

## HOSSAM ABDELGAWAD, PHD

Associate Professor, Faculty of Engineering  
Public Works Department  
Highways, Traffic & Airport Engineering



### NATIONALITY

Egyptian

### LANGUAGE

Arabic and English

### EDUCATION

**Doctor of Philosophy in Intelligent Transportation Systems**, University of Toronto, Dept. of Civil Engineering, 2010

**Master of Science in Traffic, Highway, and Airport Engineering**, Cairo University, Dept. of Civil Engineering, 2006

**Bachelor of Science in Civil Engineering**, Cairo University, 2004

### SUMMARY OF CAPABILITIES

Dr. Abdelgawad is currently an **Associate Professor** at Cairo University, Traffic and Highway Engineering. Dr. Abdelgawad completed his Ph.D. in ITS from University of Toronto. He holds a B.Sc. in Civil Engineering and M.Sc. in Highway and Traffic Engineering from Cairo University.

Dr. Abdelgawad has **17 years of experience** accumulated in Egypt, the Middle East, and in Canada in: 1) Traffic management, Transportation planning, operations, modelling, and optimization; 2) ITS specifications, technical requirements, and functional testing; 3) Smart Mobility Systems Concepts, Vision, and Strategy; 4) Data analytics and visualization, data-driven innovation in transportation and spatial data management and warehousing.

Dr. Abdelgawad is a **Transportation Expert** contributed to transport and traffic studies in the MENA Region, USA, Canada, GCC Countries. In Cairo alone he has playing a key role in managing and leading projects with a mix of Government Clients [Cairo Governorate, GARBLT, MoT, Traffic Police, NUCA], International Funding Agencies [World Bank, UNDP, UN-Habitat, UNDP, AfD, GIZ] and Private Sector [Al Swedi, Majed Al Futtaim, Capital Group].

Dr. Abdelgawad has more than **50 publications** (including 26 international journal publications) and 2 book chapters, with an h-index of 16 and more than 1000 citations according to Google Scholars.

Dr. Abdelgawad is the receipt of the “National/State Encouragement Award in Engineering Science” for 2018 and the recipient of “Cairo University Encouragement Award in Engineering Science” for 2016. Dr. Abdelgawad was nominated by the University of Toronto to the “Young Engineer Achievement Award” for his work on emergency evacuation and disaster management of large cities and he was the winner of the International Transport Forum Award, 2010, for Transport and Innovation competition among 52 countries.

Dr. Abdelgawad has an immanent knowledge and experience with a wide range of traffic computer software and tools. He is a Paramics Accredited User (APU) with ample experience in building, calibrating, validating, and



overseeing models developed using TransCAD, Paramics, UAF, VISSIM, AIMSUN, DynusT, HCS, Synchro, SimTraffic, EMME, and Dynameq.

## **MEMBERSHIPS**

- Canadian Association of Postdoctoral Scholars (CAPS-ACSP)
- Professional Engineers of Ontario (PEO)
- Member, World Conference in Transportation Research Society (W CTR)
- Member, ITS Canada
- Member, INFORMS
- Member Canadian Transportation Research Forum (CTRF)
- Member, Transportation Research Board (TRB)
- Member, Institute of Transportation Engineering (ITE)
- Member, Emergency Evacuation Planning: TRB Subcommittee ANB10(3)
- Member, Canadian Society of Civil Engineering (CSCE)
- Member, Canadian Institute of Geomatics
- Friend, Transportation Network Modelling (ADB30)
- Member, Egyptian Syndicate of Engineers (MESE)

## **RELEVANT EXPERIENCE**

<b>June 2013 – To date</b>	<b>Associate Professor</b> Senior Transportation Expert
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**Harnessing the Power of Data in the Middle East and North Africa Project – Access to Knowledge for Development (A2K4D). Senior Transport Advisor in the following projects:**

- **Data-Driven Innovation in Transportation, The Case of Greater Cairo:** This project focuses on 'Non-Traditional Approaches to Data, Transport and Urban Planning in MENA Region. One track of this project is the automatic identification of Hotspots in Cairo through the use of Google Traffic Data (through APIs) and existing studies in Cairo.
- **A Big Data System to prevent Traffic Black Spots in the MENA Region:** This project employs pervasive data collection to identify traffic black spots in Morocco.

