

Automatic Telephone Answering Machine With Image Processing

Richa Singh Rathore, Disha Malik²

ABSTRACT

An automatic telephone answering machine or system is electronic devices that answers and plays a prerecorded message and is capable of recording a message the caller wants to leave. These systems include message recording system having remote access to message playback, automatic dialing, equipment to receive an alarm, automatic data entry answering systems and other common telephone devices being used along with modem equipments. The microcontroller typically controls a number of peripherals, components of the answering machine such as an LCD or LED display, an indicator light for recording and playback options, a DTMF receiver and an audio controller. A telephone answering machine must be capable of being remotely activated consisting of:

- A switch deciding the mode of operation either automatic or normal mode.
- Provision for receiving the calls automatically when in automatic mode.
- Provision for recording the message to be delivered to the incoming user and also to record his message.
- Storage for the message.
- Microcontroller to deliver control signal as per the mode of operation.

Commonly used telephone answering devices comprises of a number of features which allow a user to examine the presence of a call, seize calls, play back recorded voice messages, record an announcement etc. Triggering of a telephone answering machine done by counting the incoming ring signals and when the counts surpass a preset number set by the user. The machine is programmed in such a way that if the user does not attain his telephone within a specified time period which is the function of number of ring signals, the call is automatically answered and a message is played back to the caller as well as asks him to leave a message.

Richa Singh Rathore

Volume: 1 Issue: 1

Index Terms: *Answering machine, Incoming ring signal, Play Back, Call*

1. INTRODUCTION

1.1 Definition

An automatic telephone answering machine can be identified as an electronic device which has the basic feature of answering a call in the absence of the receiving user. It has some added features like playing back a pre-recorded audio message to the caller. If the caller wants to leave a voice message he can do so by accepting the option to record a message. The answering machine or system can be described as data processing system. It can be connected to multiple telephone lines. There might be also additional features like connect to another predefined number and forward the recorded message to the present location of receiving end user.

1.2 Components

The ATAM device automatically answers an incoming telephone call, plays a prerecorded message and records a message that the caller leaves. These systems include message recording system having;

- Remote access message playback
- Automatic dial up alarm receiving equipment

- Automatic telephone message recording equipment
- Automatic telephone call forwarding equipment
- Automatic answering data entry systems
- The microcontroller to control a multiple number of peripherals, and basic components of an answering machine
- Peripherals like an LCD or LED display, an indicator light for recording and playback options, a DTMF receiver and an audio controller.

1.3 Operation

The basic function performed by the answering machines is to automatically answer calls coming from an incoming telephone line. In the absence of user of the machine, when the call is unanswered up to a certain time interval, a pre-recorded outgoing message is being played to the calling party. Then it asks for any message to the calling party and records the message he leaves.

A typical telephone answering machine is a separate device connected to a telephone line. This type of answering machines usually

Richa Singh Rathore

Volume: 1 Issue: 1

includes circuitry for the detection of a ringing signal on the telephone line signifying the existence of an incoming call. It answers the call by taking the line off-hook, plays an outgoing message, records an incoming message if any, and hangs up the line in order to respond to subsequent telephone calls.

1.4 Motivation

Our main goal is to provide a solution beyond the basic functionality provided by a phone. In addition to implementing video and answering machine capabilities, other features are included by making use of basic hardware components already included in the system, therefore providing a competitive and feasible solution for the embedded system in the least amount of time.

1.5 Specification

- The phone should use the POTS telephone system.
- Compatibility with other videophones that follow the H.324 standard.
- Handle analog to analog communication (for compatibility with Regular phones) and digital to digital communication with other Video phones.
- The phone gives users a “video” option, which allows the users to send

to each other images to be viewed on the videophone’s LCD screen every 12 seconds.

- The phone can be used as a digital picture frame by displaying stored images when idle.
- The videophone has an answering machine feature that can record both voice and images.
- The phone can store up to 30 one minute messages and 5 images per message. (1 image every 12 sec)
- The phone uses MPEG compression on the voice messages that it stores. It uses JPEG compression on any images that it stores.
- The phone has four modes. *Playback*, *Playback Voice Only*, *playback Image Only*, *Call*.

The phone contains the following buttons:

- **Dial pad**- For dialing numbers
- **Mode**- Switching between the 4 modes
- **Play/Reverse**- Begin playing messages. If messages are already playing reverse the direction of play.
- **Delete/Undelete**- Delete the current message after messages are done playing/ cancel delete.

Richa Singh Rathore

Volume: 1 Issue: 1

- **Skip**- Skip this message plays the next or previous message according to direction of play (Forward/Backward).
- **Stop** - Stop message playback.
- **Record Announcement**- Record the announcement.
- **Hear Announcement**- Hear the announcement
- **Memo** - Record a memo as a voice message

- **Video**- The phone signals another Videophone and

Then starts sending it images every 12 sec.

2. Block Diagram

The Block diagram of Automatic Answering Machine is shown in Figure: 1

This Includes Main Controller Unit, Audio Unit, Video Unit, Camera, Display, Phone- Modem Interface.

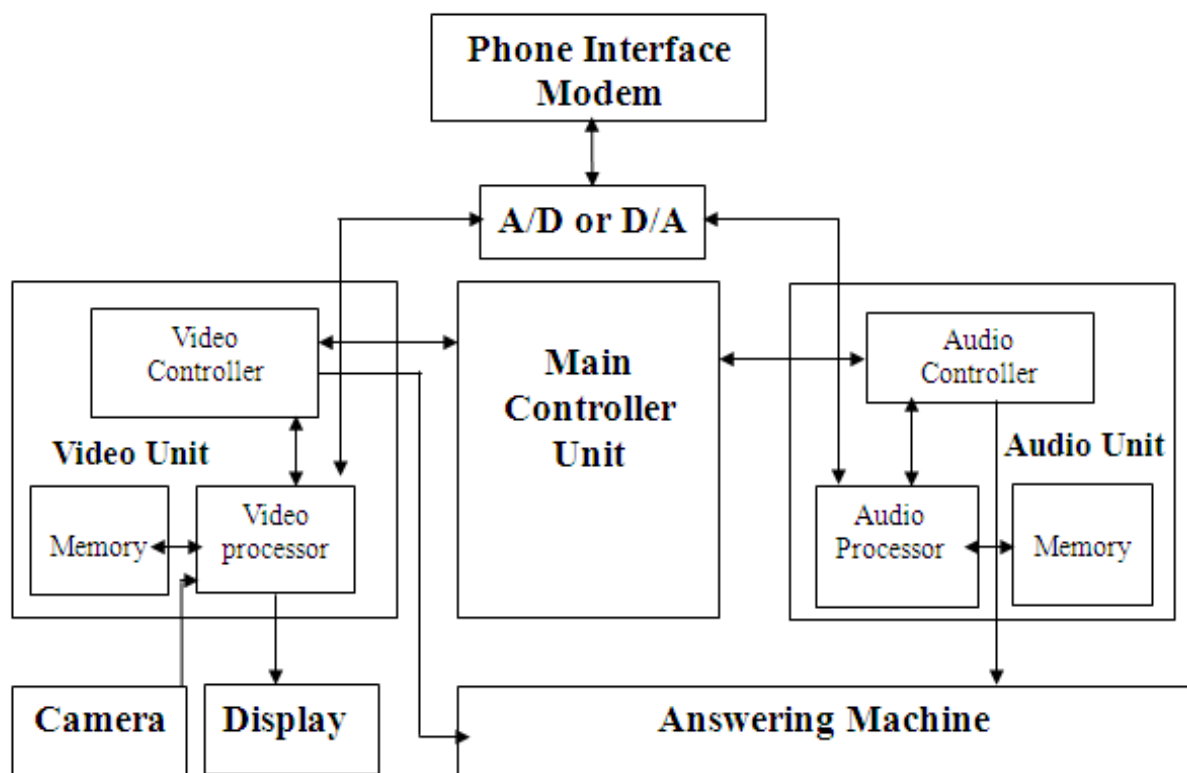


Figure 1: Block Diagram of Automatic Telephone Answering Machine

Richa Singh Rathore

Volume: 1 Issue: 1

3. FLOW CHART

Flow chart of Automatic Telephone Answering Machine is shown in Figure 2. Which shows how it will work.

