

INTEGRATED TELEPHONE ANSWERING MACHINE

(IAM)

SUBMITTED BY: ADNAN MUSHTAQ



SUPERVISED BY: Mrs. FARZANA KHAN

This thesis was submitted to fulfill the requirements of the MSC degree.

**Bahria Institute of Management & Computer Science
Islamabad Campus**

2001-2004

DEDICATED

To

“MY PARENTS SISTER AND BROTHERS”

By virtue of whose prayers

I have been able to reach

this position.

ACKNOWLEDGEMENT

I offer my humblest sense of gratitude to "ALMIGHTY ALLAH" the most compassionate the beneficent, the merciful and the gracious, whose bounteous blessings enabled me to perceive higher ideas of life and universe and helped me to complete this research work and all blessing to his Prophet Muhammad (Sallallahho Alaiah Wa Alaieh Wasallum) who has the most personality all over the world and guide his "Ummah" to seek knowledge for cradle to grave.

With deep reverence and sincerity I feel much pleasure in expressing my heartiest gratitude to my supervisor, ***Mrs. Farzana Khan***, Assistant Professor, Department of Computer Sciences, Bahria University Islamabad, for her dynamic and affectionate supervision and scholastic guidance during the study period.

Words are lacking to express obligations to my affectionate Father, Mother, Brothers and Sisters for their love, good wishes, inspirations and unceasing prayers, without which the present destination would have been mere a dream.

ABSTRACT

In the era of information technology, when everything is computerized, it is required to develop a system which can handle telephone operations in more efficient way. The objective of this project is to develop an easy-to-understand and smooth-to-run telephone answering machine system. The scope of the project includes development of telephone answering machine, implementation of Text-to-Speech (TTS) engine and development of phone book. The method of study is to use System Development Life Cycle (SDLC) during the development of the project and to build a prototype. If the prototype is accepted by the end-user, then the analysis, design, coding, testing, and implementation processes follow the course. The system is designed in such a way that it provides complete rescue from the drawbacks of the hardware based telephone answering machine.

FINAL APPROVAL

This is certify that we have read the project report submitted by **Adnan Mushtaq** and it is our judgment that this report is of well standard and it is accepted by **BAHRIA UNIVERSITY ISLAMABAD**, for the degree of Master of Computer Science, MCS.

1- Supervisor

Razzaq Khan



2- HOD

J. S. J.

3- Internal Examiner

Lorrey

4- External Examiner

Quraizze

Table of Contents

Chapeter 1	7
INTRODUCTIN AND BACKGROUND	7
1.1. Project In Brief.....	8
1.2. History of Telephone Answering Machine.....	8
1.2.1. Early Era	8
1.2.2. Middle Era	9
1.2.3. Modern Era	9
1.3. Objectives of the Telephone Answering Machine.....	10
1.4. Project Title.....	10
1.5. Project Overview	10
1.6. Scope of the Project	11
1.7. Draw Backs of Existing system	11
1.8. Project Features.....	11
1.8.1. Caller ID.....	12
1.8.2. Message notifications.....	12
1.8.3. Data Base	12
1.8.4. Voice Announcement.....	12
1.8.5. Text-to-speech Conversion	12
Chapeter 2	13
Requirement Analysis	13
2.1. Review of Literature	14
2.1.1. Marquis(1989).....	14
2.1.2. Deitel(1991).....	14
2.1.3. Shelly (1991).....	14
2.1.4. Tackett (1994).....	15
2.1.5. Blaszcak (1996).....	15
2.1.6. Pressman (2001).....	15
2.2. Materials & methods.....	16
2.3. Preliminary Investigation.....	17

