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A Survey on Voice & Touch Based Dynamic Bus Navigation System Based on Zigbee, IOT & Android

Srinath G*[1], Prashanth R[2], Immanuel Joseph A[3], T. A. Mohanaprakash[4], Dr. V. Subedha[5]

[1,2,3,4,5]Department of CSE, Panimalar Institute of Technology, Chennai, Tamil Nadu, India

ABSTRACT

In this ideology, GPS Hardware is attached in every bus for the continuous tracking of the vehicle. The most important part of this project is to get Buses into passenger's location as Call taxi is functioning. This system will avoid traditional route of the buses. The modification process is our implementation. We deploy an android based application on all customers' mobile and customer can book the bus from their android application either through normal touch based or by Voice. Voice based booking is helpful for the visually impaired people. One Zigbee is attached with the bus and another Zigbee is attached with the server. Android user requests the query specifying Source & the destination to the server. Server will verify the nearest available bus analyzing through buses mobility status via Zigbee. If there is no request for a particular stop bus will dynamically reroutes to another shortest route without crossing that stop.

Keywords: GPS, Autonomous Vehicles (AVs),Zigbee, Genetic-Algorithm,DARPA, Passing-Through Intersection (PTI), Light Detection and Ranging (LIDAR), Politely Change Lane (PCL), GPRS Arduino Shield, Heraeus.

I. INTRODUCTION

Human mobility is largely supported by public transport.Many people rely on public transport to move from one place to another when the destinations of their journeys are not within walkable distances. Representatives of road-based public transport are buses and taxis, each type of which has its pros and cons.In general, buses follow fixed routes offering shared ride so that more passengers can be served on each single journey. On the other hand, taxis offer private services and run on flexible dedicated routes based on the passenger's requests.An evolving topic on the Internet of things (IoT), which consists of devices capable of communicating via the Internet environment, also provides a platform for gathering an enormous amount of data. In other words, it is now easier to collect data than ever before. To enhance the efficiency and cooperativeness, a control centre can be employed to coordinate all the vehicles, manage all the service requests, and assign the vehicles to serve the requests.

We introduce an intelligent AV-based public transportation system. It manages a fleet of AVs to accommodate transportation requests; offering point-to-point services with tracking.Initiating a new application using GPS, a smart satellite-based system for tracking and dispatching Buses to commuters. With the new system, the nearest Bus is located with the help of GPS and then tracking are transmitted to the passengers via ZIGBEE through mobile application.

GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. GPS is being installed in vehicles with the primary objective of providing accurate monitoring of location. To provide better customer service in the competitive Cab business, fast and efficient dispatching is a critical factor. Most cab dispatching systems rely on good staff and teamwork, but misunderstandings occur when bookings are transmitted by voice. This project will

initiate a new application using GPS, a smart satellite-based system for tracking and dispatching Cabs to commuters. With the new system, the nearest Cab is located with the help of GPS and then bookings and routings are transmitted to the Cab drivers display unit in digital form.

The Central Control Room (CCR) controller consists of Arduino Uno and GSM shield, the programming of main controller has been done in such a way that it initially waits to receive the text message. Numbers of both Cabs have already been stored in main controller and as the main controller receives the SMS it will perform a comparison to detect whether this SMS is from Cabs or user. If the Cab is vacant, then driver will press the vacant button, the main controller will receive the latest coordinates of the Cab and also the main controller will update the status of Cab as vacant, after that the CAB will automatically updates its coordinates to the main controller every 10 seconds.

The user will send his coordinates using his/her Smartphone application, the main controller will look for the number first and if this number is not either of the Cab then it will save these coordinates as the user's coordinates. After number detection main controller will look for the all the possible Cabs and directs the nearest possible Cab towards user. The flowchart of main controller after receiving request from user.