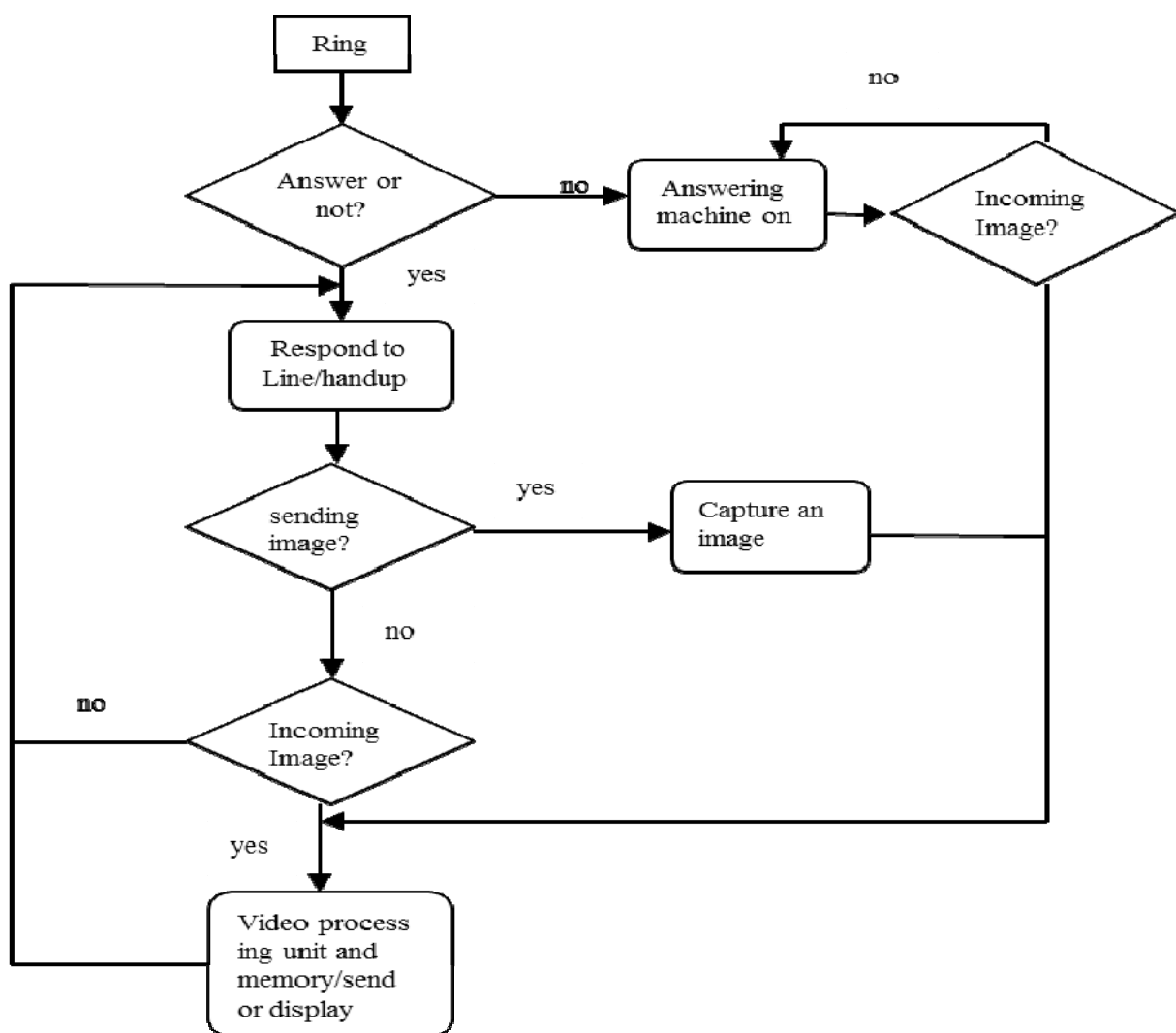


Figure 2: Flow Chart Representation of Automatic Telephone Answering Machine

Richa Singh Rathore

Volume: 1 Issue: 1

Finite State Machine (FSM)- A finite state machine is one that has a limited or finite number of possible states.

