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INTERACTIVE VOICE RESPONSE SYSTEM FOR EDUCATIONAL INSTITUTION

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***Abstract*:-**

The Interactive Voice Response (IVR) System serves as a bridge between people and computer databases by connecting the cellphone network with the database. The cellphone user can access the information from anywhere at anytime simply by dialing a specified number and following an on-line instruction when a connection has been established. The IVR system uses pre-recorded or computer generated voice responses to provide information in response to an input from a cellphone caller. The input may be given by means of touch-tone or Dual Tone Multi-Frequency (DTMF) signal, which is generated when a caller presses a key of his/her cellphone set, and the sequence of messages to be played is determined dynamically according to an internal menu structure (maintained within the IVR application program) and the user input. The IVRS system which will be designed will provide an ideal platform for the operation of start-ups and existing small concerns. It will be a highly economical and efficient. The IVRS system which will be designed will consist of simple components like microcontroller and some basic application chips interfaced to a PC which will have small software running in the backend while the other jobs are performed on the front end.

Keywords— PC, cellphone, GSM, Microcontroller,DTMF.

I. INTRODUCTION

Interactive Voice Response systems can play a significant role in providing efficient customer service. Interactive Voice Response (IVR) is a software application that accepts a touch-tone keypad selection from cellphone and provides appropriate responses in the form of voice. Interactive voice response (IVR) is an interaction between the caller and the computer provided with voice responses by the computer according to the caller response. IVRS uses ring detector circuitry for detecting and connecting the caller to the computer. The DTMF signal from the caller is provided from the caller's cellphone keypad. Caller can access the information from anywhere at any time simply by dialing a specified IVRS number and following voice response according to user input.

The input will be given by in form of dual tone multi-frequency signal, which is generated when a caller presses a key from keypad of a cellphone set. The voice responses to the caller are provided when the caller gets connected to the computer. Voice response is generated dynamically according to the caller's DTMF signal from caller's cellphone.

IVRS allows caller or users i.e. parents to interact with a college host system via a cellphone, after which they can get service their own inquiries by following the IVR dialogue. IVR systems can respond with dynamically generated audio to further direct users on how to proceed.

A. Cellphone:

Cellphone (of specified contact number) used is acts host connecting device communicate caller with computer.

B.Computer:

It contains the database. The database is accordingly referenced and the necessary information is obtained and provides to caller in the form of voice.

C. DTMF decoder

Dual-tone multi-frequency (DTMF) is an international signaling standard for cellphone digits. A DTMF signal consists of two superimposed sinusoidal waveforms whose frequencies are chosen from a set of eight standardized frequencies.

D. Microcontroller

Microcontroller used here is AT 89S52 which is 40 is IC. It consists of for ports namely port 0,port 1,port 2,and port 3. The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the indus-try-standard 80C51 instruction set and pinout.

E.GSM Module

The GSM module is used to send the SMS to the user called and send the Miss Call to the Users those who not called and whose data is stored in the data base. The GSM consist of one serial port pin and which works on 12V DC Power supply.

H. Serial interface

Serial interface provide the serial interface from microcontroller to computer. The communication of the USB device is dependent on pipes. A pipe is a connection from the host controller to a logical point, found on a device, and named an endpoint.

II. LITERATURE SURVEY

Research in speech technology predated the advent of digital computers. It starts with a speech synthesis project at Bell Labs in 1936 that resulted in a device called "the Voder" which was demonstrated at the 1939 World's Fair. A paper on "IVRS for college automation" by Dr. A.R.Karwankar. In this paper the IVR system was used with telephone lines with ring detector to detect STD, ISD & LOCAL calls. A paper on "Cellphone Based Interactive Voice Response System" by Prof. R.R.Bhambar. In this IVR system uses Cellphone instead of Telephone. DTMF technology at the Seattle World Fair in 1962.Dual tone multi frequency telephones allowed the use of in band signaling. They transmit audible tones in the same 300 Hz to 3.4 kHz range occupied by the human voice[2].The blueprint for IVRS was born [6].

Despite the increase in deployment of IVR technology in the 1970's the technology was still complex and expensive to automate tasks in call centers. Early voice response systems were DSP technology based, and was limited to small vocabularies. In the early 1980's a first mainstream market competitor emerged when Leon Ferber (Perception Technology) realized that hard drive technology (read/write random-access to digitized voice data) had finally reached a cost effective point [6]. A system could play the appropriate spoken message, and process the human's dual tone multi frequency response. A DTMF signal consists of two superimposed sinusoidal waveforms whose frequencies are chosen from a set of eight standardized frequencies [4]. For example, by pressing the button on the touch-tone telephone keypad, a signal consisting of a row frequency in Hz sinusoid and a column frequency in Hz sinusoid is produced. A DTMF detector able to detect these frequencies in the presence of noise, and determines which button is pressed [4].

