A REPORT ON

VOICE DIGITIZER

PREPARED FOR

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In partial fulfilment of requirement of
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Problem Statement

Voice signal is to be digitized and reproduced with certain modification by the microprocessor. Output from a microphone is sampled and digitized using an 8- bit ADC at the rate of 1000 samples per second.
The output obtained from the microphone has been pre-processed inside the microphone to provide a signal varying in amplitude between 0 – 5 V.
The digitized signal is to be stored in RAM. The signal for a period of 6 seconds has to be digitized.
The voice stored has to be reproduced with delay when user closes a switch labelled ***sound replay.***
The delay to be entered by the user are numbers from 1-9, with the help of a key-pad.
The keypad has digits 0-9, backspace and enter.
A seven segment display has to be provided with the keypad to display the delay value entered by the user.
The delay is between samples – If value entered in is 5 then delay between two adjacent samples when reproduced is 5ms.

System Description

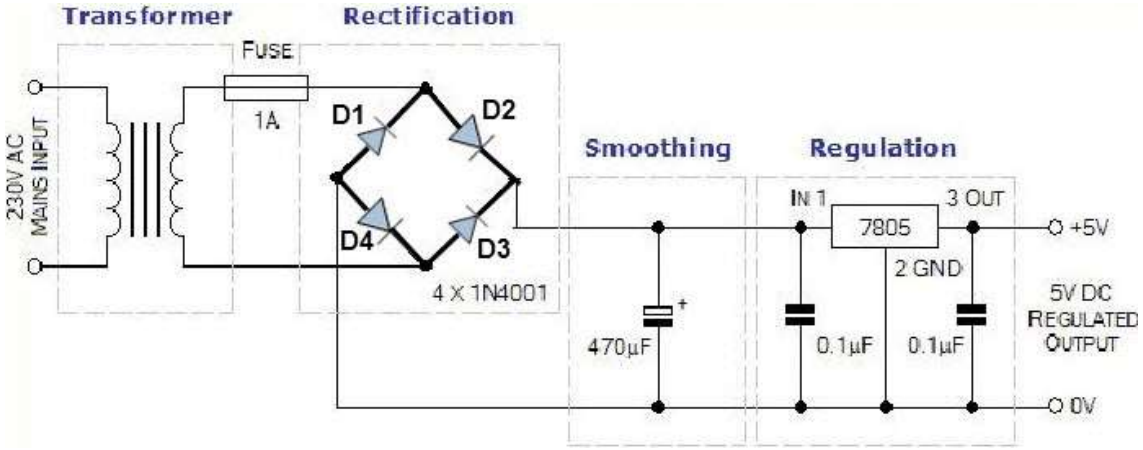
The voice is recorded and reproduced with delay as entered by the user after recording.

The system waits for instruction to start recording from user. It takes in analog input from a mic and digitalizes it at a rate of 1000 samples per second(1000 Hz) for a period of 6 seconds. It digitizes the input using an ADC(ADC0804) and stores samples of 1 byte each in memory. When the recording is done, delay is entered by the user(using num-pad) which is used later to play the sound. The delay should be between 1 and 9.

When the user presses SOUND_REPLAY button, the stored data will be replayed, with the inputted delay between each sample.

Power Supply:

The 230V AC Mains is passed through a step-down transformer, rectifier and smoothening circuitry to give 5V DC Supply. This is used to power the microprocessor and all other ICs used.



Assumptions

1. The analog input is pre-processed in the mic and input is always 0 to 5 V.
2. The system waits for user before performing the next step.
3. Current status of system is shown through LEDs to user.
4. V_{ref} for the ADC and DAC controllers are taken to be 5 volts and the signal conditioning is done accordingly.
5. All the connections are wired.
6. The system only records 6000 samples(which corresponds to 6s with a 1000 samples per second).

System Hardware

Sr. No.	Item Name	Description	Quantity
1	ADC0804	Used for taking input from mic and converting it into digital 8-bit output every ms.	1
2	DAC08008	Takes in digital input and outputs analog value in terms of current.	1
3	LF3511	An op-amp, used to convert outputted current from DAC0808 into a voltage value of required range(in this case 0-5V).	1
4	Mic	To record audio and convert into analog voltage(between 0 and 5V)	1
5	Resistors	To control current and voltage values, and to make RC circuits to control timings	14
6	Capacitors	To make RC circuits	3
7	LEDS	To show status of system	6
8	Buttons	To allow for system inputs	5
9	7-SEG-CA	To display number entered by user	1
10	Numpad	To allow user to input number	1

Design Hardware

Sr. No.	Component Number	Description and Specification	Quantity
1	8086	16-bit microprocessor chip	1
2	8284	Clock oscillator chip for supplying a clock signal to 8086	1
3	8253A	Programmable Interval Timer which performs timing and counting functions using 3 16-bit counters.	1
4	8255A	Programmable input-output device consisting of 3 8-bit directional input-output ports (24 i/o ports)	2
5	8259	Programmable Interrupt Controller for 8086 microprocessors	1
6	2716	2KB programmable memory EPROM chip	4
7	6116	2KB programmable memory SRAM chip	4
8	7432	OR Gate	4
9	7404	NOT Gate	4
10	74LS139	2-to-4 Decoder Chip	2
11	74LS373	Octal Latch with 3-state outputs	3
12	74LS245	Octal Bus Transmitter/Receiver designed for 8-line asynchronous 2-way data communication between data buses	2
13	74HCT244	Octal non-inverting buffer(used as 4-bit buffer)	1

Memory Mapping

ROM_{1E} (2K chip)	00000_H - $00FFE_H$
ROM_{1O} (2K chip)	00001_H - $00FFF_H$
RAM_{1E} (2K chip)	01000_H - $01FFE_H$
RAM_{1O} (2K chip)	01001_H - $01FFF_H$
RAM_{2E} (2K chip)	02000_H - $02FFE_H$
RAM_{2O} (2K chip)	02001_H - $02FFF_H$
ROM_{2E} (2K chip)	$FF000_H$ - $FFFFE_H$
ROM_{2O} (2K chip)	$FF001_H$ - $FFFFF_H$

I/O Mapping

$8255_{(1)}$ [For ADC and DAC]	00_H - 06_H
$8255_{(2)}$ [For 7seg, keyboard and LEDs]	10_H - 16_H
$8253_{(2)}$	20_H - 26_H
8259	20_H - 22_H

Algorithm Flowchart: