Automated Prepaid Auto System

Dr. U B MahadevaSwamy*, N MadhuSudhan**, Divya G M*** and Manasa****
*Associate professor, Department of E&C, Sri Jayachamarajendra College of Engineering, Mysuru, Karnataka, India
[1]ubms_sjce@yahoo.co.in
** - ****Post Graduate students, Department of E&C, Sri Jayachamarajendra College of Engineering, Mysuru, Karnataka, India. [2]madhu_live@yahoo.com, [3]divyagmdvg@gmail.com, [4]manasakumar94@gmail.com

Abstract: As we know the advancements in the Radio Frequency and GSM technologies have made platform to come up with various innovations reducing human effort. Since prepaid service has become important part of common man's life this is the right time to make use of existing technologies to simplify the procedure. The basic idea is to introduce technology into our lives for monitoring issues which demand manpower. By doing so, we aim at providing a reliable, self-sophisticated and user friendly solution for automation of prepaid services. A prepaid auto system is automated through a machine kept in place of a man who issues prepaid tickets.

Keywords: Arduino MEGA-2560, Google maps, GSM, RFID Reader, RFID Tag, Speech to text.

Introduction

The prepaid auto booths were brought into existence to ease the problems faced by visitors to unknown cities. The prepaid booths are present at Railway Stations, Bus Stations and other Police operated transport systems. The passenger can specify the destination at the booth and get a slip of paper with the fare details and a help line center number of the police. The booth operator assists the passenger in getting the slip. This is how the existing system handles the process. In this project we aim at improvising the system in a self sophisticated way. The system is made such that it is self operated by the passenger .The passenger can control the system through his voice. Passenger needs to input his destination through the microphone. The driver is provided with a RFID tag for his identification, he needs to swipe this card or tag at the booth before the trip starts. The auto driver will receive a text message to his mobile number, specifying that the passenger is ready for the ride. This performs the authentication process for the driver as he is a registered driver with the booth. All the details of the driver like drivers name, registration number and phone number are maintained in a database.

Literature Survey

[1] Develops an on-line speech-to-text engine, which is implemented as a system-on-a programmable-chip (SOPC) solution. The project implements a speech-to-text system using isolated word recognition with a vocabulary of ten words (digits 0 to 9) and statistical modeling (hmm) for machine speech recognition.

In [2], authors define real time speech to text as accurate conversion of words that represents uttered word instantly after speaking. Their existing system deals with various dictionaries, which implements dictation of words with correct pronunciation.

In [3], authors discuss prepaid card toll collection that was introduced in India in 2011. In this system, every vehicle will be given a unique number, all information will be transferred and toll payment will also be done through RFID tags.

Paper [4] explains about how to save time, space and money by introducing concept of RFID.

In paper [5], discussion about Wi-Fi technology to support the collection tolls with electronic based toll system and also including the use of android technology, for the range of potential toll facilities under consideration in India is made.

The authors in paper [6] discuss about the use of RFID tag passes by users by paying online so that user doesn't have to wait in toll gate.

[7] Presents how speaker recognition followed by speech recognition is used to recognize the speech faster, efficiently and accurately. It discusses different speech recognition techniques such as Mel Frequency Cepstrum Coefficients (MFCC), Vector Quantization (VQ) and Hidden Markov Model (HMM).

In paper [8], author discusses speech recognition for a spoken dialog system for automatic travel reservations. The system here uses speech recognition, natural language understanding, air travel database access, dialog management, natural language generation and speech synthesis technologies to perform the task of an automated travel agent.

Paper [9] focuses on an electronic toll collection (ETC) system using radio frequency identification (RFID) technology. It uses tags 'mounted on windshields of vehicles through which information on the tags are read by RFID readers.

Paper [10] designs and implements a secured voting system which utilizes the RFID and GSM technologies along with the Electronic Voting Machine to further improve the election process and to avoid rigging. The RFID reader senses the voter ID from RFID tag, checks weather the received voter ID belongs to the particular polling booth or not, generates an OTP (one time password) and sends it to the registered mobile of the corresponding voter through the GSM module.

Present Scenario

The present day prepaid auto booth system uses manual power to issue the tickets and to note the destination location of the customers. One of very concerned issue is that passengers have to wait for long duration in queue in order obtain prepaid service tickets, main reason for this problem is work rate of manpower is very less compare to that of machine. The existing system has no authentication for the driver, the booth operator checks the registration number of the auto and manually enters it to the system along with the destination and generates a receipt. The fares are generated according to the predefined fares in the database of the system.

