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RFID-G Based Navigation System For Visually Impaired To Work at Industry

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Abstract – The RFID G Technology is the Tag Grid technology. One of the technical challenges for the modern society to detect and find a solution for visually impaired, with increased security and service motto towards the society helped to bring a solution which would help the visually impaired in the industries and other companies. Here we had come out with a prototype as a way of finding a solution to the visually impaired. The navigation assistant technology using RFID Tag Grid minimizes the dependency. The reader used in this system is embedded in the mobile and shoes to avoid dependency on travel. The RFID reader matches with the information specified to that ID and a voice signal is generated. Wireless RF links is placed in the Bluetooth device/ headphone for voice guidance. The proximity sensing unit is an auxiliary unit is added as a solution to address unexpected and non-mapped obstacles in the user's path.

Basically it contains ultrasonic Sensor Unit interfaced with microcontroller which is inter-linked to a vibrator that would be activated when nearing obstacles. This system is technically and economically feasible and may offer a maximum benefit to the disabled

Keywords: - RFID Tag, reader, Wireless RF links, Proximity, Sensing, Ultrasonic, microcontroller, vibrator

I. INTRODUCTION

The main objective of out proposed system is to provide a reliable system for indoor [5], [7] and outdoor way finding and proximity sensing for visually impaired. The visually impaired students/faculty faces a tremendous dis advantages when they arrives on college campus and in unfamiliar public places. In order to become independent in their daily life with guaranteed full social inclusion, without depending on other physical bodies. Mobiles and wireless technologies can be used to experience the navigation system in a better and effective way into an intelligent environment.

At present the issue we diagnosed and detected is, when the visually impaired persons enter into a building they would be not familiar with the environment they may miss the path often. At such cases they seek for some other individual help, they are pretended to be dependent. And some other problems are

Limitations in pre-viewing

Difficulty in detecting the hazards and obstacles Hence a prototype has been designed to find a solution to solve the above listed issues in an effective, easier and in an economical way using RFID technology both in indoor and outdoor for visually impaired. Many robots are being designed by this technology as said in [8], [9].

II. UNDERTAKEN SURVEY

There are various and numerous research works are carried out in current scenario for navigation, to visual Impaired.

Drishti [1] gives a combination of ultrasound positioning devices for indoor navigation on 'walk able' areas outdoors and differential global positioning system (*DGPS*). The main shortcoming of this system the size and the weight, The DGPS approach is limited due to the signal barriers such as buildings, skyscrapers, and vast trees. Hence it reduces the accuracy rate. The size of the system can be reduced by choosing the smaller size reader it would reflect an issue in the sensing the tags

Magantani et al [3] made a navigation device / system for indoor environment using celling mounted optical beacons; it generates and emits the position code as an IR signal. These IR signals are harmful to the human body. And the major drawback of the system is loss of signals because of the greater ranging in the transmitter and the receiver and it consumes more power and the software development is a complex task to carry out.

Marta Mei [2] developed a project named GLIDEO (*Glove for Identification and Description of B Objects*) it had a database to store the tag information which can be updated from the on net sources available on internet. This system possess a security issue and

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building and maintaining of these databases is highly risky since it varies from time to tim

III. WORKING

The system, which consists of two units, namely Proximity Sensing *(Obstacle Detection)* unit and Navigation Unit, figure 1.1 shows the block diagram of the proposed system. The Oscillator generates the 40KHZ signal, which is fed to the ultrasonic transmitter.