II. LITERATURE SURVEY

1) Autonomous Vehicle Public Transportation System: Scheduling and Admission Control by Albert Y.S. Lam, Yiu-Wing Leung, and Xiaowen Chu-2016

Technology of autonomous vehicles (AVs) is getting mature and many AVs will appear on the roads in the near future. AVs become connected with the support of various vehicular communication technologies and they possess high degree of control to respond to instantaneous situations cooperatively with high efficiency and flexibility. In this paper, we propose a new public transportation system based on AVs. It manages a fleet of AVs to accommodate transportation requests, offering point to- point services with ride sharing. We focus on the two major problems of the system: scheduling and admission control. The former is to configure the most economical schedules and routes for the AVs to satisfy the admissible requests while the latter is to determine the set of admissible requests among all requests to produce maximum profit. The scheduling problem is formulated as a mixed integer linear program and the admission control problem is cast as a bi level optimization, which embeds the scheduling problem as the major constraint. By utilizing the analytical properties of the problem, we develop an effective genetic-algorithm-based method to tackle the admission control problem. We validate the performance of the algorithm with real-world transportation service data.

2) Sensing Requirements for a 13,000 km Intercontinental Autonomous Drive by Broggi, L. Bombini, S. Cattani, P. Cerri, and R.I. Fedriga-2010

This paper presents the design issues that were considered for the equipment of 4 identical autonomous vehicles that will drive themselves without human intervention on an intercontinental route for more than 13,000 km. Autonomous vehicles have been demonstrated able to reach the end of a 220 miles off-road trail (in the DARPA Grand Challenge), to negotiate traffic and obey traffic rules (in the DARPA Urban Challenge), but no one ever tested their capabilities on a long, intercontinental trip and stressed their systems for 3 months in a row. This paper presents the technological challenge of a set of vehicles that will run the *VisLab Intercontinental Autonomous Challenge (VIAC)*. The challenge is scheduled to take place during the 2010 World Expo in Shanghai, China. Being currently under preparation, this paper focuses on the development, the vehicles' technical details, and the challenge itself. Other following papers will describe the outcome of the challenge and its result.

3) State-Driven Priority Scheduling Mechanisms for Driverless Vehicles Approaching Intersections by Kailong Zhang, Dafang Zhang, Arnaud de La Fortelle, Xiao Wu, and Jean Gregoire-2015

Scheduling driverless vehicles with different priorities to pass through intersections efficiently and safely has been becoming an important passing-through intersection (PTI) problem in the field of novel intelligent traffic systems (ITS), which is increasingly becoming cyber–physical-fused and social-service

oriented. Considering new emerging features with possible priorities, a novel centralized priority scheduling mechanism is mainly explored in this paper. First, related pivotal aspects of environment and driverless vehicles are modeled by fusing their physical and kinematic characters. Based on these models, PTI-related motions are further abstracted as several reservation-oriented standard states and actions. Then, an event-triggered and state-driven autonomous control procedure is designed. By mapping vehicular relations in spatiotemporal domain into time–distance windows, a universal passing-through principle, rules, and priority-based scheduling mechanisms are proposed and described in detail. Finally, a priority scheduling algorithm PriorFIFO is proposed and designed. These models and mechanisms are then implemented within an algorithm simulator, through which scheduling performances are verified and evaluated.

4) Modeling and Nonlinear Adaptive Control for Autonomous Vehicle Overtaking by Plamen Petrov and Fawzi Nashashibi-2014

In this paper, we present a nonlinear adaptive controller for a two-vehicle automated overtaking maneuver. We consider the problem of an autonomous three-phase overtaking without the use of any roadway marking scheme or inter-vehicle communication. The developed feedback controller requires information for the current relative inter vehicle position and orientation available from onboard sensors only. We apply standard robotic nomenclature for translational and rotational displacements and velocities and propose a general kinematic model of the vehicles during the overtaking maneuver including for the relative inter-vehicle kinematics. The overtaking maneuver is investigated as a tracking problem with respect to desired polynomial virtual trajectories for every phase, which are generated in real time. An update control law for the automated overtaking vehicle is designed that allows tracking the desired trajectories in the presence of unknown velocity of the overtaken vehicle. Simulation results illustrate the performance of the proposed controller.