Proposed system

A machine is devised such that it takes the speech input from the passenger and is converted to text, this text output from conversion is given to Google Maps. The distance between the source and destination is calculated using Google Maps, obtained distance is used for cost calculation of the drive. On the other side auto drivers are given RFID tags for authentication, they form a queue and are serve passengers according to the queue formed. Database is also created to store details like driver name, vehicle number, mobile number etc. which can be accessed by the authority for authentication.

Components and Block diagram

The basic components required for implementation are as follows

1. Microcontroller(Arduino Mega-2560)
2. RFID Tags and Reader
3. GSM Modem
4. Power Supply(12 V)
5. Computer with internet access

The block diagram of proposed system is as shown in figure 1.

Design and working

The prepaid auto system practiced in railway stations and bus stands for the convenience of public is automated through a machine kept in place of man work who issues tickets. The public who are in need of auto will tell their destination in front of the machine kept .The machine will do the speech to text conversion by using the speech recognition api of html5.
The logical part of the code goes as follows:
The flow chart for speech recognition is as shown in figure 2. The default value for continuous is false, meaning that when the user stops talking, speech recognition will end. This mode is great for simple text like short input fields. In this project, we set it to true, so that recognition will continue even if the user pauses while speaking. The default value for interim Results is false, meaning that the only results returned by the recognizer are final and will not change. The grey text is the text that is interim and does sometimes change, whereas the black texts are responses from the recognizer that are marked final and will not change. To get started, the user clicks on the click to speak hyperlink, which triggers the handler.
This handler concatenates all the results received so far into two strings: final_transcript and interim_transcript. interim_transcript is a local variable, and is completely rebuilt each time this event is called because it's possible that all interim results have changed since the last on result event. We could do the same for final transcript simply by starting the for loop at 0. However, because final text never changes, the code here has been made a bit more efficient by making final transcript a global, so that this event can start the for loop at event. Result Index and only append any new final text.
On the other side a code is written to handle the hardware part as the driver comes into the queue he swipes his RFID tag and this forms a software queue. As the passenger comes in and gives his voice input and push button input the driver details are popped from the queue and a message stating that the customer is ready is sent to the auto driver.
The overall flow of the project is shown as follows in figure 3.

