An Electronics Tourist Assistance System with Voice Using RFID Technology

Engineering

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ABSTRACT
RFID technology is being used for many-advanced application from health sector to retail depending on the requirement. Automatic visitor/tourist guide information system, which is designed mainly for privacy of visitors. In this RFID based application, which is targeted to reach requirements and aims for particular user group or individual to listen to target within a no familiar or totally unknown area without taking any help out side. Starting from the entrance gate, application guides the user until wherever the user wants to reach and in vise versa direction. During the trip, every user will get information about each spot in selected language. The advantage of the system is the visitor can get the information repeatedly by selecting the button. The small earphone connected to the RF guide system will give clear information of each spot automatically when the person approaches in to. So every visitor will get information individually.

1. INTRODUCTION

The University of Washington's Brockman Memorial Tree Tour published in 1980, has been updated and improved using radio frequency identification (RFID) and personal digital assistant (PDA) technologies. These new technologies combined to increase the ease of locating and positively identifying each tree along the lengthy, spacious tour around the campus.

The Brock" Memorial Tree Tour has been improved through the combination of wireless, tree-locating technology and a portable, handheld information display device (1). Radio frequency identification (RFID) provides the tree tour participant a method of positively identifying each tree through wireless scanning for an identification marker, or tag, embedded beneath the bark of the tree. Once the unique identification number is retrieved, the information is used to locate specific information linked to that number and finally displayed on a portable digital assistant (PDA) device. Automatic visitor/tourist guide information announcement system, which is designed mainly for privacy of visitors and reduce loud noise caused by common announcement.

With growth of tourists day by day, it's obvious that the traditional manual guides can't meet the needs of each visitor, in addition to the shortage of rare language tour guides, in such circumstances smart guide came into being. Using unique identifier stored in RFID chips to express the various attractions, when tourists enter the scenic spot with a smart guide, it'll receive the signals emitted from RF tags and introduce the scenic spot by voice automatically, the whole process without any manual intervention. Starting from the entrance gate, application guides the user until wherever the user wants to reach and in vise versa direction. The advantage of the system is the visitor can get the information repeatedly by selecting the button. The small earphone connected to the RF guide system will give clear information of each spot automatically when the person approaches in to. So every visitor will get information individually without interfering next person.

2. Radio Frequency Identification (RFID)

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data (2). It is an automated data capture technology that can be used to electronically identify, track, and store information contained on a tag that is attached to or embedded in an object, such as a product (3),(4).
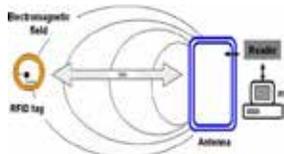

Fig-1-Principle of RFID

1.1. RFID READER

RFID reader module is used to read the information from the tag. The read information is given to the microcontroller.

- Read the data content of an RFID tag
- Relay the data to and from the controller
- Power the tag (for passive tags)

RFID interrogators are essentially hand held devices. They are composed of three parts: an antenna, an RF electronic module which is responsible for communicating with the RFID tag, and a controller electronics module, which is responsible for communicating with the controller.

1.2. RFID TAG

An RFID tag is an electronic device about the size of a grain of rice. The tag contains an antenna and a microchip with data storage. When the antenna receives a specialized radio signal, the microchip "wakes up" and uses the antenna to send a message of its own. A tag can store up to 2 KB of data, far more than bar codes (5), which are also used to track items.
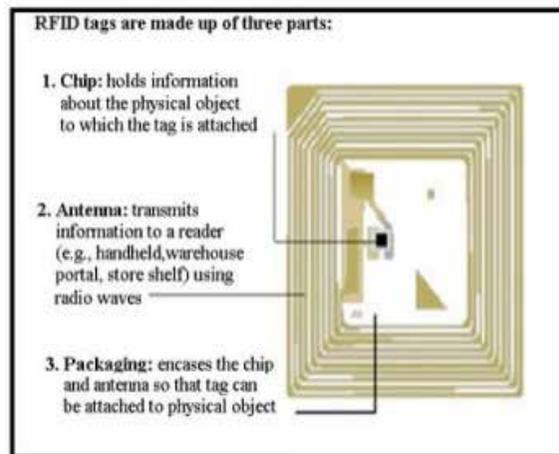

Fig-2-RFid tag

TYPES OF RFID TAGS

- Active tags
- Passive tags
- Semi-active tags

1.3. ACTIVE TAGS

RFID tags are said to be active if they contain an on board power source such as a battery. When the tag needs to transfer data to the interrogator it uses the source to derive power for the transmission.

1.4. PASSIVE TAGS

Passive RFID tags have no on-board power source. Instead, they derive power to transmit data from the signal sent by the reader. As a result of this, passive tags are typically smaller and less expensive.

2. Design and Implementation:

Automatic tourist guide based on RF technology mainly focuses on replacing manual guides. Automatic tourist guide is mainly designed for providing privacy for visitors and reducing loud noise due to manual announcement. With growth of tourists day by day, it's obvious that the traditional manual guides can't meet the needs of each visitor, in addition to the shortage of rare language tour guides, in such circumstances smart guide came into being. So tag with unique information about various locations is placed at different places.

A handheld device with reader is given to the tourist. When the tourist comes with proximity to the tag, it emits signals in the form of EM waves and displayed on the device. The small earphone connected to the RF guide system will give clear information of each spot automatically when the person approaches in to. So every visitor will get information individually without interfering next person.