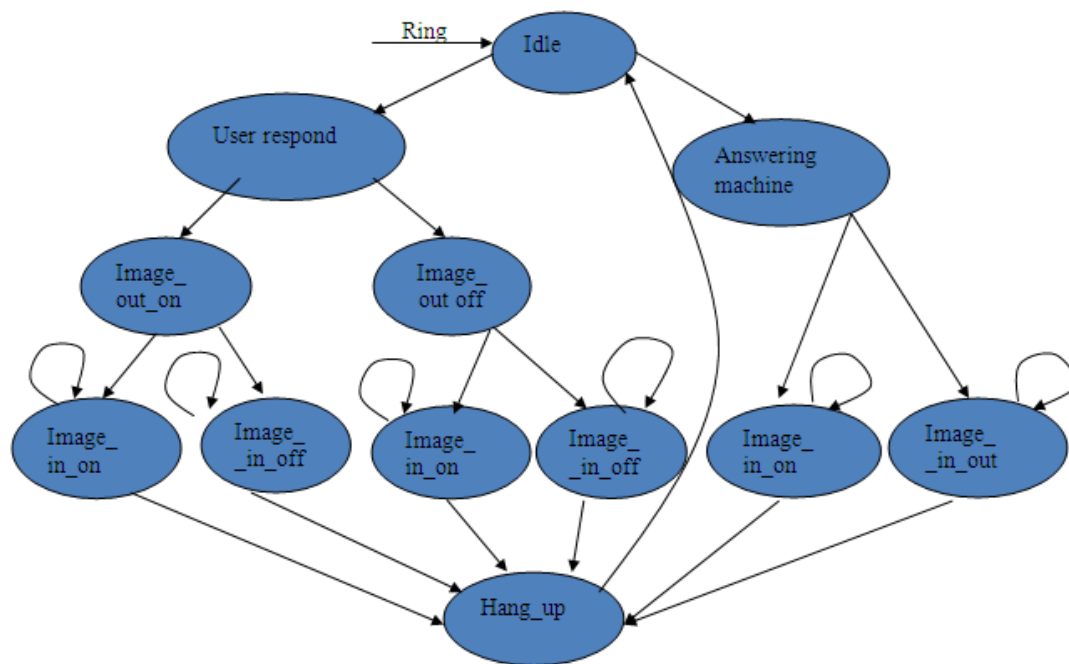


Figure 3: State Level Diagram of Finite State Machine

4. Components

Image compression and decompression unit-

Compressing a file is the process by which a large file is converted to a smaller file, decompressing a process by which a compressed file is converted back to its standard state.

POTS - Plain old telephone service.

Audio compression and decompression unit-

Compression reduces the number of bits in total required to represent the same information. Decompression refers to the opposite process of compression that is restored to its original quality.

Controller Unit-It controls communication and co-ordination between input/output devices.

