

Auditory Vision: An indoor navigation mobile Application for blind

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Abstract – Everyone in the world is not having god gifted sight. Some achieve excellence in their life because of blessing with god gifted sight. Blind users are unintentionally deprived of a full participation in the society because of many hefty restrictions on them. For our campus purpose we thought of developing something so that we can provide aid to some extent to the blind/visually impaired student or person in order to navigate closed building campus. A person is blind does not implies he is restricted from using certain technology and also social as others people.

Thus with a purpose to provide same level of services and spaces among all persons, this work proposes an innovative indoor navigation smartphone based application for providing helpful aid for blind/visually impaired student or person in closed campus or at any other place, this proposal system relies on users smartphone and RFID's deployed in the environment.

Index Terms – Assisted Navigation Indoor, Blind People, QR-codes, RFID.

I. INTRODUCTION

Back 2-3 years were discussing on issue of blinds which gave us a sight about their world in which they live and interact with others. We started collecting facts regarding how we can reduce the huge dependency of blind people on person with a sighted vision for the assistance. From assistance we came across the fact that how we can assist the blind in order to navigate that person in our college campus.

Thus we have developed an prototype of android application along with pervasive computing(also called ubiquitous computing) in order to guide blind student or person at certain extent with his choice of initial point to destination inside closed campus building. Idea behind 'Auditory vision' application is to capture coded spots that is 'QR code' and tell the information regarding current position

& describe directional information in form of speech to blind person.

II. LITERATURE REVIEW

RFID:



Figure 1. RFID module 434 MHz

RFID stands for **Radio-Frequency Identification**. Figure. 1 shows active RFID module operating at 434 MHz. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card. It provides a unique identifier for that object. And just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information. The RFID tag may be of one of two types. Active RFID tags have their own power source. The advantage of these tags is that the reader can be much farther away and still get the signal. Even though some of these devices are built to have up to a 10 year life span, they have limited life spans. Passive RFID tags, however, do not require batteries, and can be much smaller and have a virtually unlimited life span.

Wi-Fi position triangulation:

With the triangulation technique it is possible to calculate the position of the mobile device, due to the determination of incident angle on the receiving sensor of the station. Figure. 2 shows a simple ecosystem of Wi-Fi triangulate with 3 routers determining position of the mobile device. From the geometrical view, a line goes out in the calculated angle from the antenna. If this is made with all the stations standing at possession, an intersection originates.

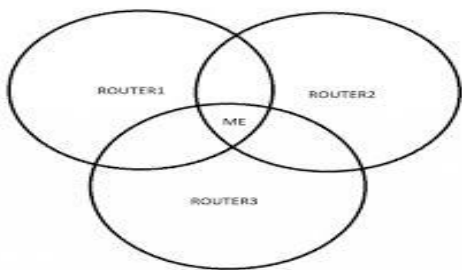


Figure 2. Wi-Fi Positioning Triangulate

QR-codes:



Figure 3. QR code embedded with a text message

Denso-Wave a subsidiary of the Toyota Group are attributed with the creation of the QR Code as far back as 1994. Originally it was designed to be used to track parts in the vehicle manufacturing industry, but its use has since grown tremendously. With as many as half of us now owning smartphones, and that number growing on a daily basis, QR Codes have the potential to have a major impact upon society and particularly in advertising, marketing and customer service with a wealth of product information just one scan away. QR or **Quick Response Codes** are a type of two-dimensional barcode that can be read using smartphones and dedicated QR reading devices, that link directly to text, emails, websites, phone numbers and more. Figure. 3 shows a text embedded QR-code.

III. METHODOLOGY

There are two major modules which are RFID module 434 MHz (transmitter and receiver pair) & android based smartphone.

A. RFID Module

In this system RFID module as shown in figure. 1 operating at frequency 434 MHz is being used which consists of transmitter and receiver pair. Initially when blind person is going to explore desired path of his choice the rfid receiver from sender side will be signaled which will act as simple feedback to blind/visually impaired student/person indicating that he is near to the QR code placed in the environment. in figure 4 an sample navigation path is shown with various colored dots. The red dots indicate QR codes placed on wall or alongside wall .At first whenever the student/person goes into electronic field created by transmitters RFID the RFID along with user commands the android application to wake up once awoken the camera scans for nearby QR code.