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the indus-try-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory pro-grammer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

III. PROPOSED SYSTEM

Fig -1: **Implemented IVRS System**

A. Block diagram Interactive Voice Response system

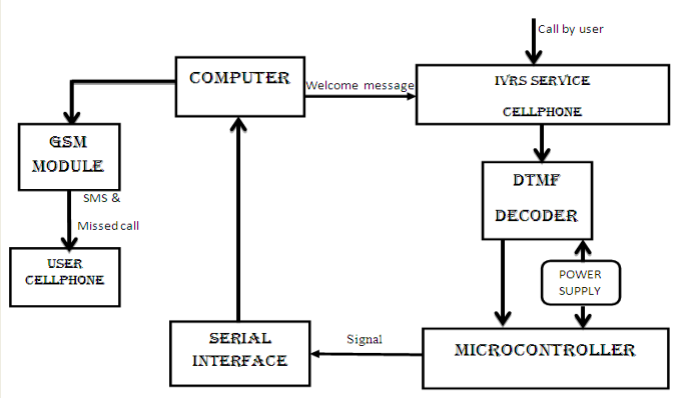

Fig -2: IVRS block diagram

B. IVRS Explanation

- *Cellphone Unit*

Cellphone is used for communication purpose. This cellphone has specified contact number using which caller can communicate with college host [1]. An input mechanism to allow the caller to interact with the phone.GSM feature phones require a small microchip called Subscriber Identity Module or SIM card.

- *DTMF detector*

It converts the DTMF tones into the BCD data.

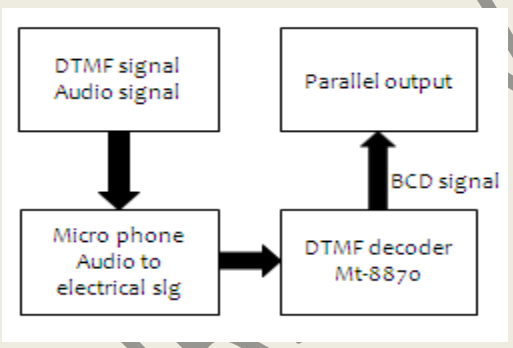

Fig -3: DTMF Block diagram

The architecture of DTMF Detector contains band split filter section, which separates high and low group tones followed by digital counting section which verifies frequency and duration of the received tones before sending the corresponding code to the output bus [3]. Pressing a single key will send a sinusoidal tone for each of the two frequencies (row and column frequency) [8].

DTMF Keypad Frequencies				
	1209Hz	1336Hz	1477Hz	1633Hz
697Hz	1	2	3	A
770Hz	4	5	6	B
852Hz	7	8	9	C
941Hz	*	0	#	D

Fig -4: Frequency structure for corresponding key

- *Microcontroller*

It controls the operation if various parts of the INR system. When a call is detected by ring detector, the micro controller switches the DTMF It accepts the BCD signal, process them and transmit them serially to the computer. The Microcontroller is the component which controls hardware of the system and sends a signal to the PC via RS232 to run the wave file welcoming the user to the IVRS. The number given by the user is decoded by the DTMF IC and is stored in the memory of the microcontroller. The code stored in the microcontroller is send to the serial port. If any hardware failure occurs, it is the controller which is taking necessary measures.

- *Serial interface*

Serial interface provide the serial interface from microcontroller to computer. The communication of the USB device is dependent on pipes. A pipe is a connection from the host controller to a logical point, found on a device, and named an endpoint.

- *Computer*

It contains the database. The database is accordingly referenced and the necessary information is obtained and provides to caller in the form of voice.

- *GSM Module*

It contains the SIM Card. The work of GSM module is to send the SMS to the user whose who called after the call is disconnected and give a missed call to the users whose who have not called at the end of the month. The module sends the SMS and Missed call only to the phone numbers storied in data base with respective roll no.

