Campus Navigator with Speech Assistance

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Abstract— A campus navigation system with the assistance of speech signal is proposed. A visitor is provided with an android application which assists him in reaching his destination. The system utilizes a microcontroller which traces the specified path through RFID readers. In addition to path assistance, a central security system is provided to vigilant any trespassing.

Keywords –Android application, Bluetooth, Campus navigation

1. INTRODUCTION

The method of monitoring and controlling the movement of person or vehicle from one place to a different place is referred to as Navigation. For e.g., aeronautic navigation, land navigation, and marine navigation. For navigating inside any campus premises like, universities, hospitals and malls, an android application is employed. Presently, mobile phones are not only devices for conversing, but also have made our life and work simpler. Due to the advancement in technology, the recognition of these devices has increased widely in couple of years. Using devices like GPS, sensors, compass and accelerometer, applications based on location and augmented reality is realizable.

Some of the existing navigation applications - like Yahoo Maps, Map quest and Google Maps help users to navigate from one place to a different one. However, these applications do not provide maps as precise as that of an on-campus path provider. The project finds application in campuses of software companies, manufacturing industries, government offices, universities, colleges, etc. A visitor assistance as well as security for the campus is implemented in this project.

A wireless pedestrian navigation system, Dristi, is proposed which integrates several technologies like wearable computers, voice recognition and synthesis, Geographic Information System (GIS) and Global positioning system (GPS). Dristi provides contextual information to the visually impaired and computes optimized routes supported by user preference, temporal constraints (e.g. traffic congestion), and dynamic obstacles (e.g. ongoing ground work, road block for special events). The system also provides capability for the user to add intelligence, as perceived by the blind user to the central server hosting the spatial database. [1]

The paper deals with the system called In-car positioning and navigation system, which is a major application of Global- Positioning- System (GPS) receivers. The positioning technologies supported by stand-alone GPS receivers are vulnerable and thus must be supported by additional data sources. Thus the specified integrity, continuity, availability, and accuracy are obtained. The data fusion and data sources technology survey are employed in current campus navigation systems. [2]

An article dealing with the task of in-door navigation of visually impaired people is implemented. The authors have carried out an analysis of audio navigation software programs like Google Assistant, Siri and Cortana. The authors suggest a model of the voice navigator, which helps an individual to efficiently find the required location and build the route. A software is integrated into the smart-campus solution, which improves the navigation of the campus. [3]

The authors propose a technology called inertial navigation system (INS) which is used for a private supported traditional steering system and consists of self-contained sensor systems. A standard INS contains large and heavy accelerometers and gyroscopes. It converts the sensed accelerations and rotations to position displacements by a strap down navigator. In order to diminish the error in inertial sensed motion, Kalman filter is utilized. However, personal navigation systems do not utilize this system due to its weight, size and power requirements. [4]

The author proposes a system in which users can interactively navigate through various point of view of a static scene. To resolve the challenges of an interactive navigation, proper planning of coding techniques and novel representation are essential. It distinctly brings interesting style constraints: the precise decoding process is unknown by the encoder, where as the decoder needs to reconstruct data from incomplete subsets of information. [5]

The author proposes a navigation system for visually impaired people by providing dynamic interaction through the utilization of audio instructions. A Blind guide application is utilized for login by the users. A voice recognition security process is employed for the blind users. It extracts the unique features of the user's voice and stores it at the time of registration. [6]