**Data Management System for the Egyptian National Highway System: Transport Expert and Project Director**

In this project Dr. Abdelgawad supported the Egyptian National Institute of Transport in managing and warehousing various datasets available at different entities within the Ministry of Transport. The project scope includes:

- Assessment of Current and Future Data Needs.
- Scanning and Collection of Available Data.
- Unifying Data Structure and Formats.
- Data Management Implementation and Warehousing

**Towards Wise Cities: A Data-Driven Approach for Sustainable Mobility. Smart Cities Expert and Project Director**

The aim of this project is to lay the ground for: understanding the concept better of smart/wise cities; harnessing the power of ICT, IOT, and open/ big data; learning from other worldwide experiences and deployments; and putting forward research questions and directions for the MENA region to clearly identify/understand the challenges and explore opportunities. Specifically the project has three central objectives: 1) define how can our cities become more wise in the way citizens, governments, and business co-operate and co-innovate – openly through social change incentives and reward programs; 2) show case examples from other cities and assess the potential and the transferability of these examples to the MENA region; and 3) identify future directions for services/sectors where realizing wise cities could be possible and define the enabling tools for such realization in the MENA region.

**Cairo Traffic Congestion Study, Egypt. Transportation Systems Advisor.** This study focuses on the causes as well as possible solutions for traffic congestion in Greater Cairo Metropolitan Area (GCMA) conducted by the World Bank. It describes the many causes for traffic congestion, from fuel subsidies to poor traffic planning. The economic costs could be as high as 4 percent of GDP. Solutions include improving public transport and making the use of private vehicles expensive. Improving traffic management and potential ITS strategies and using traffic lights can be implemented quickly. Longer lasting and sustainable solutions include the expansion of the public transport system and revision of transport pricing.

- Provide expert opinion and advisory role on the causes of congestion given the local knowledge of the area.
- Suggest and formulate stakeholder contacts in the Greater Cairo Metropolitan Area (GCMA).
- Assist in creating a solution strategy matrix for short term (quick win) solutions, moderate package solutions, and long-term strategies.
- Write and review reports submitted by the consultancy team.

**March 2010 – To date**

**SETS Intl.**

Senior Transportation Expert

**Pilgrims Transport Strategy:** SETS was commissioned to develop a vision and strategy for a futuristic state for transporting pilgrims as part of the National Transformation Plan for Saudi Arabia. The project included the following phases:

- Phase 1: Current state assessment, benchmarking, & GAP Analysis
- Phase 2: Vision Articulation & Strategy Development
- Phase 3: Technology Enablers and Implementation roadmap
- Phase 4: Governance Enablers and Implementation roadmap

**Development of Stations and Bus Transportation for Pilgrims in Al Mashaer Journey:** SETS was commissioned to develop and set up bus stations for transporting pilgrims between the City of Holy Makkah and Al Mashaer Al Muqoddasah, in order to ease traffic pressure on the streets and roads of the Makkah while facilitating the movement of pilgrims during their holy journey. SETS scope of work includes:

- Extensive data collection from stakeholders and authorities related to the Hajj season.
- Assessment of demand and supply of the transportation system for pilgrims (current and projected).
- Develop operational and implementation plans for pilgrims' bus transport during the Hajj season.
- Development of a concept design of a typical pilgrims' assembly station.
- Development of a pilot corridor for bus transport for pilgrims between Makkah and Al Mashaer Al Muqoddasah.

