IVRS Based Intelligent Train Position System

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Abstract:
This paper has proposed the implementation of an IVRS based train position system. In developing regions like India, voice based telecommunication services are one of the most appropriate medium for information dissemination as they overcome prevalent low literacy rate. However, voice based Interactive Voice Response (IVR) systems are still not exploited to their full potential and are commonly considered as frustrating to use. We work on a real world experiment to investigate the usability issues of a voice based system. The Interactive Voice Response System (IVRS) is an interaction between people who want to use IVR system and computer database by connecting the cell phone network with the computer database. The cell phone user can access the information from anywhere at any time simply by dialing a specified IVRS service number and following an instruction when a connection has been established between caller and IVRS service number. The ring detector circuitry detects caller and connects caller to computer. The caller gives input in the form of dual tone multi frequency signal, which is obtained when a caller presses a key from their cell phone set. According to the entered response from the caller when the connection is established, computer generates voice response. Voice response is generated dynamically according to the input from caller. We developing in this system IVRS based train tracking system; user can send the message to the notified mobile number. The module receives the message mobile number and it is calling back it. User access the call then particular train information is sent through GSM module and it information already can be stored in APR9600. The overall process is controlled by ARDUNIO microcontroller. Using IVR system user gets information about requested **train** in the form of voice simply by dialing the IVR system service number provided by corresponding authority.

Keywords: Arduino Mega, GSM SIM900A, APR9600, LCD and   Magnetic Sensors

I. INTRODUCTION

The IVRS system mainly working in the areas of banking, college automation and ect, because its produces the accuracy results. Now days the population India will be increasing at the same time technology also developed day to day. The government of India is updated all status of the trains information. This information knows through the web server or GPRS. But this serves mostly used in the educated peoples; because UN educated peoples they don't know how to use it.

Sequence followed in the IVRS service

• Caller dials the IVRS service number.
• The GSM waits for ringing tones at the end of which, the connection is established.
• The connection is established by lifting the handset of telephone base from ON-HOOK condition
• Now, a pre-recorded audio greets the caller conforming that the number dialed corresponding to the particular service.
• Next, the menu is presented to the caller again in the voice form, giving him the various options to choose from. If the information to be relayed back is confidential, then the system may even ask the dialer, to feed in a password number.
• The database is accordingly referenced and the necessary information is obtained.
• Next, the same information is put across to the user in voice.
• The caller generally given the option to:
a. Repeat whatever information was voiced to him.
b. Repeat the choices

c. Break the call by restarting ON-HOOK condition

II.EXITING METHODOLOGY

The exiting presents a solution implemented at India , to provide an intelligent train tracking and management system to improve the existing railway transport service. The solution is based on powerful combination of mobile computing, Global System for Mobile Communication (GSM), Global Positioning System (GPS), Geographical Information System (GIS) technologies and software. The in-built GPS module identifies the train location with a highest accuracy and transfers the information to the central system via GSM. The availability of this information allows the Train Controller to take accurate decisions as for the train location. Location data can be further processed to provide visual positioning using maps granting a wholesome view on train location. Positioning data along with train speed helps the administration to identify the possible safety issues and react to them effectively using the communication methods provided by the system. Additionally, the location information can be used to facilitate accurate scheduling with regard to train arrival and departure on each station.

III.PROPOSED WORK

In this paper proposed to the **IVRS** system based train position system with Gsm. Here we provided a unique number. Who what's to know the statuses of the train there are simply sending the message to given number. The internet connection is not established in all areas so this system is very useful and