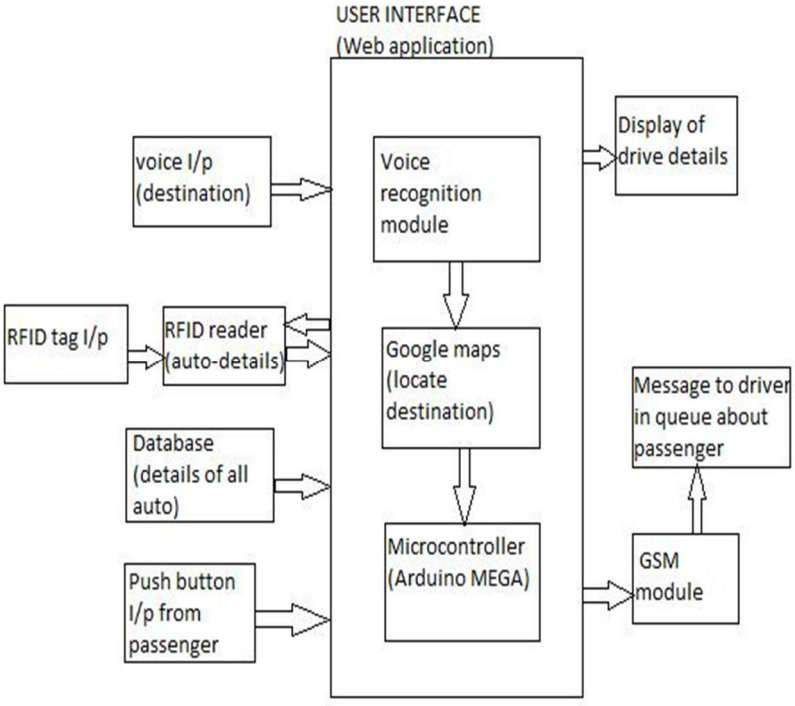


Figure 1: Block Diagram indicating flow of proposed idea

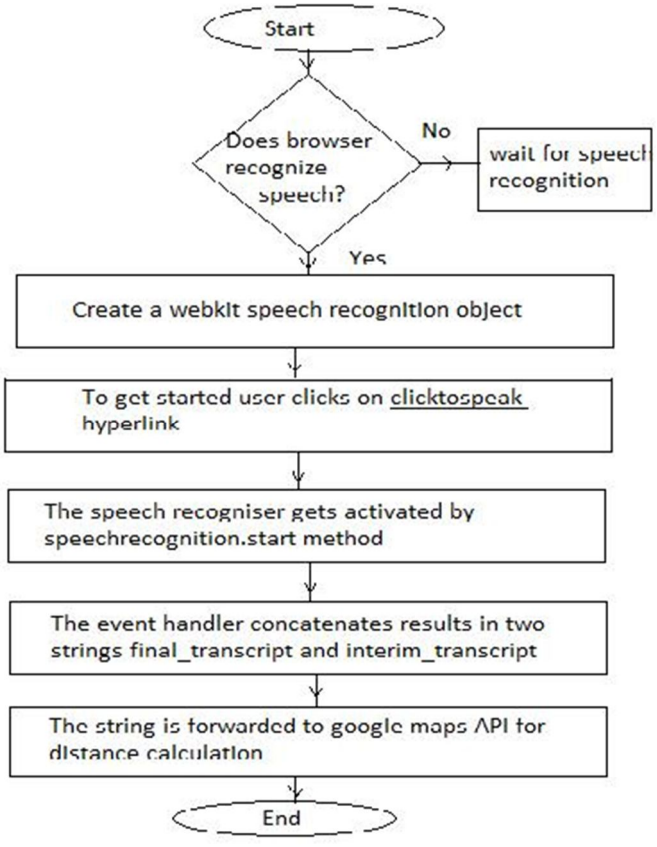


Figure 2: Flow of speech recognition

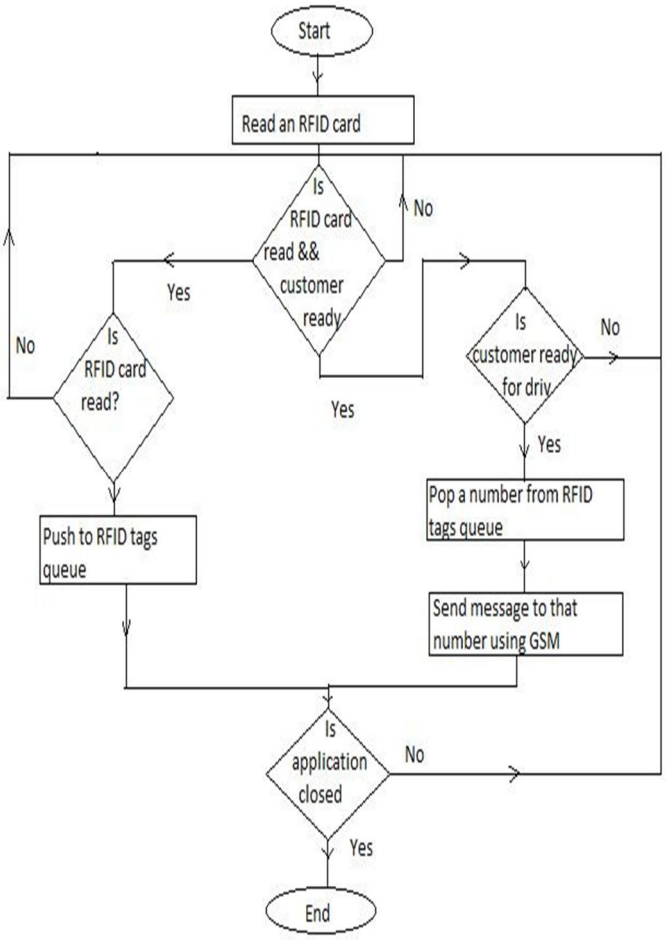


Figure 3: Overall flow of the project

Advantages

- Providing a machine instead of manual work
- Less human errors
- RFID technology and its reliance on radio waves does not require a line-of sight for identification or a straight-line alignment between the tags and readers
- Could use passive and very cheap tags since range is not a concern
- Enhanced security and safety
- Less time spent on obtaining prepaid service tickets
- It will also help illiterates
- The system can be made applicable to any place in the world just by inserting the appropriate origin point of journey in the code

Results

The hardware setup including the GSM module, RFID reader and microcontroller is as shown in snapshot of figure 4.
The developed system is tested for various destinations in Mysuru city, Karnataka, India taking Mysuru sub urban bus stand as the starting point.
The screenshot of the output displayed to the passenger after speech recognition and distance calculation using maps api is shown for different destinations as in figure 5 and tabulation of the same is in table 1.

