Voice Digitizer

Submitted By
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17/04/202

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User Requirements & Technical Specifications

Design a system to digitize the input voice, that has to be reproduced with a user inputted delay between the samples with the samples being taken at a rate of 1000 samples per second from voice input.

Technical specifications are as follows:

- The input audio is to be sampled at the rate of 1000 samples per second
- The digitized samples are supposed to be stored in the RAM
- The input for the delay is between 1 and 9 and is supposed to be taken through a keypad with digits 0-9, enter, and backspace
- The delay has to be displayed on a 7 segment display
- The digitized signal is to be reproduced when the user closes a switch labeled sound replay between the amplitude of 0V and 5V and with a delay as inputted by the user in milliseconds

Assumptions

- The analog input to the circuit is pre-processed to be between 0V and 5V
- The system waits for the user before the next input

Address Map

Memory Mapping

ROM 1	00000_H-$001FF_H$
ROM 2	$FFF00_H$-$FFFFF_H$
RAM 1	02000_H-$02FFF_H$
RAM 2	03000_H-$03FFF_H$

I/O Mapping

8255	70_H-76_H
8255	10_H-16_H
8253	20_H-26_H
8259	30_H-32_H

Components used and justification:

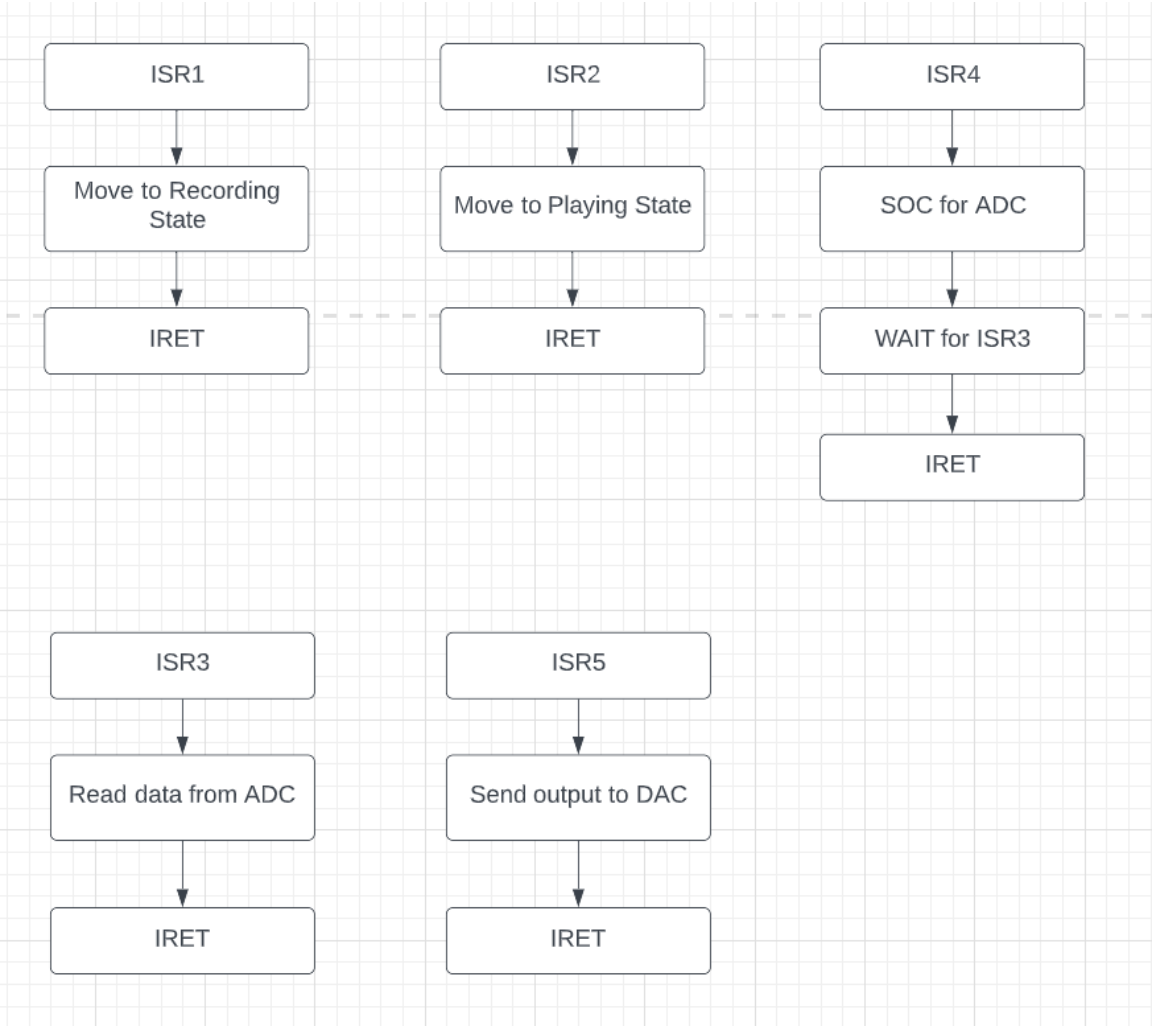
Component used	Quantity	Description and Justification
8086	1	16-Bit microprocessor
8284	1	Clock oscillator chip developed primarily for supplying clock signals for the Intel-8086/8087/8088/8089 series of processors
8253A	1	8253 is responsible for generating two clock outputs ● 1 ms: Used to generate a interrupt every 1ms to get 1000 samples per second from the ADC ● n ms: This is the delay entered by the user with the n being the value that is being taken as input and is given as the delay between the samples
8255A	2	Two 8255A have been used to connect I/O devices to the microprocessor ● SPEAKER_I/O: Connects DAC(0808) and ADC(0804) to the microprocessor ● DISPLAY_IO: Connects LEDs, 7-segment display and keypad to the microprocessor

8259	1	Generates and manages priority for 5 interrupts REC_BUTTON(starts the recording), REP_BUTTON(turns on/off the replay), RDY(Conneted to EOC of ADC), 1ms(Generates interrupts every 1ms to get samples from the ADC) and n ms(where n is the delay between samples)
2716	4	2KB programmable memory EPROM chip
6116	4	2KB memory programmable memory SRAM chip
7432	8	OR gate
7404	2	NOT gate
74LS138	2	3-to-8 Decoder
74LS373	3	Octal Latch with 3-state outputs
74LS245	2	Octal Bus Transmitter/Receiver designed for 8-line asynchronous 2-way data communication between data buses
DAC08008	1	Takes in digital input and outputs the analog value in terms of current.
ADC0804	1	Used for taking input from the mic and converting it into digital 8-bit output every ms.

LF3511	1	An op-amp, used to convert the outputted current from DAC0808 into a voltage value of the required range(in this case 0-5V)
Mic	1	To record audio and convert it into analog voltage(between 0 and 5V)
Resistors	7	To control current and voltage values, and to make RC circuits to control timings
Capacitors	2	To make RC circuits
LEDs	5	To show the status of system
Buttons	2	To allow for system inputs
7-SEG-CA	1	To display number entered by user
Numpad	1	To allow the user to input number

Flowcharts

Flowchart for the Main Program



Flowchart for the ISRs