convenient. The interactive voice response (IVR) system serves as a bridge between people & computer by connecting the telephone network with instructions. The telephone user can access the information from anywhere at any time simply by dialing a specified number and following an automated instruction when a connection has been established
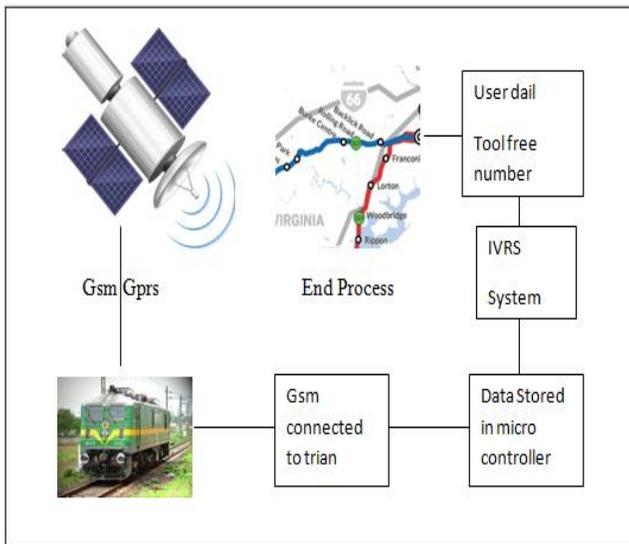

Figure.1. System working diagram

The IVR system uses pre-recorded or computer generated voice responses to provide information in response to an input from a telephone 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 telephone 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 IVR System which will be designed to provide an ideal platform for the operation of start-ups and existing small concern. It will be a highly economical & efficient way to replace the Dialogic card which is very costly and requires a high maintenance and regular up gradation. 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.

IV. HARDWARE IMPLEMENTATION

Our main aim is to design IVRS based train positioning system without using the web server. In this project the ARDUNIO mega 2560 and Magnetic sensors plays the main role, and it is a heart of the system. Proximity sensing is the technique of detecting the presence or absence of an object using a critical distance. Magnetic proximity sensors are non-contact proximity devices that are used to detect magnetic objects (e.g. permanent magnets). They sense the presence of a magnetic object, commonly referred to as the target.
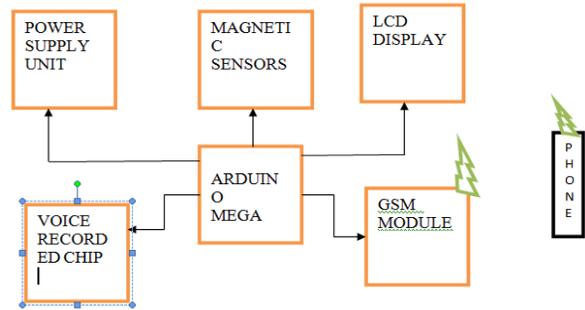

Figure.2. Block diagram of IVRS train position system

The target, characterized by its magnetic field, triggers the switching process when it enters the detection range of the sensor. The switch may be a reed switch or the device could operate due to inductive, variable reluctance, magneto resistive or Hall Effect operating principles. When the sensors identified the train then it data can be stored into the micro controller. Here that microcontroller is interfacing with GSM module, passengers (his/him) wants to train information they dial toll free number that call is connected GSM module.

V. HARDWARE COMPONENTS DESCRIPTION

Arduino mega 2560:

Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.
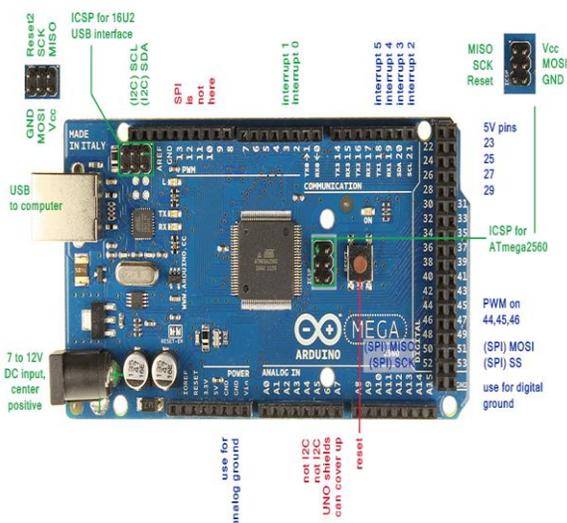

Figure.3. Arduino Mega 2560

Memory:

The Atmega 2560 has 256 KB of flash memory for storing code (of which 8 KB is used for the boot loader), for example code the magnetic sensor one is high corresponding information is stored in EEPROM. 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

Magnetic Sensors:

No standby power requirement. Operates through non-ferrous materials such as wood, plastic or aluminum. Hermetically sealed, magnetically operated contacts continue to operate long after optical and other technologies fail due to contamination.