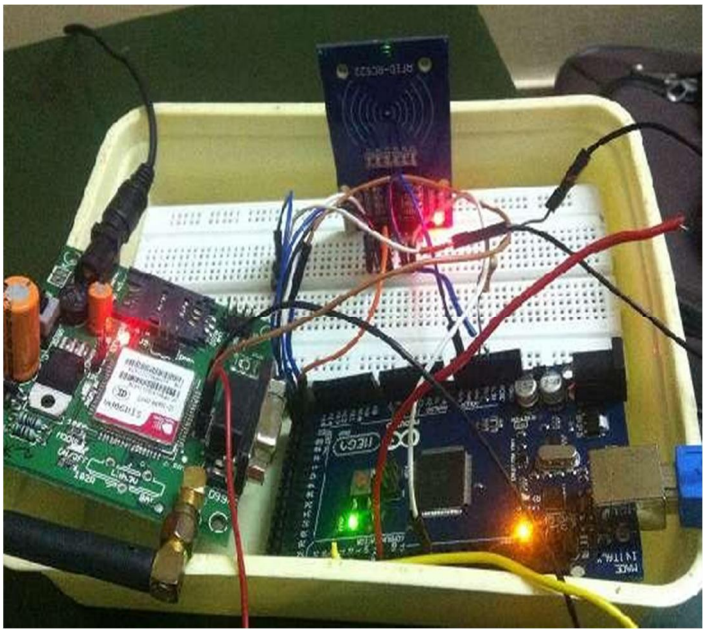
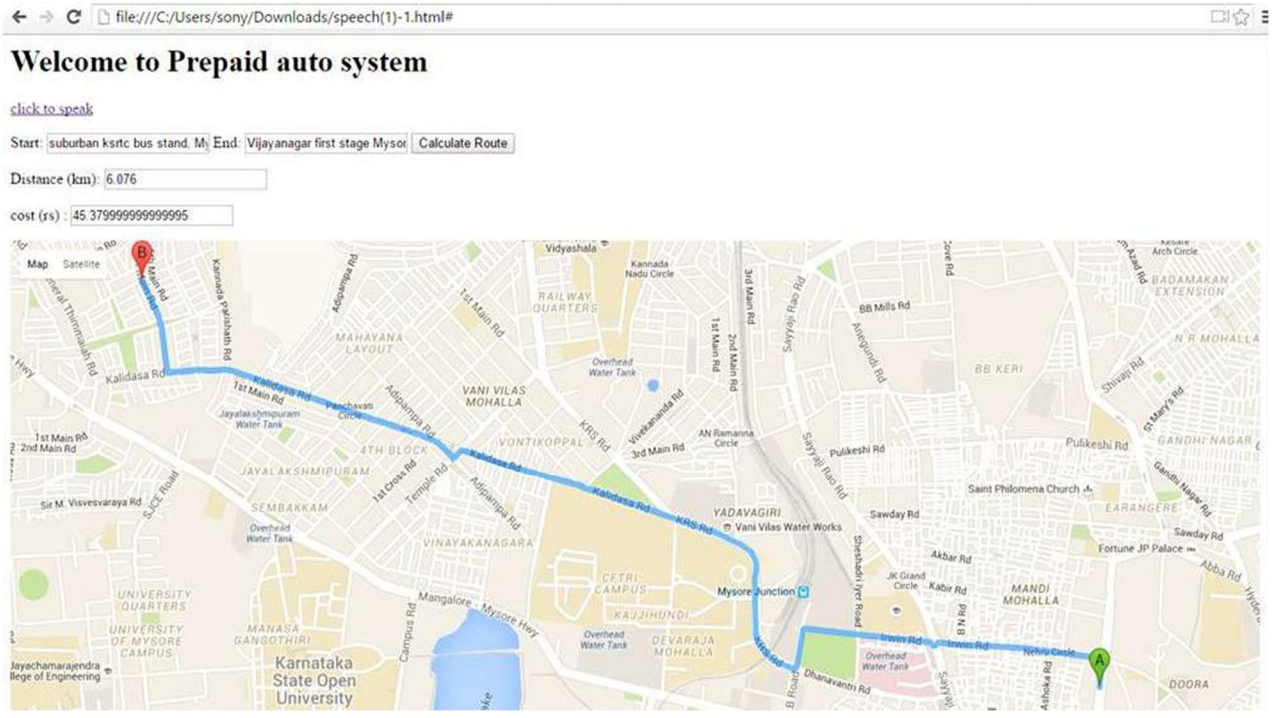