**City Center Almaza Directional and Media Signage Plan:** SETS was commissioned to develop a two-phase signage plan [1: Media Signage Plan and 2: Directional Signage Plan] for a new development – City Center Almaza - in a vibrant area near Cairo International Airport, at the interchange of Suez Road and Nasr Road. The scope of this project included:

- Site visits
- Field observation
- Spatial mapping of media elements,
- 3D high-resolution professional renders for media elements and presenting the results to the concerned authorities.

**City Center Almaza Traffic Signage Review and Assessment:** SETS was commissioned to conduct a comprehensive assessment and review of all signage plans packages for City Centre Almaza. The scope of the project included:

- Task # 1: Signage & Wayfinding Review and Gap Analysis: This task involves succinct review and assessment of the following elements (External Road Signage , City Center Immediate Traffic Signage, Parking Signage and Wayfinding)

- **Task # 2: Customer Journey Simulation:** This task involves developing simulation maps portraying customers journey accessing CCA from one or two locations accessing CCA.

**Level of Service Study for Proposed Bike Lanes in Cairo, Egypt:** SETS NA was commissioned by UN-Habitat to conduct careful assessment of traffic operations within the study area, rigorous evaluation of bike lanes impact on traffic operations, and specification of mitigation measures that could alleviate possible adverse impacts. The scope of this project included:

- Data Collection & Surveys (Traffic Counts, Parking Counts, Motorized Counts)
- Simulation Modelling & Assessment of Alternatives
- Propose Mitigation Measures
- Authority Approvals on Proposed Mitigation and Interventions

**Developing Air Quality Heat map for Cairo: A Citizen-Centric Approach:** The project aims at harnessing the power of mobile sensors and advances in technology to create informative air quality mapping of Cairo. The objective of this project is to build a heat map for greater Cairo regarding the concentration of Black Carbon which is considered one of the most pollutants affect the human health. The Black Carbon (BC) is the part of the Particle Matter (PM) which is directly related to vehicles emissions. The scope of the project included:

- Design of Experiments.
- Develop and Implement a Mobile Data Collection Plan.
- Create Inventory of Required Modelling Data.
- Landuse Regression Modelling and Pollutants Estimation.
- Mapping and Visualization.

**Road and Parking Design Review, and Detailed Road Design & Signs and Marking:** SETS was commissioned the provision of technical support services related to: Review of Maser Plan and land use data., Detailed design of road network, developing the access / egress strategy for the site, road plan layouts & Profiles, typical cross sections, road marking and signage plans.

**MALL OF EGYPT Directional, Traffic, and Media Signage Plan:** SETS was commissioned to provide services to Majjd Al Futaim Properties pertaining to enhancing the overall traffic conditions and customers experience accessing / egressing the super-regional mall. The scope of the project included:

- Data Collection & Surveys
- Parking Assessment & Queueing Analysis
- Develop directional signage plan for access for MOEG from key approach roads
- Develop directional signage plan within MOEG parking
- Develop a comprehensive media signage plan that promotes MAF brands
- Propose Mitigation Measures
- Approvals from Authorities

**Al-Bourouj Traffic Impact Study Review, Modelling, Validation, and Access / Egress Strategy (Client: Confidential):** SETS NA was retained to conduct a review and assessment of a previously conducted traffic study, validate its assumptions, and propose a set of mitigation strategies for the overall site of 5 M<sup>2</sup> developments in outskirts of Cairo and Ismalia Road. The study included the following tasks:

- Master Plan Review and Trips Generation Rates
- Data Collection: Classified Traffic Counts, Travel Time Speeds
- Traffic Simulation Model
- Assessment of Access / Egress Strategy
- Recommendations

**MENA Data Platform:** SETS was commissioned to develop the online platform with a web-based, database-driven administration interface that allows site managers to easily update content; add graphics and media; access statistics and site usage; and perform other routine site administration, all without directly accessing source code or using HTML or web-based code. The project scope included the following tasks:

- System Requirements
- Branding Design
- Backend Development
- Analytics & Visualization
- Warehousing
- Testing
- Hosting & Maintenance

**Data-Driven City Planning: Harnessing the Power of Transport Network Companies Data: The Case of Careem in Egypt:** The main objective of this project is to advance data-driven cities planning – with focus on urban mobility – through harnessing the power and wealth of data available to ride-hailing companies. More specifically, provided that data are sufficiently anonymized by TNC (to protect users' privacy), they can provide the invaluable insights to city planners and traffic operators. The deliverables of the project are the following:

- Policy Report / Brief
- Workshops with concerned stakeholders
- Capacity building to MoT staff
- Analytics Reporting and Series of Online Visualizations
- Journal Article

**Traffic Impact Study Validation and Operations Strategy (Client: Confidential):** SETS NA was retained to conduct a validation study for a large-scale development in New Cairo in light of new traffic conditions and master plan update. The study included:

- Data Collection Plan
- Microsimulation Model
- Operational and Safety Analysis
- Access/Egress Strategy
- Cost Estimation of Required Road Infrastructure

**Data Management System for the Egyptian National Highway System:** In this project SETS North Africa team is assisting the Egyptian National Institute of Transport in managing and warehousing various datasets available at different entities within the Ministry of Transport. The project scope includes:

- Assessment of Current and Future Data Needs.
- Scanning and Collection of Available Data.
- Unifying Data Structure and Formats.
- Data Management Implementation and Warehousing

**Traffic Impact Study for Major Mixed Landuse Development in New Cairo (5.6 million m2 Land Area):** SETS North Africa was retained to conduct a Traffic Impact Study for a total land area of 5.6 million m2 aimed to motivate mixed-use multi-purpose activities and walkability in the emerging New Cairo City. SETS NA conducted the traffic impact study to address the accessibility needs to the site and assesses its impact on the surrounding roadway network in two stages: Inception Stage, and Concept Stage. The study included the following tasks:

- Master Plan Review and Trips Generation Rates
- Traffic Outlook of the Development Site
- Assessment of Access / Egress Strategy
- Roadway Design Review
- Public Transport Plans Review
- Summary and Conclusions

#### **Detailed Design and Tender Documents Preparation for Thumamah Road Corridor Western Section. ITS Expert and Specialist**

Arriyadh Development Authority intends to upgrade the Thumamah Road from its current status, as a “major arterial” in the City, to an “urban freeway” standards, in line with the recommendations of the Metropolitan Development Strategy for Arriyadh. Role in the project included the development of the

technical specifications for the design, supply, installation, commissioning and maintenance requirements for ITS equipments; including:

- Closed Circuit Television (CCTV) Cameras
- License Plate Recognition (LPR) System
- Variable Message Signs (VMS)
- Intersection Traffic Signal Control
- Ramp Metering and Prioritization Enforcement
- Red Light Violation System

### **Traffic Management Program for the City of Arriyadh – KSA. Track 2 Project Manager and Transportation Expert**

The Riyadh City Road Network is witnessing huge and unprecedented transportation projects aiming to accommodate the steady increase in traffic, passengers, and freight. In response to population growth and the rapid increase in traffic volumes, engineers and planners have to verify if the transportation systems and modes are capable to accommodate traffic and to meet the citizens' requirements when they wish to reach their destinations quickly and smoothly. In this context, the Riyadh Municipality is implementing a comprehensive traffic management program which will be periodically repeated every three years. Based on this program, the Riyadh City will be able to keep pace with other developed cities around the world through the provision of comprehensive and frequent traffic management programs. Such programs have become an important necessity so cities can catch up with urban modernization needs. SETS scope of work included the following:

- **Track #1: Traffic Studies** (General traffic studies, Topographic surveys, Traffic volume surveys and data collection, Traffic diversion and rerouting studies, Traffic impact studies for commercial centers and main attractions, Traffic impact studies of future and current infrastructure projects, Traffic impact studies of public transport projects, Study of black spots and congested locations)
- **Track # 2: Update of Arriyadh Traffic Model** (Update the existing TransCAD model for the base year, Develop a similar and parallel model using VISUM software, Calibrate and validate the two models for the base year scenario, Develop multiple future scenarios)
- **Track # 3: Providing Arriyadh Municipality with a fully dedicated Technical Support Team, which is responsible for:** Identify traffic studies and their priorities, Review different projects and reports technically, Solve traffic problems and improve safety measures, Review traffic impact assessment studies.

### **Estimations and Modeling of Factors Governing Emissions of CO<sub>2</sub> and Other Air Pollutants from Public Transport Modes Cairo. Project Manager**

The study is a component of the project "Support to an Improved Urban Transport System in Cairo", being undertaken by the Egyptian Environmental Affairs Agency (EEAA) and funded by the French Development Agency. Its aim is to introduce and implement a system to measure pollutant emissions from public transit vehicles (buses, mini buses, and micro buses) based on actual observations of emissions in Cairo under real traffic conditions. Accordingly, emission factors and the relevant emissions modeling are to be developed for various public transit modes. The measurements shall be conducted using Portable (or on-board) Emissions Measurement Systems (PEMS) for representative samples of public transit buses, routes, and driving conditions in Greater Cairo.

### **Estimations and Modeling of Factors Governing Emissions of CO<sub>2</sub> and Other Air Pollutants from Medium and Heavy Trucks in Greater Cairo. Project Manager**

This assignment is part of the "Sustainable Transport Project for Egypt" funded by the Global Environment Facility (GEF) / United Nations Development Program (UNDP), and implemented by the Egyptian Environmental Affairs Agency (EEAA). Its aim is to introduce and implement a system to measure pollutant emissions from on-road medium and heavy trucks based on actual observations of emissions in Cairo under real traffic conditions. Accordingly, emission factors and the relevant emissions modeling are to be developed for medium and heavy trucks. The measurements shall be conducted using Portable (or on-board) Emissions Measurement Systems (PEMS) for representative samples of trucks, routes, and driving conditions in Greater Cairo.

**Sep 2011 – Sept 2015**

**University of Toronto, Canada**  
Manager of the ITS Centre and Testbed

### **Smart Infrastructures and Applications for Connected Vehicles and Transportation Systems (Baher Abdulhai, Hossam Abdelgawad, ITS Centre and Testbed)**

The project will develop an open applications platform for connected vehicles and transportation systems. The platform will stimulate private-sector applications for connected vehicles and enable smart transportation systems that improve safety and efficiency and promote sustainable transportation.

- Management of day-to-day activities of the project.
- Define and develop smart transportation system applications with emphasis on multi-modal applications.
- Oversee development of Multi-Modal Smart Phone Apps for Pervasive Traveller Information System, Incident Reporting, and Vehicle Diagnosis.

### **Design, Development, and Implementation of LogADay App to Support Shuttle Program, Summerhill, University of Toronto**

In this project a smartphone App was developed and connected to an OBD device to support collecting before and after GPS-traced travel diaries, fuel consumption, and mode of travel data. The Shuttle program offered training to drivers to influence their driving behavior through the development of some driving tips. The after study revealed notable change in driving behavior and traffic related statistics was summarized and presented to the client.

### **Assessment of Field Implementation and Testing of Self-Learning Intelligent Traffic Signal Control System for Congested Urban Areas. Project Manager, MaRS Innovation Proof of Principle Program**

The main goal of this project is to further develop/extend the Self-Learning Adaptive Traffic Signal Control System (MARLIN-ATSC) to an implementable status prior to wide spread field deployment and to outreach a wide range of municipalities/cities on a more robust field implementation basis. The outcome of this project is threefold:

- Assessment of Field Implementation Requirements.
- Integration of MARLIN-ATSC System into Existing Field Controllers.
- A Quantification of MARLIN-ATSC Benefits via Field Tests.

