# Implementation of Mobile Transport Scheduling and Coordination System with Location Based Service Functionality for Marginalized Rural Areas

Yani Malusi and Okuthe P. Kogeda
Department of Computer Science, University of Fort Hare
Private Bag X 1314, Alice 5700, South Africa
Tel: +27 406022464, Fax: +27 406022464
Email: {200508243, pkogeda}@ufh.ac.za

**Abstract**-***most rural communities of South Africa share a lot of common characteristics and same set of service needs. One characteristic that these communities have in common is the difficulty that the government has in providing sufficient public transportation for them. Public transport in rural communities has been historically less adequate than what is provided in urban communities. Access to appropriate technology solutions can be the determining factor in the ability to reach and meet rural transportation challenges. This paper presents the design and implementation of a system that coordinates and schedules transportation in rural communities.***

**Index Terms: GIS, LBS, GPS, AVL, MRA, mTransport, coordination.**

## I. INTRODUCTION

Creating a mobile and location-aware coordination system is becoming a necessity because most users of internet are always on the move. Device development and Geographical Information System (GIS) are the tools used to develop such systems [4]. These technologies have resulted in the provision of a useful functionality in the form of a technological service to the public in terms of their location named Location Based Services (LBS). The lack of accessibility of public transport and lack of communication between transport providers and rural inhabitants have triggered our interest in carrying-out this investigation. Therefore, the Marginalized Rural Areas (MRAs) will derive the following benefits from the system: It will improve the hours of service needs; it will do away with poor timing and reduce amount of time spent waiting for the transport.

This project aims to provide a location based transportation coordination system for rural communities. It will allow users to locate public transport using their mobile devices (i.e. cell phones, PDAs, etc.). This system intends to answer questions such as:

- What time is my transport coming here?
- Is there space for me?
- Is there any vehicle in this route I am taking?

The remainder of this paper is organized as follows: In Section II, we give a brief background of the project. We present the system design and Implementation in Section III. In Section IV, we provide conclusion and future work.

## II. BACKGROUND

There are many LBS systems that have been developed in the past. The TransTrack Passenger Information and Automatic Vehicle Location (AVL) System by Masso J. F et al [2] is one of such work. Their system allows the user to locate transport by contacting the nearest traveler information kiosk. However, our system is a mobile application system that uses real time communication where the user is not required to first consult the traveler information center before accessing the location information of their transport.

Automatic Vehicle Location (AVL) is a computer-based vehicle tracking system proposed by Dimitri Loukakos [6]. The actual real-time position of each vehicle is determined and relayed to a control center. Typically, vehicle position information is stored on the vehicle for a time, which can be as short as a few seconds or as long as several minutes. Position information can be relayed to the control center in raw form or processed on-board the vehicle before its transmission.

## III. DESIGN AND IMPLEMENTATION

As a mobile system, we designed it using J2ME, Connection Limited Device Configuration (CLDC), Mobile Information Device Profile (MIDP), and wireless toolkit emulator. This system allows the users locate position of the transport using their cell phones (java enabled). It allows the transport operator to locate possible passengers along a route. When the users activate the application a connection to the GPS is established, the GPS receives timing signals from multiple satellites, a process that allows triangulation for the accurate determination of each transport position as latitude and longitude which then sends the information about the location of the transport to a real-time communication server. Then each user accesses the information about the other user through the real-time communication server via the internet as shown in Figure1.

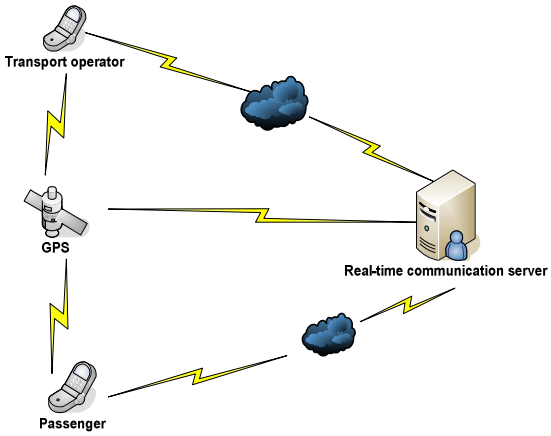


**Figure 1:** System Architecture

This system provides capability to inform passengers of predicted bus arrival time, reduce schedule preparation time, and improve communication between transport providers and passengers. This system also intends to enhance transport operator and passenger security by allowing quick location of the vehicle and faster response, and also allows the passenger to make better travelling decisions. The system use case diagram in Figure 2 shows the functionalities performed by the system users. Preliminary results show a simple user interface design that allows passengers to enter their cell numbers and indicate their location and where they are going.

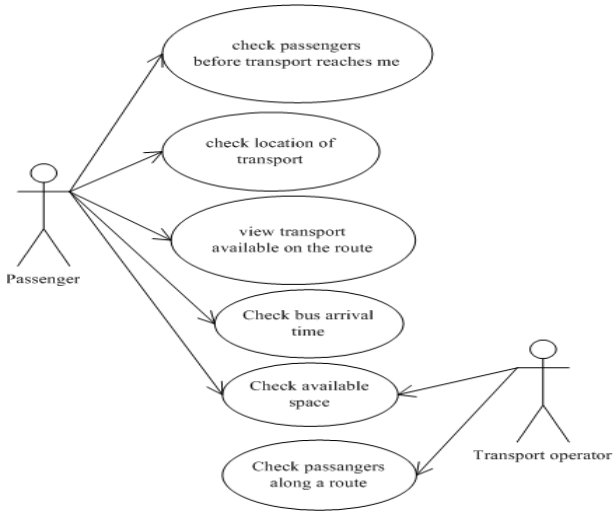


**Figure 2**: Use Case Diagram of the system

## IV. CONCLUSION AND FUTURE WORK

This paper provided a system that allows passengers locate, schedule and coordinate their transport in rural areas. The architecture and functionalities of the system were provided. More functionalities, usability testing, and system deployment in Dwesa would be undertaken in the future.

## V. REFERENCES


[1] Software "N*etbeans and wireless toolkit*" [online] Available *http://www.sum.com*

[2] Advanced transportation Technologies go to bat for rural Transit by MASSO J. F, *http://www.pcb.its.dot.gov/factsheets/**avl**/**avl**Rur.pdf*

[3] *Elsevier B.V,* Computer Communications, Volume 31, Issue 6, 18 April 2008, Pages 1091-1103, Advanced Location-Based Services, Location API 2.0forJ2ME

[4] *Fabris N,* GPS-Enabled Location-Based Services (LBS) *http://www.abiresearch.com/abiprdisplay.jsp?pressid=731* NEW YORK - September 27, 2006

[5] Michael Juntao Yuan, "*Enterprise J2ME, DEVELOPING MOBILE JAVA APPLICATIONS*",2004

[6] Dimitri Loukakos, Automatic Vehicle Location(AVL) *http://www.calccit.org/itsdecision/serv_and_tech/Automatic_vehicle_location/automatic_vehicle_location_summary.html*


## BIBLIOGRAPHY

**YANI MALUSI** received his Bachelor of Science Degree in Computer Science and GIS at the University of Fort Hare. Currently studying towards his honours degree in Computer Science at the University of Fort Hare.