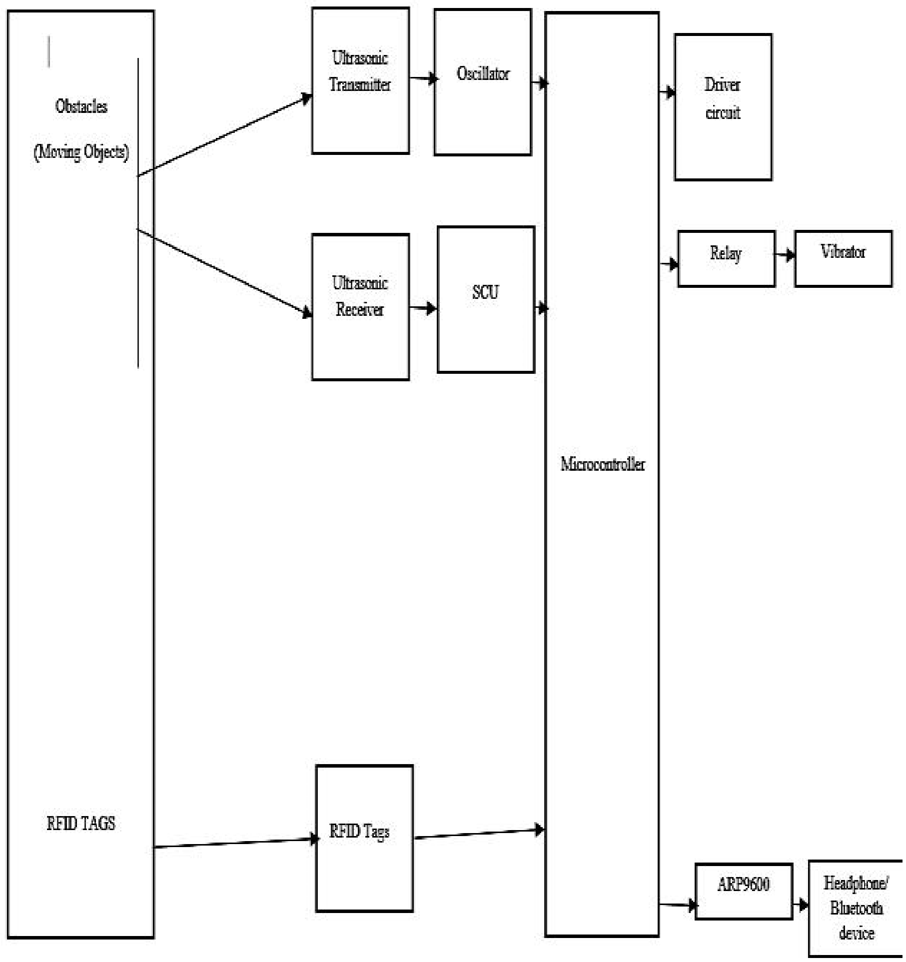

Fig 1.1 Block diagram of the Prototype

The Transmitter emits ultrasonic waves, which are reflected on encountering any obstacle in the user's path. The echo is received by the ultrasonic receiver, which is weak signal and is hence fed to a signal conditioning unit (*SCU*), where it is amplified. It is then given to the micro controller's I/O port, where the distance is calculated. The RFID system, comprising the reader and the tag is the major part of the navigation unit. When the reader inside the shoe moves over a specific tag, unique ID is sent to the reader. Corresponding to the ID string received the micro controller places data on the I/O pins.

The corresponding voice is played back by the APR9600 IC through the headphone. A Bluetooth module is placed in between the reader and the microcontroller for wireless transmission of data. Thus the directions for the specific location are made available to the user.