Figure 4: Snap-shot of proto-type

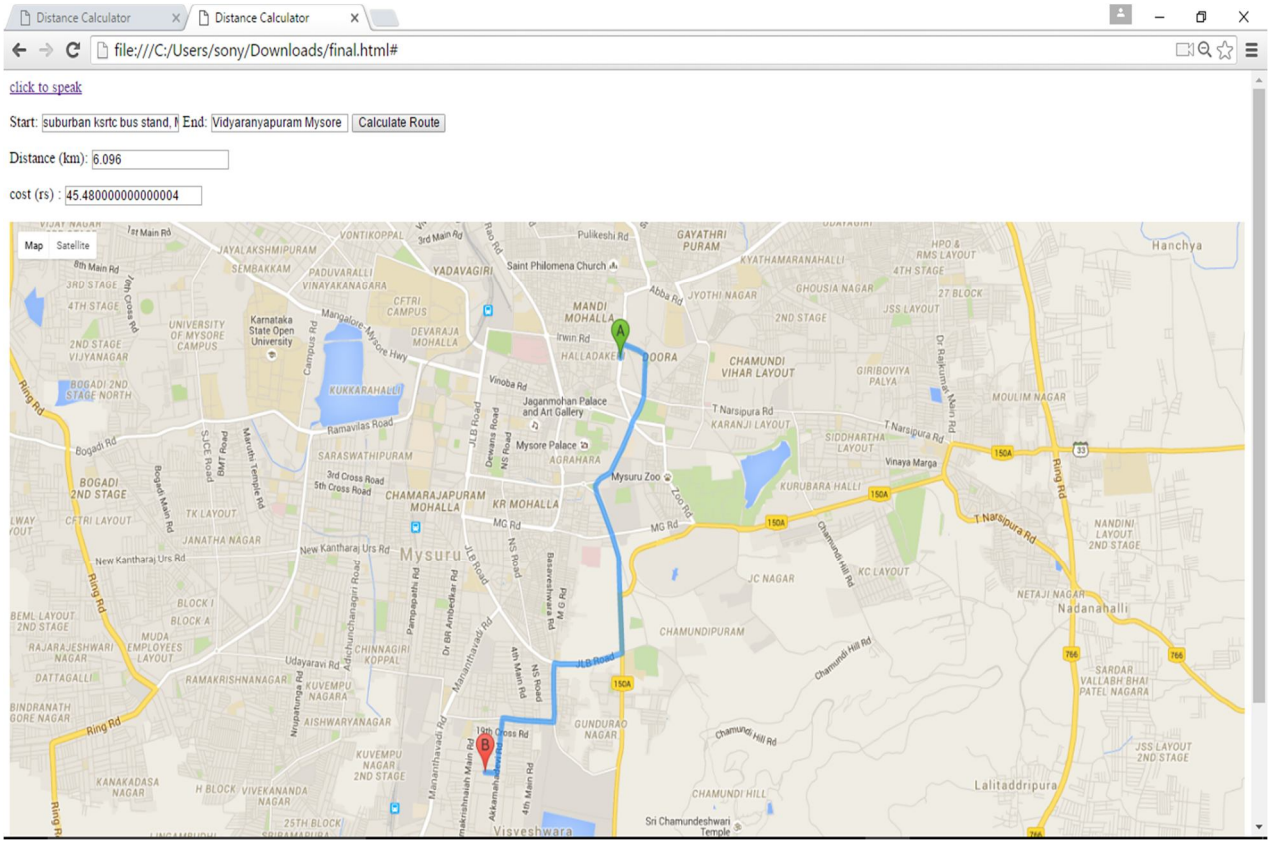
Table 1: Tabulation of results for various destinations