2.4.	Feasibility Study	17
2.4.1.	Technical Feasibility.....	17
2.4.2.	Operational functionality	18
2.4.3.	Economic feasibility	18
2.5.	Objectives of Preliminary Investigation	18
2.5.1.	Steps of Preliminary Investigation.....	18
2.5.1.1.	Identify the Necessary Information	19
2.5.1.2.	Perform fact finding to gather the required information.....	19
2.6.	Analyze the information	19
2.7.	Final report.....	20
	Chapeter 3	21
	TAPI Technology & Speech Technology.....	21
3.1.	Telephony Application Programming Interface	22
3.2.	The Telephony API Model	22
3.2.1.	Line devices	23
3.2.2.	Phone devices.....	24
3.3.	TAPI and the WOSA Model.....	25
3.4.	Typical Configurations of TAPI	25
3.4.1.	Phone-Based Configurations	26
3.4.2.	PC-Based Configurations.....	27
3.4.3.	Shared or Unified Line Configuration	28
3.4.4.	Multiline Configurations.....	30
3.5.	Telephone Line Services.....	31
3.6.	Inside TAPI.....	32
3.7.	TAPI Architecture.....	33
3.7.1.	Call Control Model	34
3.8.	Object relationships	35
3.8.1.	Using TAPI Objects	36
3.8.1.1.	To place a call	36
3.8.1.2.	To Answer a Call	36
3.8.2.	Media Streaming Model	37

3.9.	TAPI Versions	37
3.10.	Advantages of TAPI Based Applications	40
3.11.	Speech Technology	41
3.11.1.	Speech API.....	41
3.12.	Introduction to Speech Synthesis.....	42
3.12.1.	Steps of Speech Synthesis.....	44
3.13.	How does a machine read?	45
3.13.1.	The Natural Language Processing Component.....	46
3.14.	Problems in Speech Synthesis	48
3.14.1.	Text-to-Phonetic Conversion.....	48
3.15.	Speech Synthesis Limitations	49
3.16.	Speech Synthesis Assessment.....	50
	Chapeter 4	52
	Initial System Analysis & Proposed System	52
4.1.	System Analysis.....	53
4.2.	IAM development	53
4.3.	Mechanism of Text-to-Speech.....	53
4.4.	Handle the telephone using Telephony API	54
4.5.	Microsoft Visual C++ 6.0	55
4.6.	Diagram analysis.....	55
4.6.1.	Data Flow Diagram.....	56
4.6.2.	Block diagram.....	57
4.6.3.	Use case diagram	58
4.6.4.	Top level use case diagram	59
4.6.5.	Sequence diagram	60
4.6.6.	Collaboration diagram	61
4.7.	System Requirements.....	62
4.8.	Audio Hardware.....	62
4.8.1.	Microphone.....	62
4.8.2.	Sound Card.....	62
4.9.	Installation Requirements	63

Chapeter 5	64
Detailed System Design.....	64
5.1. System Design Phase	65
5.1.1. Relationship between Analysis & Design.....	65
5.2. Which Software Approaches to Follow ?	65
5.3. How to Manage IAM.....	65
5.4. Reason of dividing the IAM	66
5.5. Speech Module.....	66
5.6. Telephone Module	66
5.7. Main Module.....	67
5.8. Application Architecture.....	68
5.8.1. Modem types and Function.....	69
Chapeter 6	70
Implementation & Testing	70
6.1. System Implementation	71
6.2. Code the Program	71
6.3. Testing.....	71
6.3.1. Desk Testing:	71
6.3.2. Unit Testing:	72
6.3.3. String Testing:.....	72
6.3.4. System Testing:.....	72
6.4. Documentation	73
6.4.1. Program Documentation	73
6.4.2. System Documentation	73
6.4.3. User Documentation	73
6.5. Training.....	73
6.6. Maintenance Activities	74
6.7. Managing system performance	74
6.7.1. Response Time.....	74
6.7.2. Turnaround Time	74
6.7.3. Throughput.....	75

Conclusions.....	76
Future Enhancements.....	77
Literature Reference.....	78

List of Figures

Figure 1 System Development Life Cycle.....	16
Figure 2 Line Devices.....	23
Figure 3 Phone Based TAPI Configuration.....	26
Figure 4 PC Based Configuration.....	27
Figure 5 Shared or Unified Configuration.....	28
Figure 6 Telephone Headsets.....	29
Figure 7 TAPI Architecture	33
Figure 8 Call Control Model.....	34
Figure 9 Speech API Architecture	41
Figure 10 Text To Speech Synthesis	43
Figure 11 TTS Synthesizer	46
Figure 12 TEXT Processing.....	47
Figure 13 Data Flow Diagram	56
Figure 14 Block Diagram.....	57
Figure 15 Use Case Diagram	58
Figure 16 Top Level Use Case Diagram.....	59
Figure 17 Sequence Diagram.....	60
Figure 18 Collaboration Diagram	61

List of Tables

Table 1 TAPI Versions	38
Table 2 TAPI Function	39