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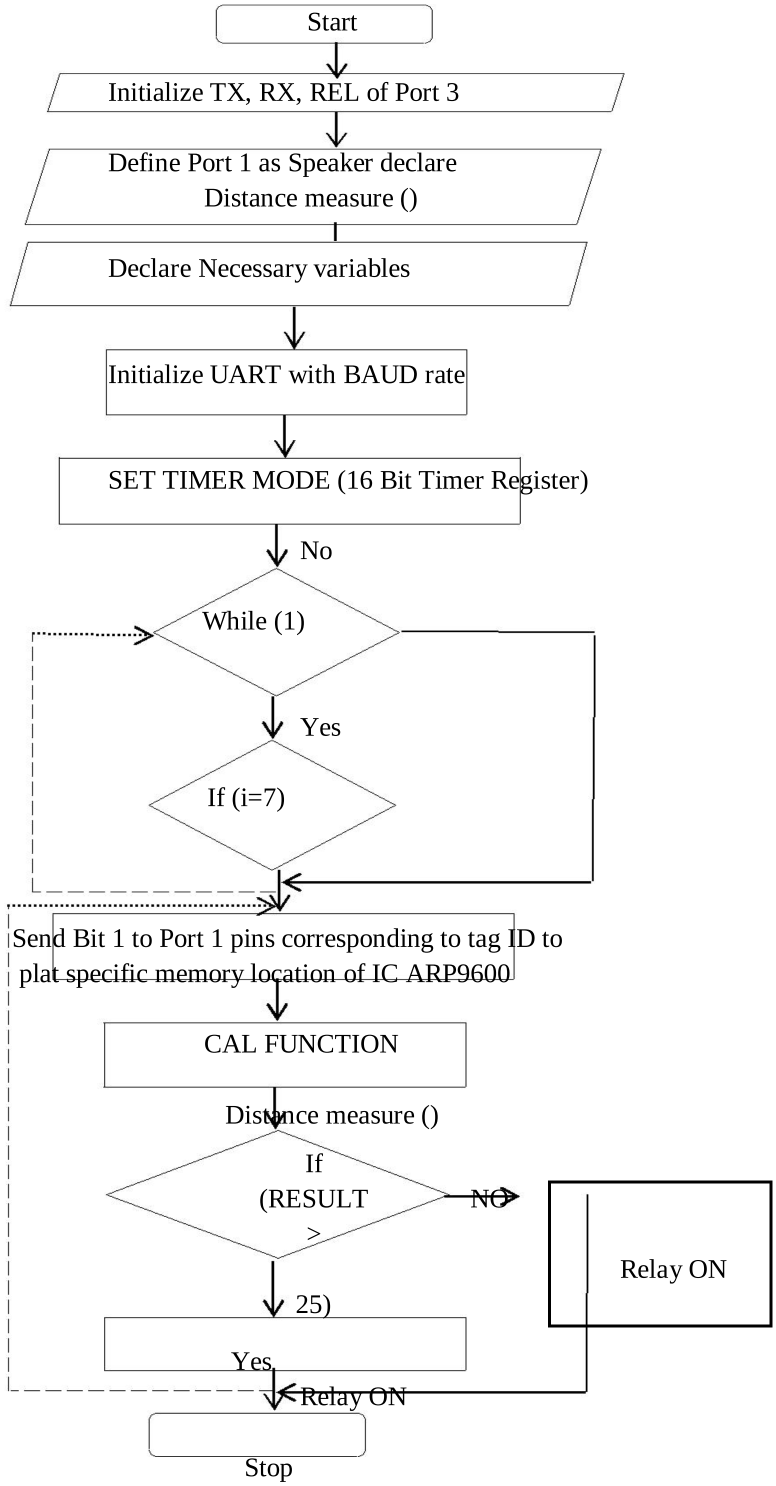

Fig 1.2 Flow chart of the main Routine

A. Navigation Unit

The navigation unit contains the pre-installed guidelines for the way-finding of the user. The pre-recorded instructions guide the visually impaired user to find his/her way.

The figure shows the block diagram of the proximity sensing unit. The oscillator in the PIC125C508 microcontroller generates the

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40KHZ signal, which is fed to the ultrasonic transmitter. The TTL signal from the microcontroller is fed to the driver circuit (MAX232) converted to an 8V signal to drive the transmitter.

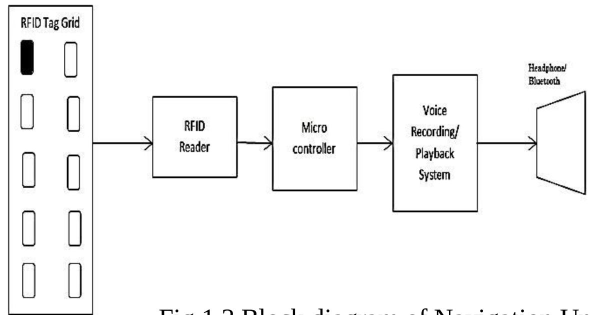

Fig 1.3 Block diagram of Navigation Unit

As shown in the above diagram, the RFID system, comprising the reader and the tags [6] is the major part of the navigation unit. When the reader placed inside the shoe moves over a specific tag, unique tag ID is sent to the reader. The tag ID is transmitted to the microcontroller through the serial port using RS-232 protocols. Corresponding to the ID string received, the microcontroller places data on the pin activates, which transmits a string of 0’s and 1’s to the APR9600 IC. A LOW signal placed on the pin activates it and voice stored in that memory location is played back through the headphone. Thus the directions for the specific location are made available to the user.

B. Proximity sensing unit

The Proximity sensing unit or the obstacle detection unit is a supplementary module provided to detect unexpected or moving objects on the user’s path, for example, fellow human beings [11].