Starting point	Destination	Distance (in Km)	Fare* (in rupees)
Mysuru sub-urban busstop, Karnataka, India	Vijayanagar first stage, Mysuru, Karnataka, India	6.07	45.37
Mysuru sub-urban busstop, Karnataka, India	Vidyaranyapuram, Mysuru, Karnataka, India	6.09	45.48
Mysuru sub-urban busstop, Karnataka, India	SJCE,Mysuru, Karnataka, India	5.98	44.94
Mysuru sub-urban busstop, Karnataka, India	KD road, Mysuru, Karnataka, India	4.89	39.48
Mysuru sub-urban busstop, Karnataka, India	Clock tower, Mysuru, Karnataka, India	1.15	25

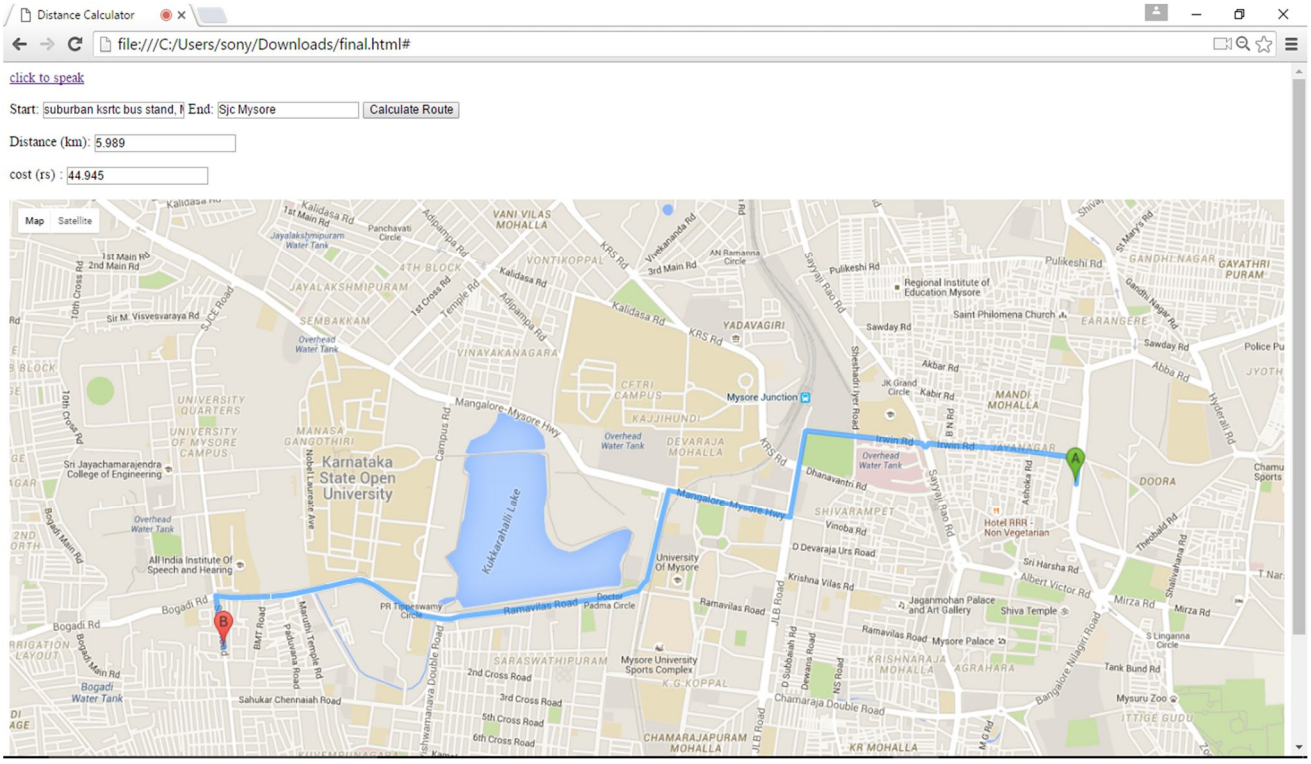
*Fare is calculated with a base fare of Rs.25 for 2Km and Rs.5 per km thereafter.



