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RFID based navigation system for blind person in campus

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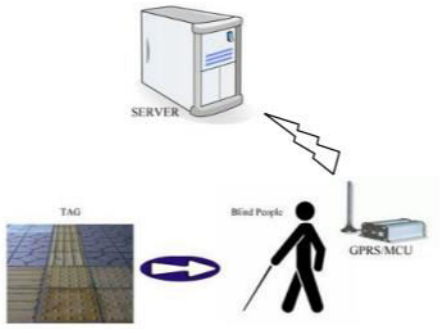
Abstract: *One of the most significant constraints for individuals with visual impedance is the failure of unassisted route and direction in new structures. A minimal effort indoor route framework, which depends on portable terminals, supporting innovation Near Field Communication (NFC), and Java program admittance to Radio Frequency Identification (RFID) labels, is created. The proposed route framework empowers clients to envision the guide of the rooms (measurements, relative situation of focal points). This data is put away in RFID labels in WAP Binary eXtensible Markup Language (WBXML) design. The framework permits leaving sound messages that are recorded in RFID labels in Adaptive Multi Rate (AMR) design. Voice empowered route, that is comfortable to clients with visual incapacities, is utilized.*

Introduction

The quantity of individuals with visual handicaps is around 135 million, of which 45 million are visually impaired [20]. For individuals with visual handicaps route in new structures is more troublesome than outside, where principally they depend on control canines and white stick. The fundamental troubles in the indoor route and direction are: missing known milestones, over-coming impediments can be unsafe, not all the visually impaired can peruse Braille labels, the cost of the current frameworks for indoor route doesn't coordinate the buying intensity of the individuals with visual handicaps. One of the significant burdens of the current indoor route frameworks for the visually impaired is the exorbitant cost of equipment part, which much of the time isn't predictable with the pay of visually impaired individuals. The indoor route framework for the visually impaired is proposed, that guarantees inescapable use because of the joining of cell phones from the center value sections, Java advancements, and detached RFID labels.

RELATED WORK -

There are two essential techniques for indoor route: 1) Navigation dependent on infor-mation from sensors, which decide the situation of the visually impaired (steering strategies) and 2) Find the current situation of the visually impaired dependent on data for the past position and a gauge of speed and course of developments (way mix strategies or dead retribution). Dead retribution: For the acknowledgment of this sort of route Micro-Electro-Mechanical Sensors (MEMS) are utilized, which give a gauge of speed, course and tallness (electronic accelerometers, magnetometers and indicators). This kind of route frameworks require alteration of the situation after certain time span. The amendment is acknowledged regularly through (D)GPS, A-GPS or Wi-Fi situating [1,10,16]. Steering: This sort of route is utilized by frameworks with infrared, ultrasonic and radio-recurrence (RF) coaxing and frameworks, in light of visual example acknowledgment and visual and RFID labels location. IR based route frameworks require uncommon equipment part, which can get signals from the IR transmitters witch have a fixed position. The assurance of position depends on the ID code of the closest transmitter [8]. Better outcomes are gotten when utilizing ultrasonic calling.



FRAMEWORK DESIGN –

The plan of the application considers the inclinations of the benchmark group of 20 clients with visual inabilities. We utilized a meeting to assist with

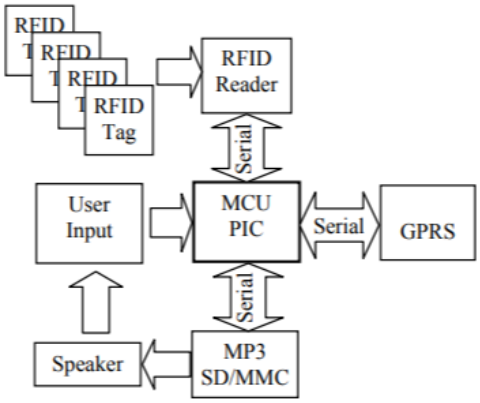
recognizing explicit issues of the objective client gathering. The decision of the UI is significant for individuals with visual inabilities. Exploration here [12] demonstrates that visually impaired and visual weakened like to actualize route with verbal orders. The visually impaired individuals want to stroll along the dividers than the center of rooms. The quantity of alters of course ought to be limited. The course ought to be built by short straight fragments with 90° point between them. The visually impaired clients can without much of a stretch distinguish entryways, dividers, and steps with white stick. It is proposed to execute the route from space to room. For this reason RFID labels are set on every entryway. The framework perceives two kinds of labels: navi labels, that contain navigational data and sound labels, that contain voice messages. For simpler limitation RFID labels are set above (navi labels) and under (sound labels) the entryway handle. This arrangement has the accompanying preferences: least number of required labels; discovering RFID labels is simpler in light of the fact that it is restricted to finding the entryway handle; every entryway is a reference point. RFID tag for each reference point contains data about the area of all other reference focuses inside the room. To defeat any obstructions the visually impaired depend on the white stick and messages in sound labels.