Richa Singh Rathore

Volume: 1 Issue: 1

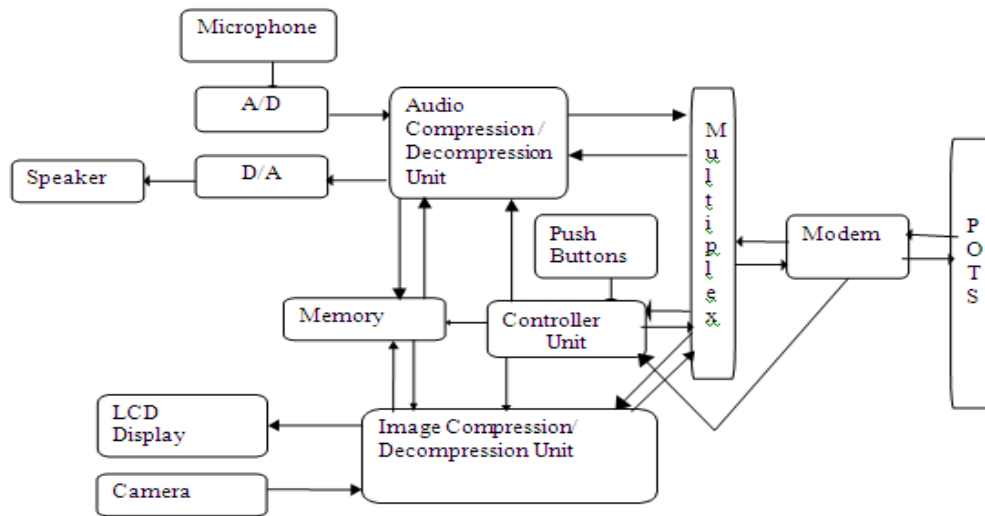


Figure 4: Block Diagram

5. Conclusions

- A videophone system has been designed based on ITU compatible standard.
- Operation function, feasibility, and structure diagram have been provided and analyzed.
- An example focused on baseline sequential FDCT and IDCT based coding for image compression and decompression is to demonstrate the typical JPEG image processing.
- VHDL simulation and synthesis has been made to generate a gate level

structure to fulfill the required function.

6. References

General

1. ITU-T Recommendation H.261 (1993) - Video Codec for audiovisual services at px64 kbit/s
2. Telecommunication Transmission Handbook, Third Edition, Roger L. Freeman, Wiley Publishing, 1991
3. ITU-T Recommendation H.324 (02/98) – Terminal for Low Bit-Rate Multimedia Communication, ITU
4. ITU-T Recommendation H.245 (6/4/96) – Line Transmission of Non-Telephone Signals, ITU

Richa Singh Rathore

Volume: 1 Issue: 1

5. Generic Coding of Moving Pictures and Associated Audio, Recommendation H.26x, ISO, IEC, 3/27/00
6. Coding of Moving Pictures and Associated Audio, ISO/ IEC/ JTC1/ SC29/ WG11N0531, MPEG93, 9/ 93
7. Coding of Moving Pictures and Associated Audio, ISO/ IEC/ JTC1/ SC29/ WG11N0403, MPEG93/ 479, 3 /27 /00
8. ITU-T Recommendation V.34 (9/94) – Data Communication over the Telephone Network, ITU

Video Compression



1. Video Compression Techniques Over Low-Bandwidth Lines, RoaltAalmoes, August 27,1996
2. H.263 Video Coding http://www.4izi.com/h263_video_codec.htm
3. H.263 Video Coding <http://www-mobile.ecs.soton.ac.uk/peter/h263/h263.html>
4. H.261 Video Coding <http://www-mobile.ecs.soton.ac.uk/peter/h261/h261html>
5. H.263+: Video Coding at Low Bit Rates, IEEE Transactions on Circuits and Systems for Video Technology, Vol 8. No. 7, November 1998, Guy Cote, Berne Erol, Michael Gallant, Faouzi Kossentini
6. The JPEG Still Picture Compression Standard, Gregory Wallace, April 1991 Communications of the ACM

7. Digital Image Processing, Gregory Baxes, John Wiley & Sons, 1994

Audio Compression

1. A Tutorial on MPEG/Audio Compression, Davis Pan, IEEE Multimedia Journal, Summer 1995 System Parts
1. SED1330F/1335F/1336F LCD Controller ICs Technical Manual, S-Mos Systems, Inc, September, 1995, Version 0.4
2. Interfacing a Hantronix 320x240 Graphics Module to an 8-bit Microcontroller, Hantronix, Application Note, 2000
3. TMS320C54x DSP Reference Set Volume 5: Enhanced Peripherals
4. TMS320C54x Serial Ports: Addendum to the TMS320C54x User's Guide

BIOGRAPHIES:

	<p>Richa Singh Rathore did her B.tech in ECE from Krishna Girls Engineering College Kanpur. She is pursuing M.tech in VLSI from JVVU. Her area of interest are Digital Image Processing, Digital System Design, Intergated Circuit, VHDL etc.</p>
	<p>Disha Malik did her B.tech in ECE from G.L.Bajaj Institute of Technology and Management Greater Noida. She is pursuing M.tech in VLSI from JVVU. Her area of interest are Digital Image processing, Digital Computer Networking, VHDL etc.</p>