5) Improving Safety for Driverless City Vehicles: Real-Time Communication and Decision Making by Andrei Furda, Laurent Bouraoui, Michel Parent, and Ljubo Vlacic-2010

This paper elaborates on the Cybercars-2 Wireless Communication Framework for driverless city vehicles, which is used for Vehicle-to-Vehicle and Vehicle-to-Infrastructure communication. The developed framework improves the safety and efficiency of driverless city vehicles. Furthermore, this paper also elaborates on the vehicle control software architecture. On road tests of both the communication framework and its application for real-time decision making show that the communication framework is reliable and useful for improving the safe operation of driverless city vehicles.

6) A Sensor-Fusion Drivable-Region and Lane-Detection System for Autonomous Vehicle Navigation in Challenging Road Scenarios by Qingquan Li, Long Chen, Ming Li, Shih-Lung Shaw and Andreas Nuchter-2014

Autonomous vehicle navigation is challenging since various types of road scenarios in real urban environments have to be considered, especially when only perception sensors are used, without position information. This paper presents a novel real-time optimal-drivable-region and lane detection system for autonomous driving based on the fusion of Light Detection and Ranging (LIDAR) and vision data. Our system uses a multisensory scheme to cover the most drivable areas in front of the vehicle. We propose a feature-level fusion method for LIDAR and vision data and an optimal selection strategy for detection of the best drivable region. Then a conditional lane detection algorithm is selectively executed depending on an automatic classification of the optimal drivable region. Our system successfully handles both structured and unstructured roads. The results of several experiments are provided to demonstrate the reliability, effectiveness, and robustness of the system.

7) Lane-Change Fuzzy Control in Autonomous Vehicles for the Overtaking Maneuver by Jose E. Naranjo, Carlos Gonzalez, Ricardo Garcia, and Teresa de Pedro-2008

The automation of the overtaking maneuver is considered to be one of the toughest challenges in the development of autonomous vehicles. This operation involves two vehicles (the overtaking and the overtaken) cooperatively driving, as well as the surveillance of any other vehicles that are involved in

the maneuver. This operation consists of two lane changes—one from the right to the left lane of the road, and the other is to return to the right lane after passing. Lane-change maneuvers have been used to move into or out of a circulation lane or platoon; however, overtaking operations have not received much coverage in the literature. In this paper, we present an overtaking system for autonomous vehicles equipped with path-tracking and lane-change capabilities. The system uses fuzzy controllers that mimic human behavior and reactions during overtaking maneuvers. The system is based on the information that is supplied by a high precision Global Positioning System and a wireless network environment. It is able to drive an automated vehicle and overtake a second vehicle that is driving in the same lane of the road.

8) Scheduling of Connected Autonomous Vehicles on Highway Lanes by Jiajun Hu, Linghe Kong, Wei Shu, and Min-You Wu-2012

With recent progress in vehicle autonomous driving and vehicular communication technologies, vehicle systems are developing towards fully connected and fully autonomous systems. This paper studies lane assignment strategies for connected autonomous vehicles in a highway scenario and their impact on the overall traffic efficiency and safety. We formulate a model of connected autonomous vehicles, which includes three features: traffic data available online, ultra-short reaction time, and cooperative driving. Based on this model, we propose a novel lane change maneuver Politely Change Lane (PCL), which achieves the tradeoff between traffic safety and efficiency. Its effectiveness is validated and evaluated by extensive simulations. The performance shows that PCL improves both safety and efficiency of the overall traffic, especially with heavy traffic.

9) Collaborative Driving Support System in Mobile Pervasive Environments by Nevin Vunka Jungum, Razvi M. Doomun, Soulakshmee D. Ghurbhurrun and Sameerchand Pudaruth-2008

The Bluetooth protocol can be used for intervehicle communication equipped with Bluetooth devices. This work investigates the challenges and feasibility of developing intelligent driving system providing time sensitive information about traffic conditions and roadside facilities. The architecture for collaborative vehicle communication system is presented using the concepts of wireless networks and Bluetooth protocol. We discuss how vehicles can form mobile ad-hoc networks and exchange data by the on-board Bluetooth sensors. The key design concepts of the intelligent driving service infrastructure are analyzed showing collaborative fusion of multiple positional data could give a better understanding of the surrounding traffic conditions for collaborative driving. The technical feasibility of using Bluetooth for data exchange among moving vehicles is evaluated.