C. IVRS Flow chart

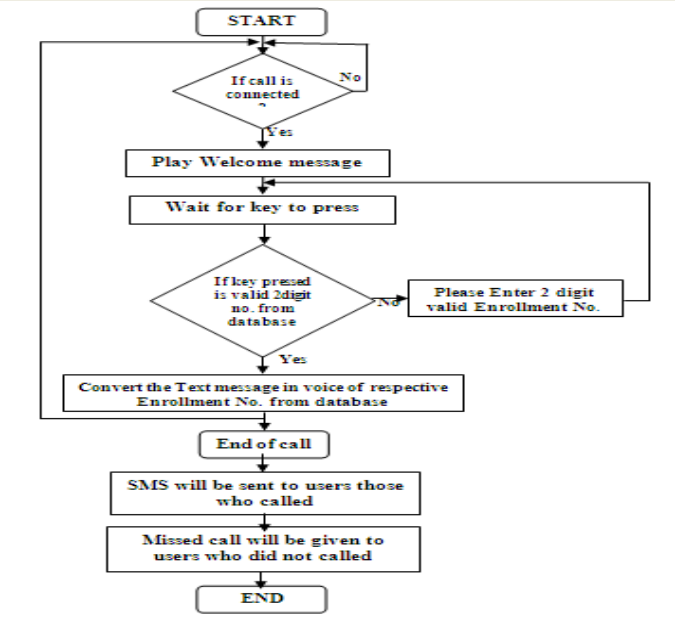

Fig -4: flow chart

D. IVRS Working

- When user wants to access IVR system, he/she simply dials IVRS service number.
- Ring detector circuitry detects the call; it will signal Conditioning the incoming signal and feed to the microcontroller unit for connection establishment i.e. to connect with the computer.
- The connection is established by sending HIGH signal At microcontroller unit input.
- Microcontroller unit will then send a signal to Computer for connecting caller to the computer.
- As caller is connected to computer, computer will greet or send a welcome message in the form of voice to the caller.
- Computer requests (in the form of voice) the caller for valid enrollment number.
- The caller enters the enrollment number by pressing keys of caller cellphone keypad.
- DTMF (Dual Tone Multi Frequency) decoder detects the tone frequency.
- The DTMF decoder circuit will convert DTMF tone to the BCD equivalent.
- BCD signal from DTMF Decoder output applied as input for microcontroller unit.
- Microcontroller accept BCD signal, process them and transmit them serially to computer.
- Database in computer for entered enrolment number student is verified accordingly.
- If user enters an invalid enrolment number, computer requests (in the form of voice) for valid enrolment number.
- If entered enrollment number is verified and found valid, then corresponding information is made available for inbuilt stored voice is played from computer.
- Required database of requested enrolment number of the student is provided to the user in the form of voice and call is disconnected.
- When the call is disconnected the corresponding caller will get the same data through SMS on callers mobile number which is registered/stored in data base.
- The callers/users those who did not called will get a missed call on the registered mobile number in data base.

IV. HARDWARE AND SOFTWARE REQUIREMENT

A. Hardware used in system

- Laptop or Computer.
- Cellphone.
- DTMF detector.
- AT89S52 Microcontroller.
- 5V Power supply.
- GSM module
- Max 232

B. Software used in system

- IVRS software window using VB.
- Kill
- Proteus 8 Professional.

V. APPLICATION OF IVRS

- *In educational institutes-*
  With IVR system parents and student as well can use this system to know students academics progresses, notice, etc.

- *In banking-*
  With the use of IVRS bank customers came to know about balance availability and any queries related to customers wish.

- *In Railway enquiry –*
  Using these system users knows train related enquiries and queries.

VI. ADVANTAGES AND DISADVANTAGES

A. Advantages

- IVRS is user friendly system can be access easily.
- IVRS is cost effective system.
- As system providing automatic voice response

according to input it reduces human resource cost.

- With IVRS database can be secured as there is no use internet so no chances of hackers.
- This system can be available for 24 hours.
- System can be portable.
- It reduces human efforts for knowing bus, railway etc enquiry.

B. Disadvantages

- System provides service to single user at a time.
- System responds according to inbuilt voice response In computer which comes with operating system.
- As database limit for enrollment number is of 2 digit enrollment numbers, then user is supposed to enter 2 digit enrollment numbers. (E.g. for enrollment number "1"user is supposed to enter "01".)

VII. GOAL OF PROJECT

Our project allows the caller to know the student's academic status such as semester performance, academic progress, detention status, marks, oral/ practical Schedule, status of the student quickly through a single by the cellphone without the intention of the college authority. The hardware used in system includes ring detector circuitry, DTMF decoder section, microcontroller unit, serial interface unit, computer, GSM module etc. It will be very useful to the parents to know the performance of their son/daughter in the college. The key feature of our system is that no requirement of college authority to receive calls, as we have used Ring Detector circuitry which detects incoming call and connects them automatically to the IVR system. As call is accepted automatically this reduces human authority efforts.

VIII. RESULT

By using this IVR system user/caller comes to know that academic status of particular student through a single call to IVR system service number and responds in the form of voice. Now days peoples are too much busy in their work it is not possible to visit college every time, so that using this system they come to know academic status of the student. Using this system whatever database for particular students responds in the form of voice. And as the written proof we the sending an SMS to the registered mobile number and even if user/caller doesn't call then we can send a missed call to the user/caller on the registered mobile number in data base.

IX. PURPOSE OF OUR IMPLEMENTED SYSTEM

The implemented system proves to be quite useful for the people livening in rural areas. Further there is no need of any an internet connection. It can be used by people who wish to get updated about the information on a daily basis. The implemented system uses auto answer mode to attend the incoming calls and hence there is no need of any human efforts. This system uses mobile network and hence it is not complex. With use of this system we can save time and money and also due to this wastage of paper will be less.

X. CONCLUSION

The implemented system is very beneficial to the user, to know the status of student in the form voice. Using this IVR system user gets information through a single call to the IVR system. The system designed will be intelligent for interaction and will suitably provide a good response to the caller who will access it.It will be truly a responsible system for human mankind. It will be digitally accessed and will have a strong data base and can be operated easily and of low cost. And the future will show that every organization will be using our system. So we have decided it to implement this system for educational purpose i.e.marks, students attendance etc.

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