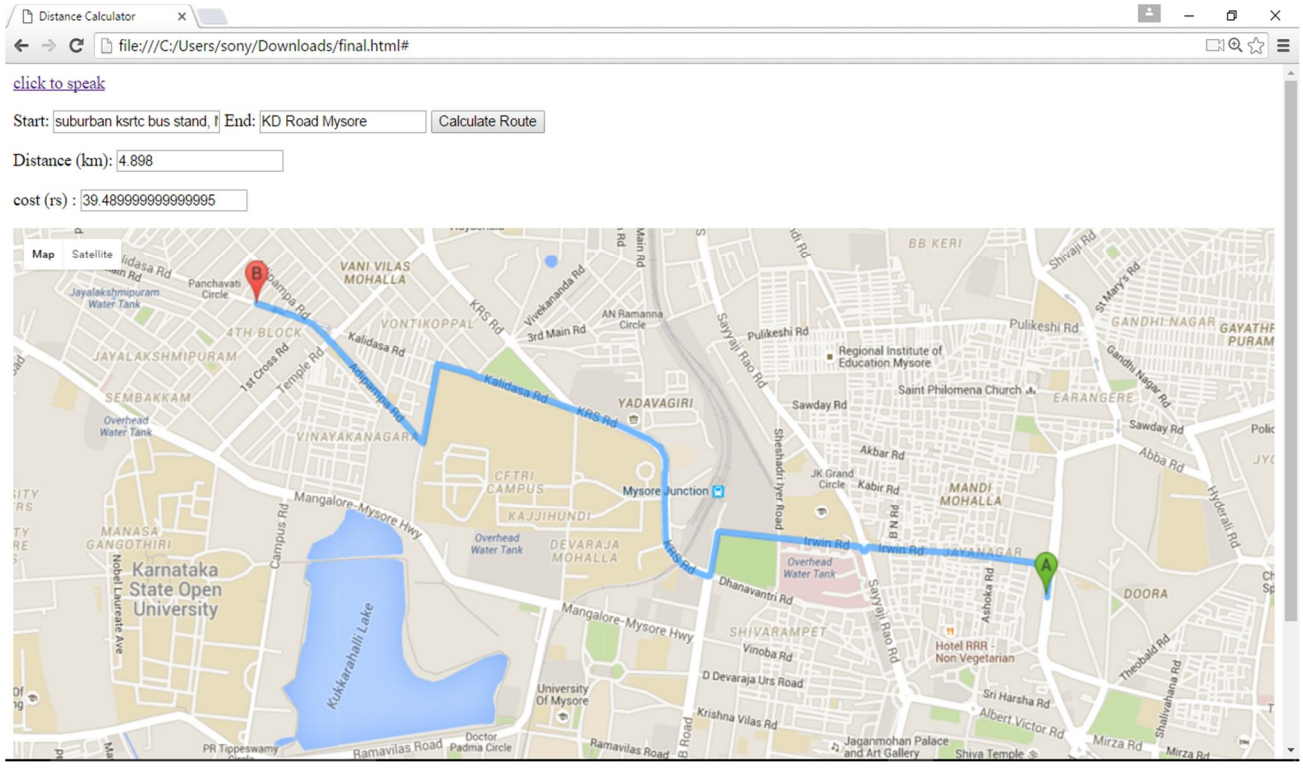
(a) Screen shot of speech recognition and distance module for Vijayanagar first stage, Mysuru, Karnataka, India