Using unique identifier stored in RFID chips to express the various attractions, when tourists enter the scenic spot with a smart guide, it'll receive the signals emitted from RF tags and introduce the scenic spot by voice automatically, the whole process without any manual intervention.

3.1. HARDWARE DESCRIPTION
COMPONENTS USED
- ATMEL AT89S52
- IC MAX232
- 125 Khz PASSIVE RFID TAG
- RFID READER
- VOICE MODULE

3.1 ATMEL AT89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out.

The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. 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.

3. SOFTWARE DESCRIPTION

A compiler is a computer program that transforms source code written in a computer language (source language) into another computer language (target language).

The common reason to transform source code is to create an executable program. A program that translates from a low level language to high-level one is called "decompiler".

A program that translates between high level languages is called language translator. A compiler is likely to perform many or all of the following operations: lexical analysis, preprocessing, parsing, semantic analysis, code generation and code optimization. The compiler that we use for coding purpose is known as KEIL MICROVISION-4

4.1 KEIL SOFTWARE

Keil was founded in 1986 to market add-on products for the development tools provided by many of the silicon vendors. Keil implemented the first C Compiler, designed from the ground-up specifically for the 8051 compiler. Keil provides a broad range of development tools like ANSI C Compiler, macro assemblers, debuggers and simulators, linkers, IDES, library managers, real time operating systems and evaluation board, for 8051, 251, ARM and C16X/ST10 families.

4.2 COMPILING USING KEIL SOFTWARE

When starting a new project, simply select the micro controller we use from the device database and the micro vision IDE sets all compilers, assembler, linker and memory options for us. Numerous examples, programs are included to help us get started with the most popular embedded 8051 devices. KEIL micro vision debugger accurately simulates on-chip peripherals of 8051v device. Simulation helps us understand hardware configurations and avoid time wasted on setup problems.

4. System Architecture and Interfacing

An RFID module basically consists of two parts, namely, a tag (RFID card) and a reader. A typical RFID system consists of an antenna, a transceiver and a transponder (RF tag). The radio frequency is read by the transceiver and the information is transferred to a device for further processing. The information (the unique serial number) to be transmitted is stored in the RF tag or transponder. The transponder contains a chip and an antenna mounted on a substrate. The chip transmits the relevant information through antenna.

The antenna also receives the electromagnetic waves sent by the RFID reader. Different RFID tags work on different frequencies. Here low frequency, 125 kHz, RFID tags have been used. These tags work within a range of 10 cm. When an RFID tag comes in this range, the reader detects it and sends a unique code of the tag serially. This serial code, consisting of 12 bytes, is received by the microcontroller.

A serial level converter is required for AT89S52 to receive these serial signals. IC MAX232 has been used for this purpose to interface the RFID reader with microcontroller. In the program, Timer1 is configured for serial communication.

The baud rate is set to 9600bps for data transmission. Pins 1-3 of port P1 (P1.0, P1.1 & P1.2 respectively) of AT89s52 are connected to the control pins 4-6 LCD. The unique identification code of RFID tag is displayed on the LCD. Receiver1 (R1) of MAX232 has been used forthe serial communication.

The receiver pin of RFID reader is connected to R1IN (pin13) of MAX232. R1OUT (pin 12) of MAX232 is connected to RxD (P3.0) of microcontroller. The LCD is initialized to display the code. When a card/tag comes in the proximity of RFID reader, the microcontroller reads the code and sends it to the LCD module.

5. Conclusion:

It is an efficient RFID based application that meets the needs of each and every individual. It saves a lot of time as it does not need any manual assistance. It can be operated as per the convenience of users. The advantage of the system is the visitor can get the information repeatedly by selecting the button .It's an interactive system through which visitors can send data and get answers for them. With help of voice board tourists can simultaneously hear the information about the place through a headphone when tag comes in close proximity to the reader.
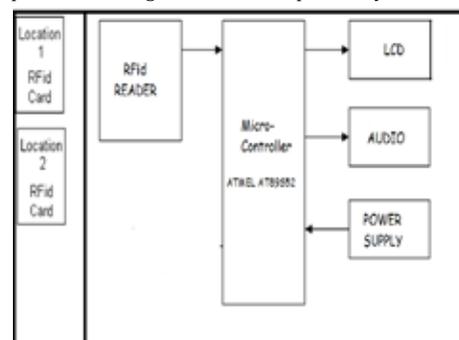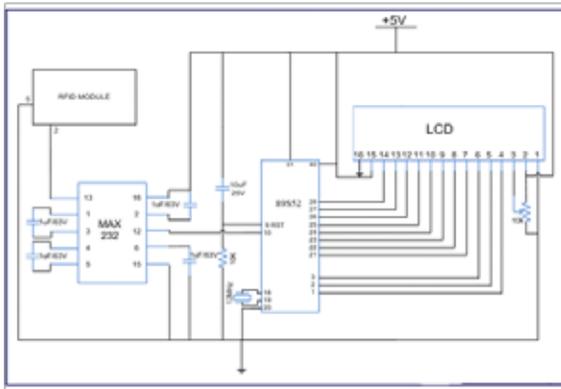

Figure 3. Block Diagram

Figure 4 .INTERFACING MICROCONTROLLER WITH READER AND LCD

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