MOBILITY TRANSITION, URBAN SPACES AND TECHNOLOGY

SATURDAY 14TH OF APRIL 20018

A CITY ON THE MOVE / VEDECOM EVENT

Shanghai Urban Planning Center (SUPEC)
(where the Passages exhibition is presented)
People Square
M°: People's Square station

Organized by Tongji University, City on the Move/VEDECOM, Urban Planning Society of Shanghai, Shanghai Urban Construction Institute,
Operated by CAUP, IFCIM, CTE, Shanghai Institute of Traffic Engineering and Shanghai Association for System Simulation
With the support of Shanghai Tongji Urban Planning Institute, Shanghai Municipal Urban Planning Institute and the French Consulate

9.00 - Opening - welcome

Introduction by:

- Opening address by **Prof. Fethi BEN OUEZDOU & Prof. PAN Haixiao**
- UPM
- French Consul
- Tongji/Shanghai Urban Planning Association
- City on the Move / VEDECOM
- Shanghai Science/Technology Association
- Shanghai Transport Association
- Shanghai System Simulation Association

9.30 - Official pictures and tea break

10.00 - 1ST SESSION: CITY AND NEW MOBILITIES

10:00: **"Shanghai Master Plan 2035"**
Chen Lin, Deputy Director, First Institute of Shanghai Urban Planning Academy

10:15: **"Three Strategies' option for Congestion Mitigation"**
Kong Lingbin, Deputy Chief Engineer, China Urban Planning Academy

10:30: **"Shanghai Urban Transport Today"**
Xue Meigen, Deputy Director, Shanghai Construction and Transport Institute

10:45: discussion

11:00 **"French Strategies for ACE and experimentation"**
 Prof. Fethi BEN OUEZDOU, VEDECOM Scientific Director

11:15: **"Coordination of Infrastructure and Driverless Car"**
Bo Lixia, Director Smart Transport Center, Shanghai Urban Construction Institute

11:30: **"Bike and multimode balanced green transport"**
Pan Haixiao, Professor, Department of Urban Planning, Tongji University

11:45: discussion

12.30: Lunch

13:15 – **Visit of the exhibition visit, Mireille APEL-MULLER and Prof. PAN Haixiao**

14.00 - 2ST SESSION: MANAGING MOBILITIES WITH TECHNOLOGY

14:00: "VIPSIM: a novel simulation and optimization platform for shared autonomous taxi fleets"
Wilco BURGHOUT, PhD, VEDECOM
With the rapid development of autonomous driving on the one hand and Mobility as a service (MaaS) platforms on the other hand, autonomous private rapid transit services are expected to develop widely in the near future. In order to be able to analyze such systems of autonomous demand responsive transit and to develop algorithms for optimal design and operation of such systems, a new microscopic simulation platform is developed, that captures all relevant aspects of such systems from multiple points of view: operator, transport authority and passenger; focusing on KPIs such as operational costs, service reliability, environmental impact and quality of service. The presented framework is applied to a test case Paris - Saclay and an innovative algorithm for empty vehicle redistribution is shown to improve on state of the art nearest neighbor algorithms in terms of passenger queues and waiting times.

14:15 - "Establishment of Shanghai Road Traffic State(TSI) & Application in governmental decision and public service"
Hang Yang, Director, Research Department, Shanghai Transportation Information Center

14:30: "Toward a Local Dynamic Map: pedestrian detection and vehicle-to-vehicle communication"
Bertrand LEROY, PhD, VEDECOM
Building and sharing a Local Dynamic Map (LDM) among road users is a key objective for improving safety and mobility. Two contributions to the LDM will be presented. The first one aims to detect pedestrians, focusing on those that are far away or partially occluded, two cases that are not always well handled by existing models. The second one is dedicated to sharing information (LDM components for instance) among vehicles and infrastructure using hybrid cellular/V2V connectivity while ensuring optimal network efficiency and cost distribution.

14:45 - "Traffic simulation for Mega City"
Guo Jifu, Director, Beijing Urban Transport Center

15:00 – "History and current status of driverless car in China"
Prof. Yang Ming, Professor, Shanghai Jiaotong University

15:15: "Duality of city and technology: Driverless Car?"
Prof. Zhang Lun, Tongji University

15:15: discussion

15:30 – Tea break

15.45 - <u>3ST SESSION: INTERACTIONS OF SLOW MODES AND AUTONOMOUS VEHICLES</u>

15:45 – "Shanghai Pedestrian Space Planning and Street Design"
Ge Yan, Shanghai Urban Planning Academy

16:00 - "General problematic of the interaction between autonomous vehicles and slow modes"
Olivier ORFILA, PhD, IFSTTAR
Slow transportation modes, as opposed to fast modes are promoting a slow way of moving inside cities. Although considered as a silver bullet for the last mile transportation issues these modes suffer from a very high exposition to accidents risks.
As shown recently, autonomous driving technology cannot deal with all interactions with human using slow modes. Thus, this presentation introduces the main challenges that autonomous vehicles will have to tackle to minimize the accident risk. These challenges are decomposed according to perception and trajectory planning tasks and the role of communication means and artificial intelligence is evaluated. The variability of slow modes (bicycles, pedestrian, scooters,…) is highlighted throughout several use cases and examples.

16:15 - "An architecture for accurate and robust perception for autonomous vehicles"
Mohamed Cherif-Rahal, PhD (VEDECOM)
Perception refers to the ability of an autonomous system to collect information and extract relevant and useful knowledge from its environment. Indeed this field of research addresses fundamental functions to enable autonomous vehicles. These functions provide the vehicle with crucial information on its surrounding environment, including the free space and surrounding obstacles in the current and future states. In this context several sensors are used such us LIDAR (Light detection), RADAR (Radio detection), cameras (passive detection), ultrasonic sensors, etc. Based on these sensors the perception task can be tackled using separate sensors or a combination by synchronizing and fusing them in the same spatio-temporal space. In this presentation, VEDECOM perception and fusion architecture based on three kinds of sensors namely Lidars, Radars, and cameras will be detailed showing for each sensor family its advantages and drawbacks. The best sensor combination giving a robust modeling of the environment will be presented.

16:30: "Interactions between autonomous vehicles and vulnerable road users: from behavioral studies to the design of HMI"
Stéphanie CŒUGNET-CHEVRIER, PhD, VEDECOM
The good interaction between pedestrians and automated vehicles will be a milestone in the acceptability of these new vehicles by the general public. To ensure that this new technology will be positively received by the other road users, the automated vehicle should be capable to offering a safe and non-uncertain situation of interaction. Although, for example, the decision to cross the street is well documented in the scientific literature, it is necessary to merge the knowledge within a global and representative analysis in a natural environment, taking into account a more detailed comprehension of the steps of decision-making. Indeed, more than the detection of users on the road, the research and development of automated vehicles should include a detection of their intention, avoiding thus recurring emergency braking in the urban flow or even fatal accidents. The next issue deals with the signalization and the communication of the automated vehicles (e.g., automated taxis and shuttles).
In this context, the laboratory of new uses conducts several studies aiming at better understanding the decision-makings of the vulnerable road users, integrating the future needs in this interaction context and designing some solutions of external communication. The presentation will focus on our approach by illustrating the interest of a user-centered method to improve the acceptability of the automated vehicles.

16:45: "Robust Driverless Bus Technology: Shenzhen Application"
Dr. Matthew HU，VP,S&T, Haylions Technologies

17:00: discussion

17.15 – WRAP -Prof. PAN Haixio and Prof. Fethi BEN OUEZDOU)

17.30 End

18.30 Diner

LECTURERS

Chinese participants

- **Chen Lin,** Deputy Director, First Institute of Shanghai Urban Planning Academy
- *Kong Lingbin, Deputy Chief Engineer, China Urban Planning Academy*
- **Xue Meigen**, Deputy Director, Shanghai Construction and Transport Institute
- **Bo Lixia,** Director Smart Transport Center, Shanghai Urban Construction Institute
- **Zhang Yang,** Director，Research Department, Shanghai Transportation Information Center
- **Guo Jifu**, Director, Beijing Urban Transport Center
- **Prof. Yang Ming**, Professor, Shanghai Jiaotong University
- **Prof. Zhang Lun**, Tongji University
- **Ge Yan**, Shanghai Urban Planning Academy
- **Dr. Matthew HU**，VP,S&T, Haylions Technologies

French participants

- **Mireille Apel-Muller** is Director of City on the Move Institute at VEDECOM. After having participated in the foundation and animation of EUROPAN (a European biennial architectural competition), Mireille Apel-Muller is heading since its creation in 2000 the City on the Move Institute. She has led various research programs, and co-directed the international exhibitions "*Architecture on the move, Cities and mobility*", "*The street belongs ot all... of us!*" and "*Passages, transitional spaces for the 21st century city*"; she also co-directed international symposiums such as "*The genius of walking*", "*The making of movement*", "*Where are the taxis going?*", "*Mobilities for integration*", as well as some fifteen books.