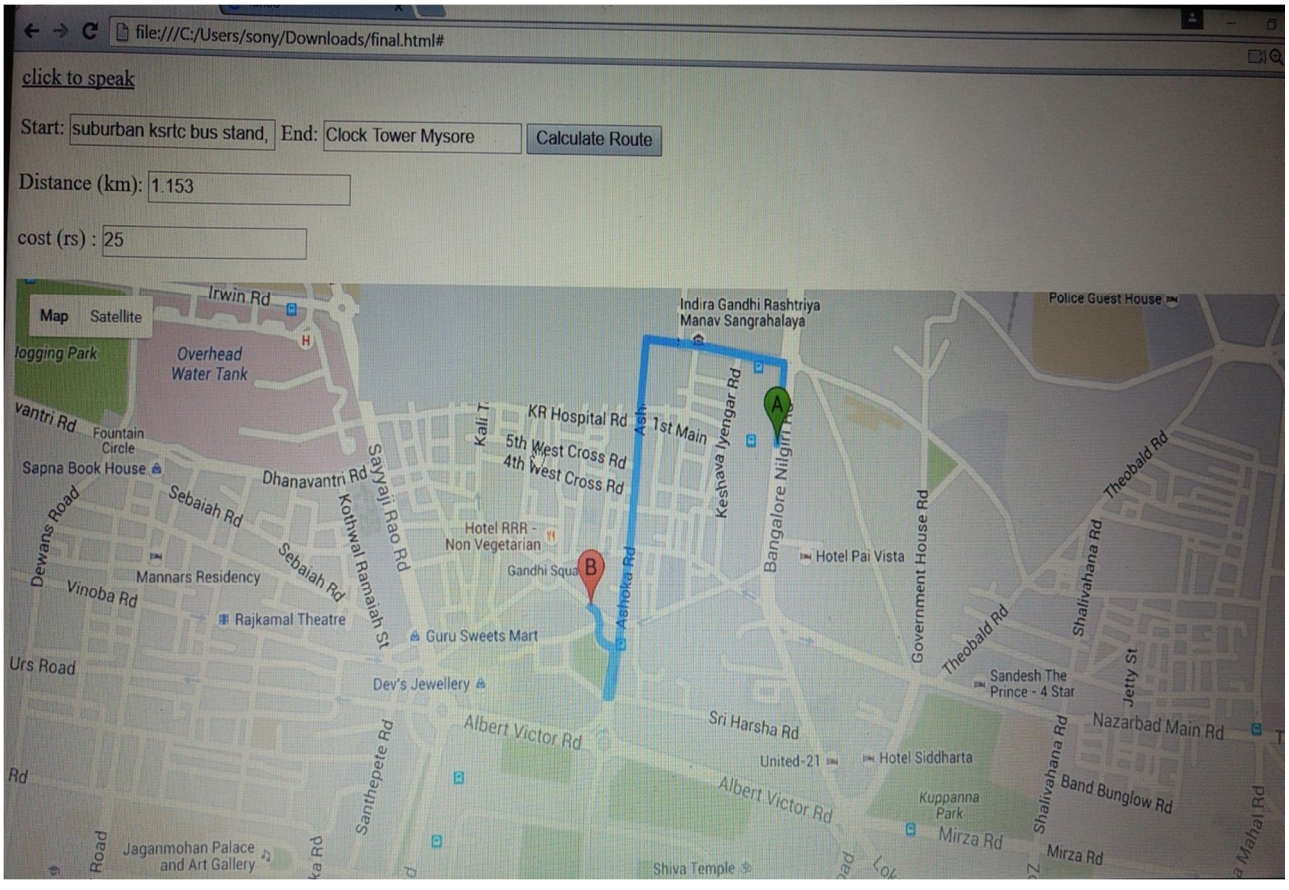
(b) Screen shot of speech recognition and distance module for Vidyaranyapuram, Mysuru, Karnataka, India



(c) Screen shot of speech recognition and distance module for SJCE, Mysuru, Karnataka, India



(d) Screen shot of speech recognition and distance module for KD road, Mysuru, Karnataka, India



(e) Screen shot of speech recognition and distance module for clock tower, Mysuru, Karnataka, India

Figure 5: Output screenshot

Future Improvements

- To develop a compatible system with both speech to text module and hardware interface integrated.
- System can be improved to locate and calculate destination distance using offline maps.
- The system can be extended to taxi's as well by suitably varying the base fare and cost per kilometre.

References

[1] M.T. Bala Murugan and M. Balaji, “SOPC-Based Speech-to-Text Conversion”
[2] Mosam Sangole, Yogesh Risodka, Sampada Kulkarni, Rahul Kushare, Vijay Pawar, “Automatic Toll collection and Antitheft system”
[3] Nuzhat Atiqua Nafid and Md. Safaet Hossain, “Speech to Text Conversion in Real-time”
[4] Pranoti Salunke, Poonam Malle, Kirti Datir, Jayshree Dukale, “Automated Toll Collection System Using RFID”
[5] Adesh Mhatre, Shilpesh Agre, Anil Avhad, Nilesh patil and Dhruv Gandhi, “Electronic Toll Collection (ETC) System Using Wi-Fi Technology”
[6] N.Poornima, M.P. Arvindan, R. Karthikeyan and S.Gokulraj,“Automated Toll Plaza Verification System for an Automobile at a Check Point”
[7] Suma Swamy and K.V Ramakrishnan, “An efficient speech recognition system”
[8] Hakan Erdogan “Speech recognition for a travel reservation system”
[9] Khadijah kamarulazizi, Dr.Widad ismail, “Electronic toll collection system using passive rfid technology”
[10] Jhani Bhasha Shaik and Mazhar Hussain Shaik, “Voter Identification and Detection System using RFID and GSM to stop rigging in the elections”