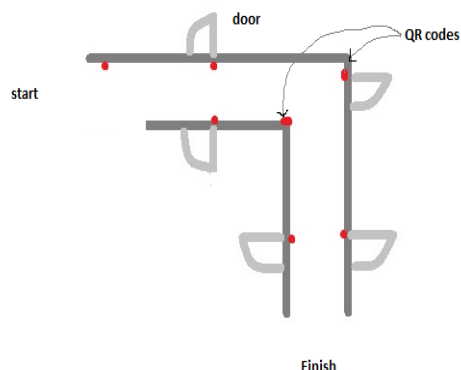


Figure 4. Sample navigation path

B. Smartphone Module

Once the camera scans for QR code further work is carried out by android smartphone which is with the blind student/person. The message embedded in QR code is processed by text to speech API. If the location is user's destination then application will be closed else the application will provide information of next QR code's location details. Figure. 5 shows the operational flow chart of the system.

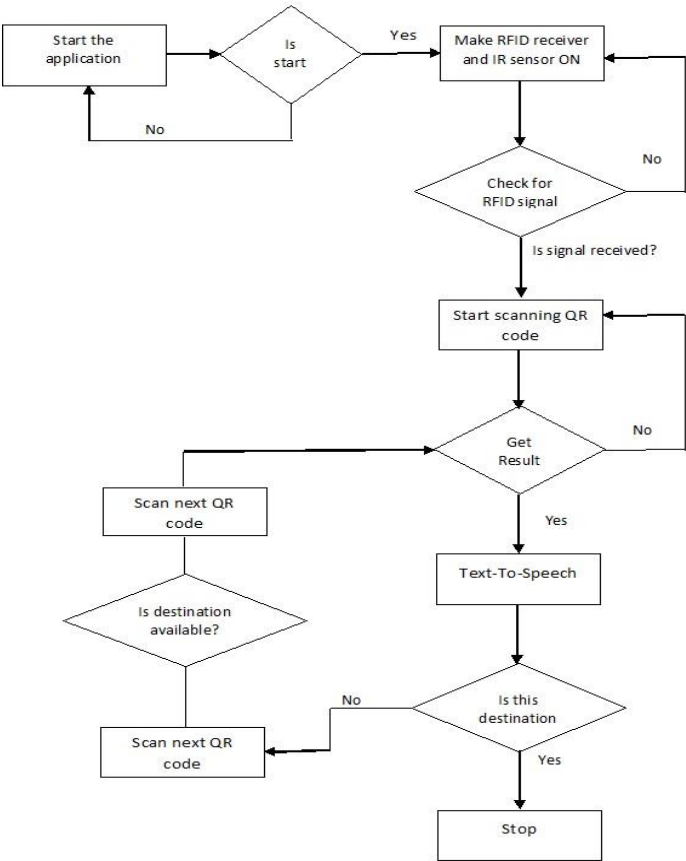


Figure 5. Algorithmic flowchart indicating operation of corresponding system

IV.EXPERIMENTS AND RESULTS

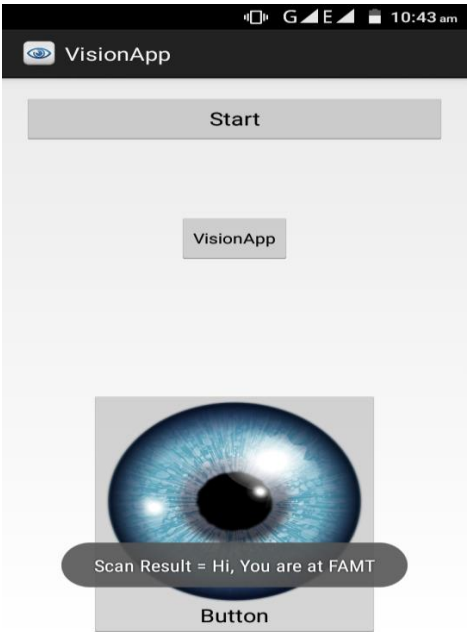


Figure 6. Snapshot of android application

We have placed the QR codes in our college campus alongside the walls on one of the paths as shown in the figure. 4. We tested the QR codes with the android application and it is working fine within 5-8 meters.

V. CONCLUSION

For future work, we are going to include a floor map in android application so that android application will be more dynamic one which will enable user to command for his choice of destination through speech. Also we will be going to provide an interface for interacting blind person/student with internet which will act like an primary help seeking source from them also we are trying to implement android smartphone camera based currency identification.

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