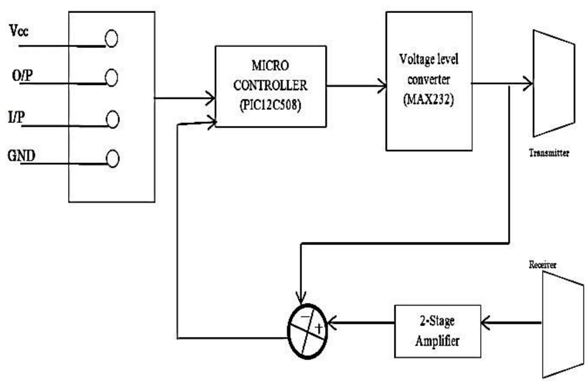

Fig 1.4 Block Diagram of Proximity Sensing unit

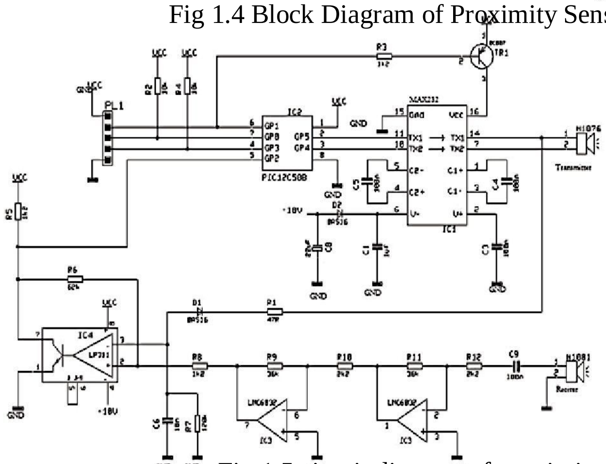

Fig 1.5 circuit diagram of proximity sensing unit

The transmitter emits ultrasonic waves, which are reflected on encountering any obstacle in the user's path. The echo is received by the ultrasonic receiver, which is weak signal and is hence fed to two stage amplifier where the gain is sufficiently improved. The amplified signal is fed into a comparator to convert the analogy signal to a TTL signal compatible with the microcontroller pins.

IV. CALCULATION OF DISTANCE

The distance of the obstacle from the user is calculated using the microcontroller. The time from transmission of the pulse to reception of the echo is the time taken for the sound energy to travel through the air to the object and back again. Since the speed of sound is constant through air, the distance of the object is calculated by measuring the echo reflection tome:

*Distance= (SPEED * TIME)/2(in meters)*

Based on the response generated with the obstacles alerts the users to choose a different path

V. RESULTS

Demonstration was carried out by a person, assuming how a visually impaired person would feel. 8RFID tags were placed on the floor at a distance of 1 foot each and the person moved within the specific area.

The RFID reader was placed in the user's shoe and the proximity sensing unit was placed in the belt. The tags were detected when the reader came within the 12cm circumference around the tags [4] and the guiding voice specific to the location was played through the head phones.

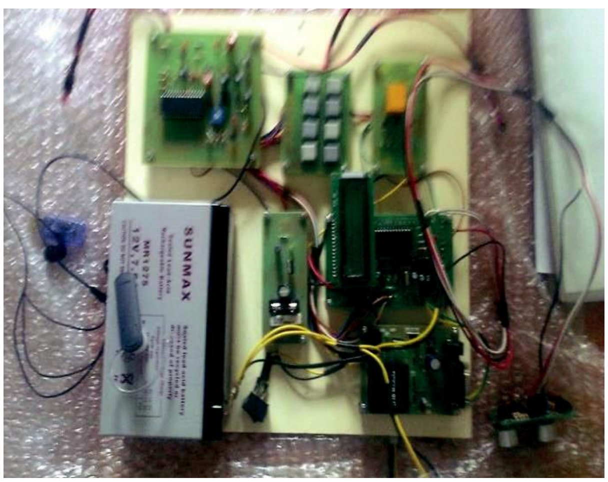

Fig 1.6 Prototype of the proposed System

The obstacles in the user's path, which came within the range of 25 inches, were sensed and the vibrator was activated and thus the tactile system was employed for informing the user of the obstacles. This setup is illustrated in the figure 1.6.

VI. CONCLUSION AND FUTURE SCOPE

The system reduces the external dependency on a central database, which would involve some tedious work in putting together a lot of information on mapping the desired locations. Since, each tag is separately programmed to relay-time information; this system is more advantageous and requires lesser implementation of time. Through developed with the welfare of the visually impaired in mind, the system could still be used by all people, making the system economically feasible. For example, it could be implemented in huge unfamiliar places like museums; people tend to get lost, for guidance. Thus this could be applied to the majority of the population, enhancing the system usage. The grid could be used for lot more applications, for example, for guiding people on wheelchairs equipped with RFID and robotic systems for automation. Thus the same grid could become multi-purpose, since the RFID technology is growing to be applied in almost all fields, with the production costs corresponding coming down.