2. METHODOLOGY

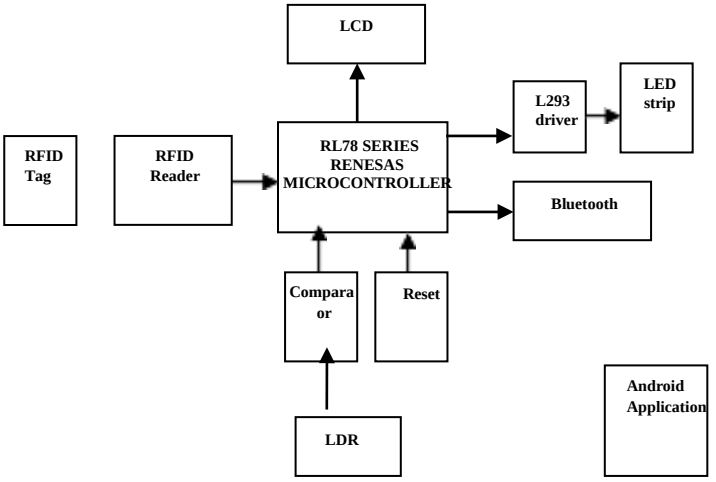
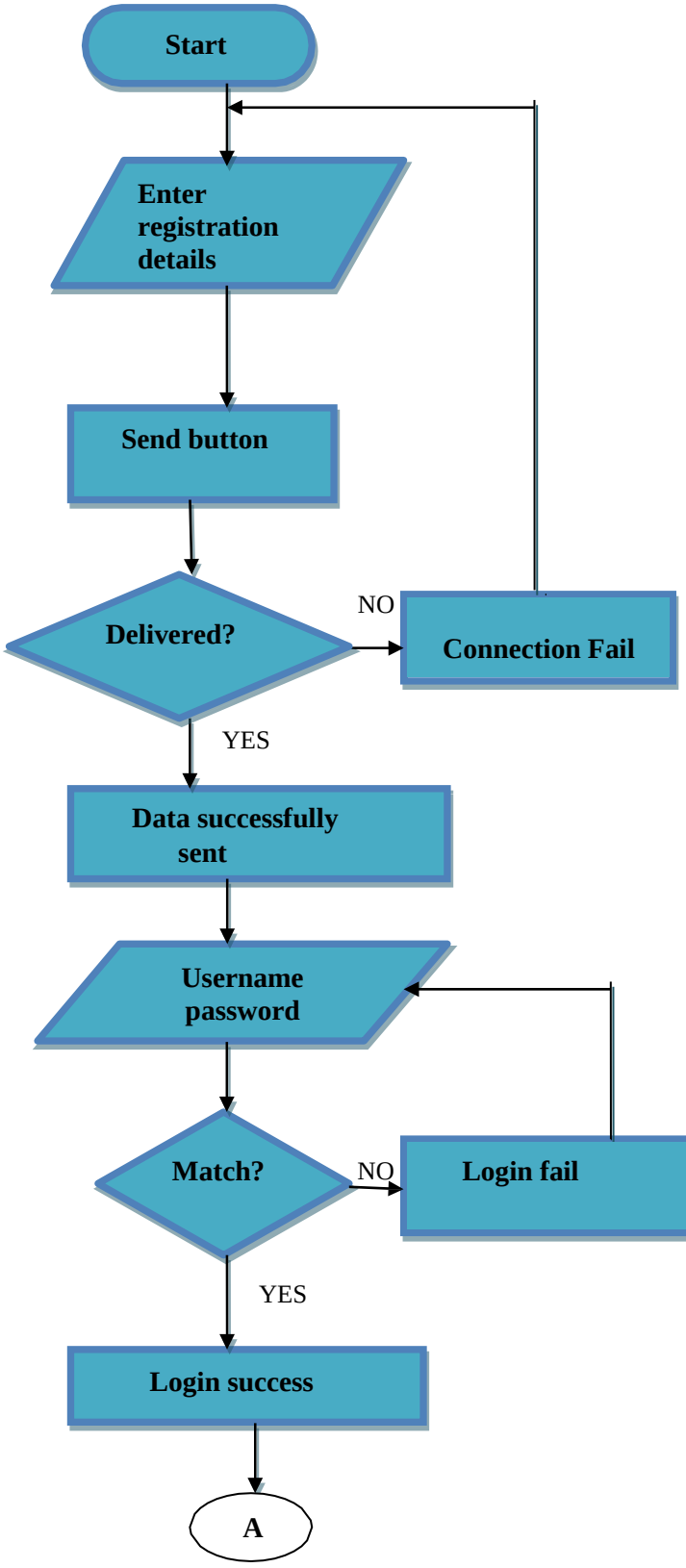