Figure.4. Magnetic Sensors

GSM module:

GSM SIM 900A GSM is built with Dual Band GSM SIM900A, works on frequencies 900/ 1800 MHz the Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM shield by Arduino is used to send/ receive messages and make/receive call just like a mobile phone by using a SIM card by a network provider. We can do this by plugging the GSM shield into the Arduino board and then plugging in a SIM card from an operator that offers GPRS coverage. The shield employs the use of a radio modem by SIM Comm. We can communicate easily with the shield using the AT commands.
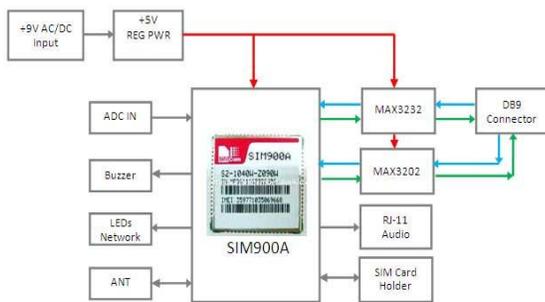

Figure.5. GSM sim900a

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of output taken from the board – say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal computer). The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections. These types of provisions vary with different modules.
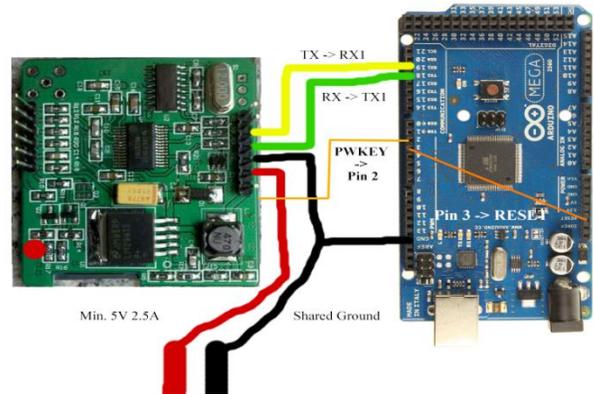

Figure.6. Interfacing of GSM with Arduino Mega 2560

Lots of varieties of GSM modem and GSM Modules are available in the market to choose from. For our project of connecting a gsm modem or module to arduino and hence send and receive voice call using arduino – it's always good to choose an arduino compatible GSM Module – that is a GSM module with TTL Output provisions.

LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

Pre Recorder Chip:

APR9600 is a low-cost high performance sound record/replay IC incorporating flash analogue storage technique. Recorded sound is retained even after power supply is removed from the module. The replayed sound exhibits high quality with a low noise level.
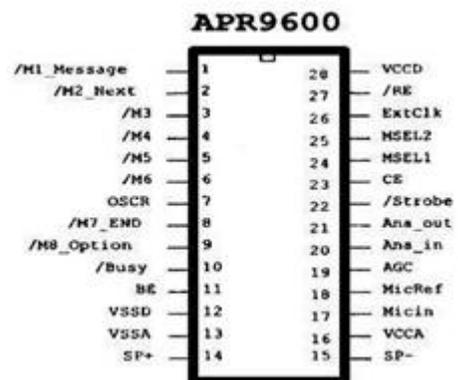

Figure.7. Pin-Out of APR9600

Sampling rate for a 60 second recording period is 4.2 kHz that gives a sound record/replay bandwidth of 20Hz to 2.1 kHz. However, by changing an oscillation resistor, a sampling rate as high as 8.0 kHz can be achieved. This shortens the total length of sound recording to 32 seconds. In telephony, interactive voice response, or IVR, is a phone technology that allows a computer