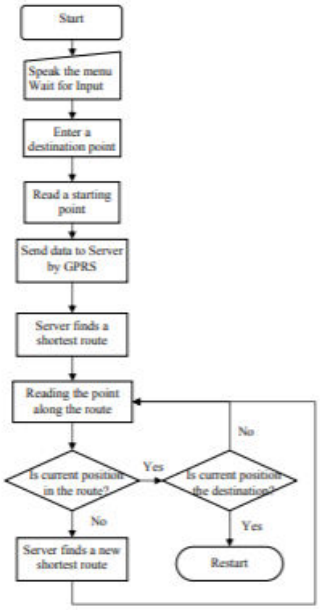
CELL PHONE DETERMINATION –

There is a mental hindrance related with the utilization of specialized assistive gadgets from individuals with visual inabilities. To get to the RFID labels is proposed to utilize versatile terminals, supporting innovation Near Field Communication (NFC), for instance: Nokia6212, Nokia 6131 NFC, Samsung SGH X700 NFC, Samsung D500E, LG 600V contact-less, Motorola L7 and Benq T80. The utilization of such cell phones is clearly a bit of leeway over utilize an extra equipment that client must purchase and figure out how to utilize. IDTechEx figure that, the quantity of RFID-empowered cell phones sold will ascend from 134 million out of 2008 to 540 million of every 2013 and to 860 million out of 2018 [7]. This conjecture is anyway excessively idealistic, on the grounds that the quantity of RFID-empower cell phones is still little.

FRAMEWORK ENGINEERING –

The primary highlights of the application are: Speech route in Bulgarian and English; Automatic actuation of the application when versatile terminal approaches the RFID tag; Working with two kinds of labels - navi and sound; Intuitive route from the current situation of the client.





NAVIGATIONAL INFORMATION ENCODING –

To empower portrayal of any reference point in navi labels a self-depicting information portrayal is looked for. This suggests the utilization of meta language which can portray any information types. Extensible Markup Language (XML) is most broadly utilized language when stage autonomous exchange is required. It permits the portrayal of a client information and will along these lines be utilized. The fundamental issue with XML specifically application is the restricted size of the memory of RFID labels. XML would not permit conservative information portrayal. To pack XML information WAP Binary XML (WBXML) design is utilized. The WBXML empowers data for roughly 35-40 reference focuses to be put away in Mifare 4K tag. Route is from current reference highlight the objective reference point. For this reason we utilize

the accompanying orders: forward (F), left (L), right (R), in reverse (B), and flight of stairs (S±n, where n is the quantity of floors). At the point when L and R orders are utilized course is changed 90° from the current client direction and 180° - when order B is utilized. In the route cycle three measurements can be utilized: meters (order Um), steps (Us) and number of rooms (Ur). Of course, meters are utilized. For instance, route string "F5.5 Ur L R5" signifies: proceed for 5.5 meters, turn 90° left, wanted roomis the fifth in right half of the passageway. The identical voice order is: 1) Go straight 5.5m; 2) Turn left; 3) Right half of hallway; 4) Count 5 entryways. Each navi tag contains the accompanying data: Current situation of the client (XML tag <pos>); Name of the room (tag <to>); Dimensions of the room in meters (tag <dim>); Name of reference focuses and navigational data to arrive at it (labels <object>, <name>, <navi>).

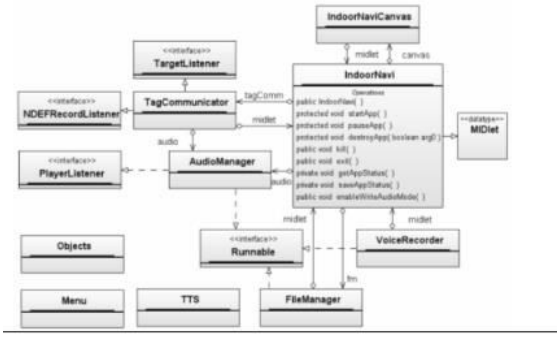
```
<?xml version="1.0"?>
<tag>
     <pos>entrance</pos>
     <to>leaving-room</to>
     <dim>5.5x4</dim>

     <object>
       <name>bedroom</name>
       <navi>L1 L3 R0.5</navi>
     </object>

     <object>
       <name>terrace</name>
       <navi>L1 L4.5 L3</navi>
     </object>
</tag>
```