The concept of setting up an RFID information grid in all the buildings is technically and economically feasible. As the applications of RFID in the retail sector are growing enormously, the manufacturing costs would come down considerably due to mass

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production, thus permitting the adoption of RFID grids in government buildings, college campuses, large corporate offices, etc.

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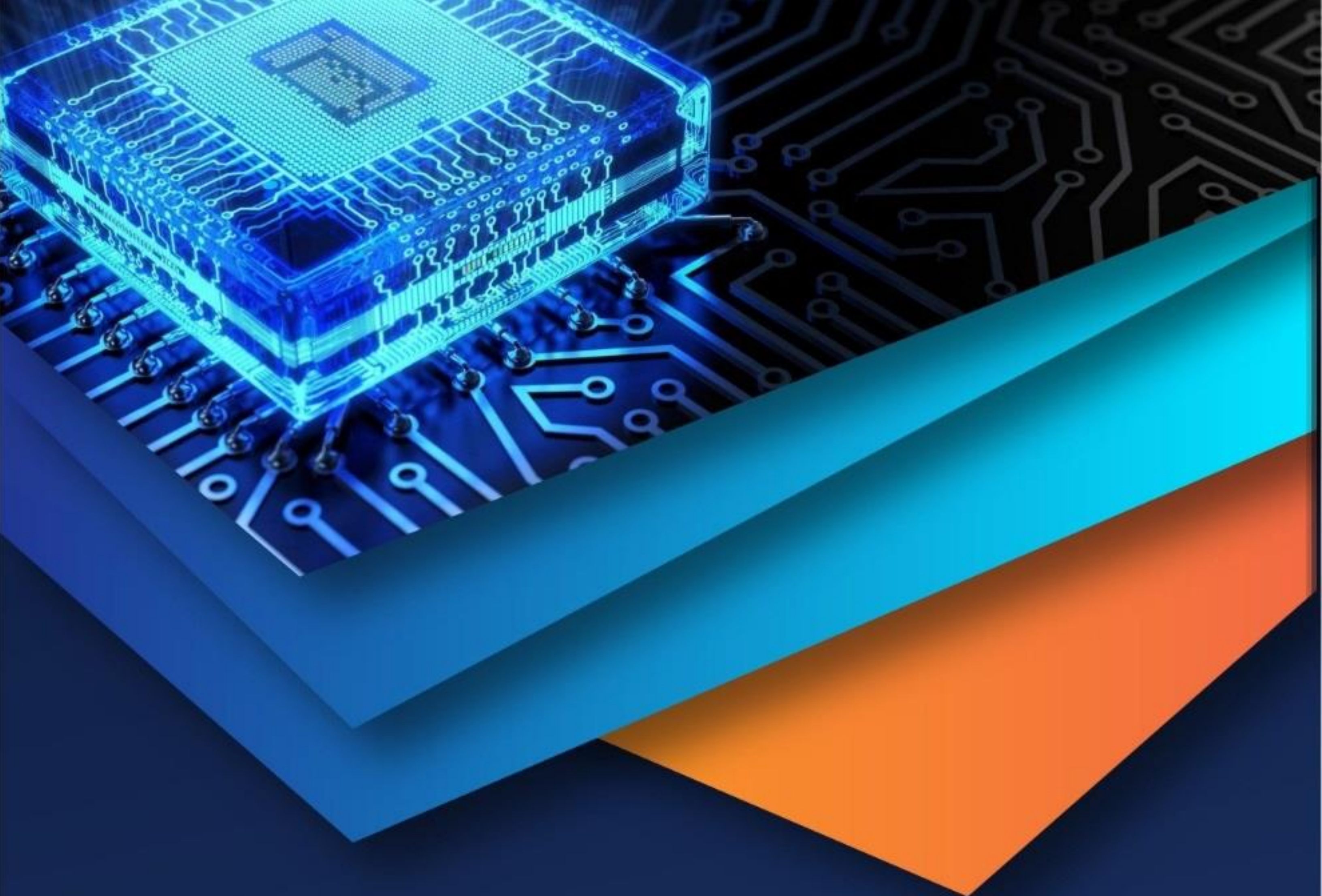

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