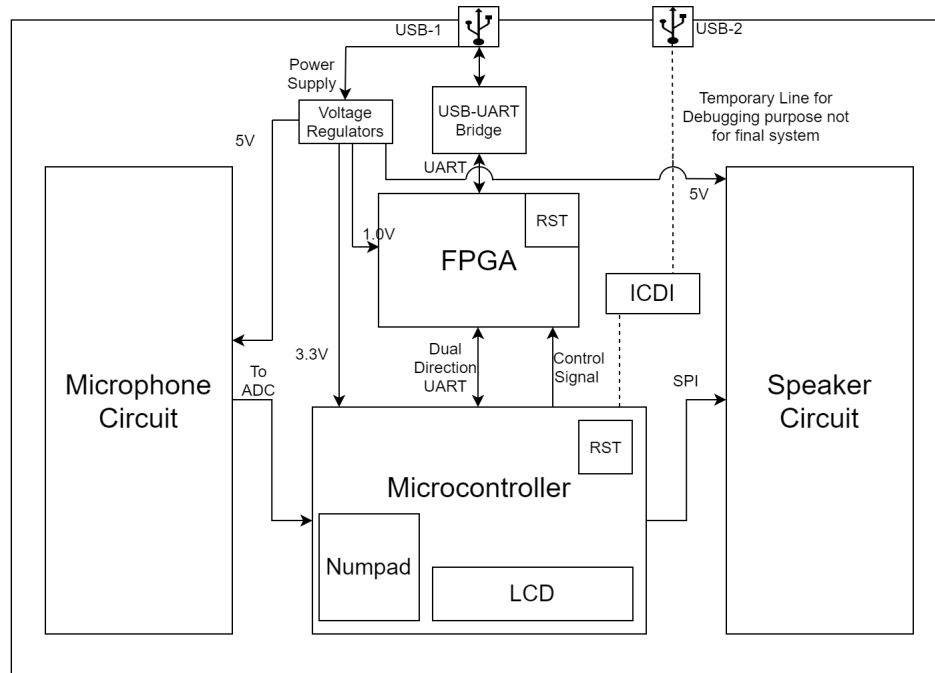February 2, 2020

Contents

1 Block Diagram

Figure 1: Proposed Design

Section-2 will detail the components of the whole system, and Section-3 will describe the flow of the system after it is powered on.

2 Component Details

The following bulletin will individually cover the details concerning all the components described in the Design Proposal (Fig:1).

- **USB-1**: USB-1 is used as the communication link to the PC to transmit data from the device to PC. It will also be used as the power source for whole system. It is connected to a USB-UART bridge(something like FT2232H) and voltage regulators.

- **USB-2**: USB-2 is a temporary attachment to the system which can be removed once the designing is complete. It is used to program the microcontroller, which is a necessary debugging tools during designing stage.

- **ICDI**: The Integrated In-Circuit Debug Interface (ICDI) is added to aid in debugging while designing the device, can be removed in the final system.

- **Voltage Regulators**: This block will include all the necessary voltage regulators to convert the incoming 5V supply from the USB into the required, which for Microphone and Speaker is 5V, for Microcontroller is 3.3V and for FPGA board is around 1V.

- **USB-UART Bridge**: This block will include the IC like FT2232H which converts a incoming UART data to USB data. It will also have JTAG functionality to ensure the programmability of the FPGA, this feature can be removed once the designing of the device is complete but it important for debugging while the design process is going on.

- **FPGA**: FPGA will store basic encryption and compression engines.

- **Microphone and Speaker Circuit**: Basic circuits for capture and output audio respectively.

- **Microcontroller**: Used to convert the audio for digital to analog form or vice-versa and to transmit data to FPGA. Also to initialize the system with properly with new key.

- **Numpad**: To be used to input password and the encryption key.

- **LCD**: To be used to guide a user to properly configure the system.

- **RST**: RST blocks are reset switches used to reset the microcontroller and the FPGA.

3 Flow of the System

The following bulletins will step-by-step cover the flow of the system just after it is powered on.

1. The device is powered using the USB-1 connection, so once the device is connected a USB port in the PC via USB-1 port the device will power on.

2. Once the device is power on the Microcontroller will start all will prompt the user to input the password using the Numpad. The instructions will be displayed on the LCD.

3. After inputting the password the user will be prompted to input the encryption key.

4. After inputting the key the device will send a signal to FPGA to start. The FPGA will now be initialized by the microcontroller with the new key and other settings.

5. Once initialized the FPGA will start its handshaking sequence to establish connection to another device.

6. Once handshaking is completed the device will start audio transmission.