Fig 1: Block Diagram

Figure 1 shows the functional diagram of the proposed campus navigation system. The system is designed using modular concept consisting of Microcontroller, Bluetooth, RFID reader, LDR, LCD and LED. The control unit of the whole system is a Microcontroller, which is located at the center of the proposed system. A program is embedded within the microcontroller to perform actions based on the received inputs. The RFID tags are located in the paths which lead to different destinations in a campus. A RFID reader is provided to the visitor. The LCD is employed to showcase the communication between the microcontroller and its peripherals. A map is displayed on the visitor's android application depicting the selected destination in the campus. To help the users for navigation during night time, an LDR is used. The LED will be in OFF state during daytime and ON during night time. The system can be restarted using a reset button. The softwares utilized in the project are listed below:

- Embedded C
- JDK
- ECLIPSE
- SDK
- ADTPLUGIN
- SQLITE

3. FLOWCHART AND WORKING



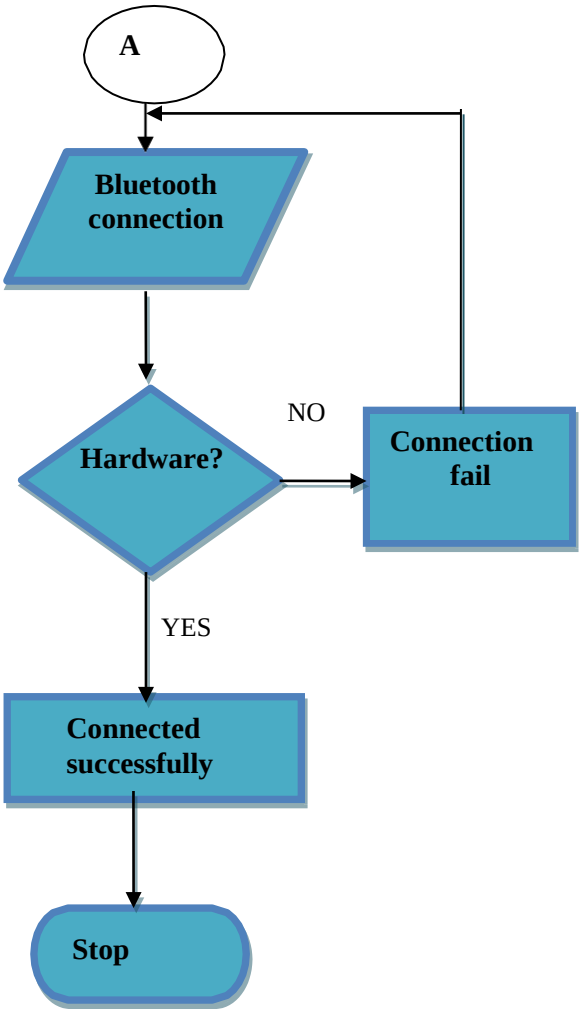


FIG 2: Visitor Registration Flowchart

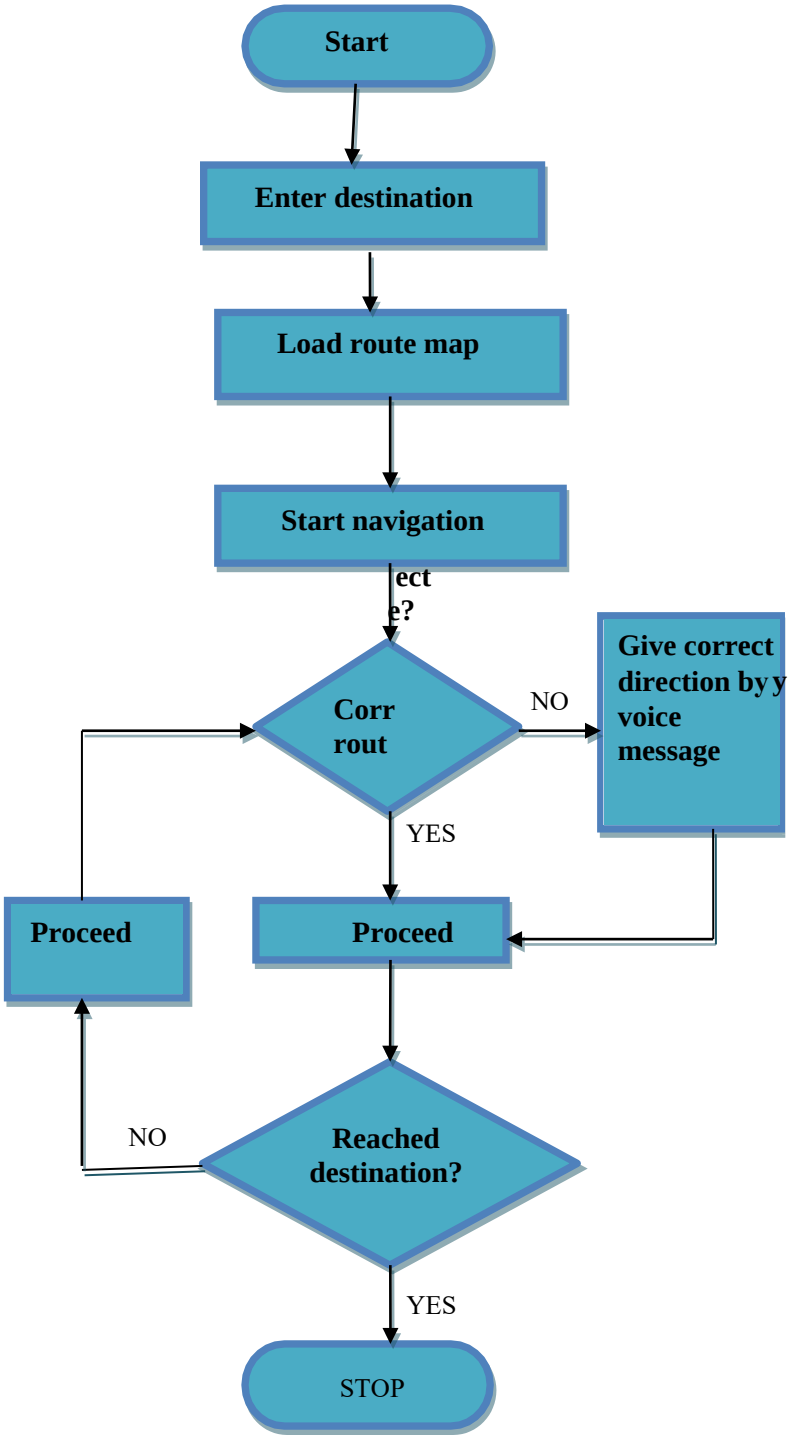


FIG 3: Navigation Flowchart

In order to exhibit the route map of a destination in a campus, an android application is designed. The visitor's smart phone is installed with the android navigation application by security personnel at the campus entrance.

Figure 2 represents the flowchart of visitor registration.

Figure 3 represents the flow chart for navigation process. The visitor selects the destination (from the android application) to traverse in the campus. The route map pertaining to his selection is loaded on the android phone. The visitor starts the navigation and if he deviates from the path, a message will be passed by the microcontroller to the user via Bluetooth. A predefined voice output is generated to suggest the visitor for right path. A message is automatically transmitted to the security centre at the entrance, if the visitor deviates for the third consecutive time.

CONCLUSION AND FUTURE WORK

An android application based campus navigation system is implemented. The route paths are provided with RFID tags to guide the visitor. The microcontroller monitors the visitor's navigation and sends control signals to android mobile through Bluetooth. A voice enabled message guides the visitor to his destination.
In future work, a GPS can be used instead of RFID tags by storing the route maps of a campus in android phone. The system can be extended for guiding blind people through additional hardware.

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