10) GSM-GPRS Arduino Shield (GS-001) with SIM 900 chip module in wireless data transmission system for data acquisition and control of power induction furnace by Dr. Mohamed Saad Zaghloul-2014

This paper concerns the practical design and implementation of professional tool using GSM-GPRS Arduino Shield (GS-001) with SIM 900 chip module in wireless data transmission system for data acquisition and control of power induction melting furnace, We will respond with innovative, value added technique and services that improve quality, productivity, costs, environmental protection and working conditions. An induction heater (for any process) consists of an electromagnet, through which a high-frequency alternating current (AC) is passed. Heat may also be generated by magnetic hysteresis losses in materials that have significant relative permeability. To ensure the quality of molten steel, its temperature and chemical composition must be constantly monitored. Using immersion sensors like Heraeus ones to take precise measurements of these parameters within seconds directly in the molten steel, rendering time-consuming sample analyses in laboratories unnecessary. This increases throughput and lowers energy consumption during steel making. Normally the obtained measurement data is sent locally to the control station through wires or fiber optics, Our mission is to proactively find and satisfy the measurement, monitoring and control needs of the molten metal processes by sending these data to a remote station using SIM 900 chip module in wireless data transmission system for data acquisition and control of high power induction melter. For software part we will use GSM-GPRS Arduino Shield (GS-001), Using C language to program microcontroller, we put some strings in the program to make the GSM module

understands them like AT commands. The complete designed system has basic and optional features as we operate in real time monitoring and control, use GPRS communication.

11) Real Time Taxi Ride Sharing by Prof. Deeksha Bhardwaj, Azam Khan, Sunny Patil, Rajat Dhoot-2015

The traffic congestion has been increasing in urban areas due to this studying alternative measure of mobility management, and one of these measures is carpooling. In theory, these systems could lead to a reduction in the use of private vehicles to achieve success there are limitations because of two reasons the psychological barriers associated with riding with strangers and the flexibility of poor scheduling. The limitation of traditional scheme has been overcome by studying a model of carpooling with this model new feature is introduced Establishing a base trust level for Carpoolers to find suitable matches for traditional group and at the same time allowing to search for a ride with the other alternatives group when numbers of pool has scheduled trip different from usual one. This lead to problem like number of vehicles traffic, fuel consumption, air pollution, parking problem and increase in overall expenses by using unique vehicles per user. To overcome this hurdle real time carpooling can be used. Concept of car polling is to share same vehicles by the passenger travelling in the same route instead of travelling by personal vehicles. This help us to resolve the problem of traffic jam fuel consumption and also controlling air pollution result in green environment. The android application will successful overcome the problem as android mobiles are easily accessible, available and user friendly to everyone

12) GPS Based Autonomous Vehicle Navigation and Control System by Irtsam Ghazi, Muhammad Rashid Maqbool, Ihtisham ul Haq, Sanaan Saud-2016

The main aim of the paper is the development of an overall routing system which accepts input from common users via a simple android application and as a result directs the nearest vacant Cab towards the passenger. In this project two algorithms for the implementation of our project have been developed. The first algorithm is an autonomous route calculation algorithm in which a PC is used to calculate coordinates at each road intersection between any two input coordinates. The PC takes input coordinates from user and transmits the output coordinates to the cab. The 2nd algorithm is a control algorithm that navigates our prototype robots. It does so by using Haversine heading and distance formulae. The code gets it desired set point in the form of input coordinates and compares it to the robots current heading to compute an error signal. Based on this signal the robot's heading is changed to maneuver it within the robot boundaries. This type of system has a variety of applications and can be used for other purposes such as guiding a completely autonomous robot to distressed areas.

III. CONCLUSION

We are Developing an Android based User Interface for Fetching the nearest available Bus, it's Time to reach the Source and the Distance which will surely avoid the waiting time for Android User. One of our projects major applications is its use as an autonomous Cab dispatch system. The Cab dispatch problem involves assigning Cabs to callers waiting at different locations. In such an application our system can be deployed to provide enhanced fuel and time efficiency.