PROGRAM DESIGN –

The depiction of the most significant classes and interfaces is follows: IndoorNavi base class is utilized for instatement and enrollment of the application. It is acknowledged in body of the technique startApp. At first an object of class TagCommunicator is made. At that point all other fundamental items, for the working of the application, are made. Correspondence with RFID labels is executed through class TagCommunicator. Its principle task is enrollment of the application in the Push Registry in the event that it has not yet been made. When RFID tag is recognized technique targetDetected is called. In the event that the mode "sound chronicle" is empowered, and if tag is Mifare 4K and sound message is accessible, it content is saved money on sound tag. When NDEF record is perceived strategy recordDetected is initiated. In the event that the tag is navi type its substance is perused and decoded. This is acknowledged through inner class ParseXML. Data for all reference focuses in the room is depicted by objects of class Objects (name of the reference point and route to it). In the event that the tag is sound sort the client can: hear the voice message and date and time leaving, and erase message in the event that he/she has important rights. Discourse route is acknowledged by class TTS, which calls the important techniques for class AudioManager. Class TTS gives static strategies to word, sentence and digit to discourse change. To each word, which the application uphold, relates asset AMR sound record. Record details, comparing to words, are spared in line and hang tight for their handling. It is executed in a different string. To accelerate the correspondence with RFID labels, information is reserved on the nearby circle of the portable terminal. At the point when the application is begun just because, the accompanying envelopes are made: IndoorNavi/reserve/sound and IndoorNavi/store/navi. Reserving is executed by the techniques for class FileManager. When RFID tag with NDEF record is recognized, the accompanying data is extricated: the record ID code (RID), the record date and time (eTag) and MIME type. The document determination depends on RID, eTag and MIME type. Sound messages are made by the strategies for class VoiceRecorder. The versatile terminal must help Multi Media API and sound catch mode. UI is executed by class IndoorNaviCanvas. It is maximally improved and natural. By Left or Right Soft key application's menu is called. The menu is construc-ted utilizing static strategies for class Menu. Menu things is changed adaptively relying upon the activity mode and occasions from RFID labels (Tag distinguished, Record identified).



SOFTWARE AND HARDWARE –

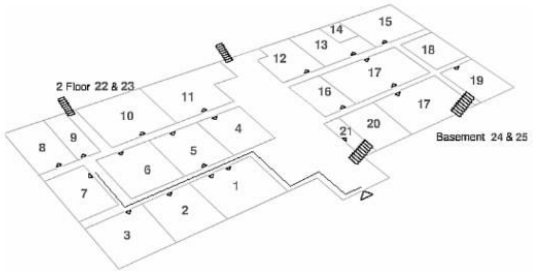
Software - The frequency range of RFID (radio frequency identification) is of low frequency range (30 KHz to 500 KHz) . Keil software is used in this project, which is burn in the AT89S52 microcontroller which is highly efficient device 3 RFID TAG are used.

Hardware –

RFID reader	Frequency	910~914MHz
	RF power	4W EIRP
	Read distance	~5m
	Modulation	ASK
	Radio access	FHSS
RFID reader antenna	Angle	60°(3dB)
	Gain	6dBi
	Size	215(W)×420(L)×55(H)
RFID tag	Data	64bit
	Data rate	256kbps

TEST RESULTS –

The tests are acknowledged in the disconnected mode by Nokia 6131 NFC SDK and the Nokia 6212 NFC SDK. As an outside RFID peruser is utilized Omnikey CardMan® 5321. For on-line tests Nokia 6212 cell phone is utilized. So as to assess the presentation of the application a progression of trials in emergency clinic is led. RFID labels are set on the entryways of all rooms to which guests approach (specialist's workplaces, control, enlistment, latrines), including the passage leave entryways. The specialists can leave messages for their patients in sound labels.



Eight visually impaired clients partake in the application test (5 men and 3 ladies from 18 to 61 years). The chose emergency clinic and target reference point are both new for clients. To maintain a strategic distance from any impediments in transit clients utilize their white sticks. The beginning reference point is emergency clinic entrance entryway and target reference point is room 7. The chose route string is: "L2.5 R4.5 L4.5 R6.5 Ur L L4 R L1". Two measurements for route are utilized: number of spaces for route in the passages of the emergency clinic and meters for route in rooms. Since hallways are long, route in steps and meters isn't proper, on account of the chance of enormous blunders. For this situation the client tallies the quantity of rooms to be passed before arriving at the ideal reference point. All members in the test arrived at an objective reference point. For one of them assis-tance was required, in light of the fact that she pass a navigational order. The purpose behind this is squeezing <Fire> key (next order) twice rather than once. This issue was tackled by impeding <Fire> key for 4 seconds subsequent to being squeezed. We estimated the time needed to discover room 7. The interim to finish the undertaking is 136s (1.5km/h). The best time is 106s (1.9km/h), and the most noticeably awful – 180s (1.1km/h).

CONCLUSIONS AND FUTURE WORK –

A practical, RFID-based portable indoor route application for the individuals with visual handicaps, has been created. Application joins the capacities of present day cell phones, permitting the production of multi-modular interfaces and minimal effort inactive RFID labels. It tends to be utilized for indoor route of individuals with visual handicaps (from space to room in emergency clinics, schools, colleges, and so forth.). The primary focal points of the application are:

- Low expense and generally available.
- Simplified and natural UI.
- Automatic enactment of the application.
- Local data storing to accelerate reaction.
- Audio-empowered route.
- User can leave sound messages.
- Floor-plan of a structure and correspondence with WEB worker are not needed. Navigational data must be revised if the client stray from the course between two reference focuses or get lost. This is effectively possible, if the cell phone upholds program admittance to an electronic compass and accelerometer. Right now there is no NFC-empowered cell phone, which has underlying compass and accelerometer. A planned module "Electronic compass and accelerometer", which will speak with cell phone by means of Bluetooth™ interface, will be created.

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