to detect voice and touch tones using a normal phone call. The IVR system can respond with pre-recorded or dynamically generated audio to further direct callers on how to proceed. IVR systems can be used to control almost any function where the interface can be broken down into a series of simple menu choices. Once constructed IVR systems generally scale well to handle large call volumes. As a part of train tracking position, we have decided to do a project. Voice Interactive System for train tracking. Our project allows the user to know the train arrival and departure of any station. Quickly through the telephone line without the intention of the IRCTC authority. In the hardware side embedded system has been used. It will be very obliging to the uneducated peoples, because they don't know about the how to check status of train by using the GPRS.
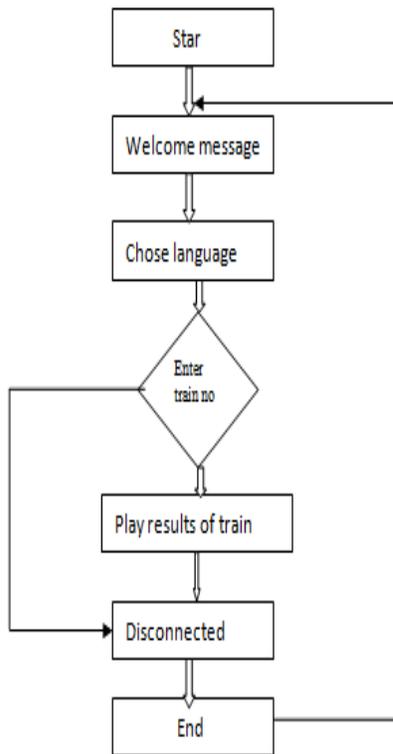
VI. FLOW CHART

Figure.8. Flow chart for IVRS system

VII. HARDWARE MECHANISM

 In the hardware side embedded system has been used. A 100 pin arduino microcontroller 2560 is used because of its compatibility with our hardware. This microcontroller controls the whole hardware. GSM is used for communication purpose. Interactive Voice Response (IVR) is a software application that accepts a combination of voice telephone input and touch-tone keypad selection and provides appropriate responses in the form of voice, fax, callback, e-mail and perhaps other media. IVR is usually part of a larger application that includes database access. An IVR application provides pre-recorded voice responses for appropriate situations, keypad signal logic, and access to relevant data, and potentially the ability to record voice input for later handling.

VIII NEED FOR THE SYSTEM.

This system is mainly developed to in our india some places there is no internet facility, so pepoles facing some problems. The persons who are (he/she) traveling source to destination by using train, they check their status on mobile etc.. by using GPRS, web browser. Most probably educated pepoles only utilize this serivce but un educated people they do not know how to use the GPRS serivses, in our system mainly instead of GPRS or web server using IVRS system. The auothirty provides uniqe number, user can send the messaege to provided number it access the and identifies the mobile number and it's call back to the number. When ever user can lift the call the sensing information can listen.

IX. SOFTWARE REQUIREMENTS

ARDUINO SOFTWARE

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources. The Arduino project was started in Italy to develop low cost hardware for   interaction design. An overview is on the Wikipedia entry for Arduino.

X. RESULT AND DISCUSSIONS

By using this IVR system user/caller comes to know that train status of particular train 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 position
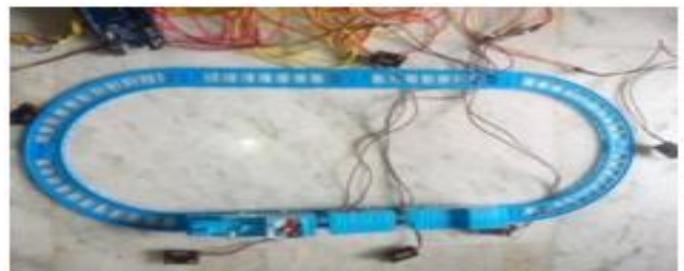

Figure.9. sensors arrangement

Figure.10. track and train position

Figure.11. hard ware interfacings

Train every time, so that using this system they come to know status of the train. Using this system whatever database for particular train position responds in the form of voice. 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.

XI. CONCLUTION&FUTURE SCOPE

The implemented system is very beneficial to the user, to know the status of train in the form voice. Using this IVR system user gets information through a single call to the IVR system In this case by using arduino mega and magnetic sensors, voice recorder chip and GSM module. We are developing an IVRS based train positioning system instead of GPRS. This type of system performs operations similar to that of a human telephone operator. The USP of the project is its relevance to the field of telephony and its cost that will be bearable.

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