IV. REFERENCES

[1]. Albert Y.S. Lam, Yiu-Wing Leung, and Xiaowen Chu,"Autonomous Vehicle Public Transportation System: Scheduling and Admission Control"IEEE Transactions on Intelligent Transportation Systems (Volume: 17, Issue: 5, May 2016)

[2]. Broggi, L. Bombini, S. Cattani, P. Cerri, and R.I. Fedriga,"Sensing Requirements for a 13,000 km Intercontinental Autonomous Drive", Intelligent Vehicles Symposium (IV), 2010 IEEE, 10.1109/IVS.2010.5548026

[3]. Kailong Zhang, Dafang Zhang, Arnaud de La Fortelle, Xiao Wu, and Jean Gregoire ,"State-Driven Priority Scheduling Mechanisms for Driverless Vehicles Approaching Intersections", IEEE Transactions on Intelligent Transportation Systems,Year:2015, Volume:16, Issue: 5Pages:24872500,DOI:10.1109/TITS.2015.2411619\

[4]. Plamen Petrov and Fawzi Nashashibi,Modeling and Nonlinear Adaptive Control for Autonomous

Vehicle Overtaking", IEEE Transactions on Intelligent Transportation Systems (Volume: 15, Issue: 4,Aug,2014),DOI: 10.1109/TITS.2014.2303995

[5]. Andrei Furda, Laurent Bouraoui, Michel Parent, and Ljubo Vlacic, "Improving Safety for Driverless City Vehicles: Real-Time Communication and Decision Making", Vehicular Technology Conference (VTC 2010-Spring), 2010 IEEE 71st, DOI: 10.1109/VETECS.2010.5494179

[6]. Qingquan Li, Long Chen, Ming Li, Shih-Lung Shaw and Andreas Nuchter "A Sensor-Fusion Drivable-Region and Lane-Detection System for Autonomous Vehicle Navigation in Challenging Road Scenarios",IEEE Transactions on Vehicular Technology (Volume: 63, Issue: 2, Feb. 2014), DOI: 10.1109/TVT.2013.2281199

[7]. Jose E. Naranjo, Carlos González, Ricardo García, and Teresa de Pedro "Lane-Change Fuzzy Control in Autonomous Vehicles for the Overtaking Maneuver" IEEE Transactions on Intelligent Transportation Systems (Volume: 9, Issue: 3, Sept. 2008), DOI: 10.1109/TITS.2008.922880

[8]. Jiajun Hu, Linghe Kong, Wei Shu, and Min-You Wu,"Scheduling of Connected Autonomous Vehicles on Highway Lanes" Global Communications Conference (GLOBECOM), 2012 IEEE, DOI: 10.1109/GLOCOM.2012.6504005

[9]. Nevin Vunka Jungum, Razvi M. Doomun, Soulakshmee D. Ghurbhurrun and Sameerchand Pudaruth "Collaborative Driving Support System in Mobile Pervasive Environments" , Wireless and Mobile Communications, 2008. ICWMC '08, DOI: 10.1109/ICWMC.2008.58

[10]. Dr. Mohamed Saad Zaghloul ,"GSM-GPRS Arduino Shield (GS-001) with SIM 900 chip module in wireless data transmission system for data acquisition and control of power induction furnace", International Journal of Scientific & Engineering Research, Volume 5, Issue 4, April-2014 776,ISSN 2229-5518

[11]. Shuo Ma,Yu Zheng,Ouri Wolfson," Real-Time City-Scale Taxi Ridesharing", IEEE Transactions on Knowledge and Data Engineering, (Volume: 27, Issue: 7, July1 ,2015), DOI: 10.1109/ TKDE. 2014 .2334313

[12]. Irtsam Ghazi, Muhammad Rashid Maqbool,, Ihtisham ul Haq, Sanaan Saud, "GPS Based Autonomous Vehicle Navigation and Control System", Applied Sciences and Technology (IBCAST 13), 2016, DOI: 10.1109/IBCAST.2016.7429883