- VEDECOM Scientific Director, **Fethi Ben Ouezdou** is currently Full Professor in Robotics at the Physics and Mechanics Department of the University of Versailles St. Quentin en Yvelines. He is the leader of Humanoid Robotics group in the LISV Laboratory. He received his M.S. from the Ecole Nationale Superieure des Arts & Metiers and Ph.D. degrees from the University of Pierre et Marie Curie (Paris 6), in 1986 and 1990, respectively. From 1990 to 1991, he was Researcher at the University Paris 6, and worked on the project of quadruped locomotion. From 1991 to 2004, he was Associate Professor, at the University of Versailles and holds Position at the Department of Mechanical Engineering of the University of Versailles. He was also the head of the Department. Since April 2012, he is Vice President Research and Innovation Development of the University of Versailles St. Quentin. He is the co-inventor of 8 patents and the author of over 135 technical publications, proceedings, editorials and books. His research interests include Humanoid robots, Actuation, biomechanics of locomotion and manipulation systems and biologically inspired design and control of robotic systems. He is the co-coordinator of CNRS Research Group dealing with Humanoid Robotics. He is involved in ROMEO 2 National Project and was the coordinator of ANR (French Research National Agency) PHEMA and ROBIAN projects and L2I (funded by EADS foundation) former projects.

He is also involved as LISV coordinator in several former ANR projects (ABILIS, INTERACT, R2A2, SHARMES, SIMBIOMAN, ESTA, PERFRV2).

- **Dr. Wilco Burghout** is the head of the Centre for Traffic Research at the KTH Royal institute of technology in Stockholm, from where he obtained his PhD in transport modeling in 2005. His research interests focus on modeling and analysis of traffic processes, ranging from large-scale traffic data mining to autonomous and public transport modeling and system-wide traffic state estimation and prediction. Dr. Burghout is currently attached to VEDECOM where he leads the working group on modeling of system and network effects of autonomous and automated vehicles."

- **Stéphanie Cœugnet** is a researcher in ergonomics and cognitive psychology at VEDECOM. Her main research interests lie in the field of transportation psychology/ergonomics and focus on the use of emerging technologies and HMI as well as on the ergonomic analysis of the road users' activity. She holds a Ph.D. in cognitive psychology and ergonomics from the University of Valenciennes (France) where she has conducted research studies about driving under time pressure at the Laboratory of Industrial and Human Automation control, Mechanical engineering and Computer Science (CNRS, LAMIH, 2008-2011). After having coordinated some works about design and evaluation of HMI in European labs, she took part in projects founded by the French Ministry of Ecology, Sustainable Development and Energy as a researcher at IFSTTAR-LEPSiS about older pedestrian street crossing, navigation and road workers' safety tested in a virtual environment (projects: A-PIED, YELLOW ; 2014-2016). Since 2016, she is a researcher at the VEDECOM institute (laboratory of new uses) in three main fields. (1) She investigates the interactions between the vulnerable road users and the different types of autonomous vehicles (e.g. robot-taxi, shuttle) by using analysis of activities in natural and dynamic context and studies in virtual reality. (2) She implements several studies about the user-centered design and the evaluation of vehicle HMIs and mobility services. (3) She raises the issue of the human-robot cooperation. She is involved in AUTOCONDUCT and EVAPS projects. She is the co-author of about 50 scientific publications, research projects and proceedings.

- **Bertrand Leroy** leads the VEDECOM research group dedicated to "Mobility Data Sensing and Processing". His research interests include image processing, machine learning and connected sensors applied to mobility. From 2006 to 2014 he served as innovation project manager in a car manufacturing company. Prior to that, he was a project manager at Engie-Ineo (Paris) after having worked as a software developer in start-ups in Switzerland and France. He started his career as a research scientist in image processing at Hopital Saint Louis (Paris) and at the University of Southern California (USC) working on JPL-NASA contracts. Bertrand Leroy holds a PhD in Computer Science from the University Paris-Dauphine; his thesis work was carried out at INRIA in the field of Computer Vision. He also holds an MBA degree from University Paris-Sorbonne.

. **Olivier Orfila**: After an engineering degree and a master degree in 2006 from the Burgundy University, he received a Ph.D. degree from the University of Evry (France) in 2009. After 3 years working on ecodriving assistance systems and road safety, he integrated the LIVIC, Laboratory on the Interactions between the Vehicle, the Infrastructure and the Driver, as a researcher in 2010. His research interests include road safety, ecodriving, ADAS and Autonomous Driving. He is expert for the ACEA in Brussels and from 2015, he is the LIVIC deputy director. In 2016, he spent six months as invited professor in TongJi University in Shanghai (China) and he is now expert for the French Ministry of Ecology.

- **Mohamed Cherif Rahal** is currently senior researcher and head of the perception and data fusion team at VEDECOM. He received his state engineer degree from the computer science

institute at Constantine University in 2002. He get a DEA in applied mathematics and a Ph.D. Degree in data analytics and mining from the university Paris Dauphine in 2010.

He is the co-inventor of 2 patents and the author of over 20 technical publications, proceedings, and books chapters. He is also program and chair member of 4 international conferences. He participated to 3 ANR French projects (SEVEN, CIPEBUS and Score@F) and one European Projects in the field of big data and data analytics. Actually he is in charge of 3 European projects, Automate, CoExist and Adas&Me. His research interests are in applied AI, Homan to machine interaction with a special focus on vulnerable users detection and tracking.