### **ONE-ITS: Online Network Enabling Intelligent Transportation Systems. (Baher Abdulhai, Mohamed El-Dariby Hossam Abdelgawad, ONE-ITS)**

ONE-ITS is an open service-oriented virtual organization for creating, sharing, and managing the knowledge, expertise, resources, and the services of Intelligent Transportation System. ONE-ITS has a three-pronged vision: Building Collective ITS Intelligence, Sharing ITS Resources, Involving and Serving Mobile Travellers. The following projects are managed and operated through ONE-ITS:

- Development of Telematics Portlet for Highway 407 ETR.
- Pilot Fleet Management for the Ministry of Transportation Maintenance and Construction Fleet.
- Traveller Information System Platform using Smart Phones and Web Services.
- Canadian Automobile Association Mobile Application for Customer (vehicle) Diagnosis and Identification.

### **Multi-Agent Reinforcement Learning for Integrated and Networked Adaptive Traffic Signal Controllers (MARLIN-ATSC). (Samah El-Tantawy, Baher Abdulhai, Hossam Abdelgawad, ITS Centre and Testbed)**

This platform is designed to address the Adaptive traffic signal control (ATSC) to alleviate traffic congestion and reduce emissions in transportation networks. An Artificial Intelligence technique, Reinforcement Learning (RL) is used to design a "self-learning" ATSC. The MARLIN-ATSC system is designed to achieve coordination-based decentralized ATSC in transportation networks. In MARLIN-ATSC, each signalized intersection represents a control agent that interacts with the traffic environment to achieve an optimal control policy while coordinating with the adjacent intersections. The coordination mechanism among agents models the neighbors' policies and selects the best response action accordingly for each agent in the network.

### **Win-Win Dynamic Congestion Pricing for Congested Urban Areas. (Aya Aboudina, Baher Abdulhai, Hossam Abdelgawad, ITS Centre and Testbed)**

In this platform a dynamic congestion framework is developed that a) uses dynamic traffic assignment for a realistic representation of congestion dynamics; b) uses rigorous optimization and high performance computing to deduce optimal pricing in real time; and c) uses pricing to eliminate bottlenecks, spread demand over space and time, reduce road density to below critical density, increase capacity by gaining efficiency due to eliminating hyper-congestion, and raises funds for transit, while maximizing social welfare.

**Optimal Freeway Traffic Control Using Self-Learning Agents. (Kasra Rezaee, Baher Abdulhai, Hossam Abdelgawad, ITS Centre and Testbed)**

This platform utilized reinforcement learning (RL) as a self-learning algorithm to solve the optimal freeway control problem. The major advantage of RL control agents is that they learn from the interaction with the traffic environment directly without the need for a complex model of the system, and hence adapt to any changes in the environment over time. A simulation platform is developed to test the efficiency of an adaptive self-learning ramp metering controller on a few on-ramps along Highway 401.

**Development of Generic Optimization Platform for Intelligent Transportation Systems Applications: An Artificial Intelligence Approach. (Tamer Abdulazem, Baher Abdulhai, Hossam Abdelgawad, ITS Centre and Testbed and University of Calgary)**

A generic optimization platform is developed to solve complex and highly-dimensional optimization problems for Intelligent Transportation Systems. The platform is designed to provide a user friendly and customizable web service to solve any optimization problem.

**ITS Training Curriculum Project: ONE-ITS Society for ITS Canada-Transport Canada (Baher Abdulhai, William Johnson)**

ITS Canada entered through a partnership agreement with the Government of Canada establishes a comprehensive training curriculum addressing all domains of intelligent transportation; create an inventory of training topics and modules required to support the curriculum, and logically prioritize modules for development. Carried out the following tasks:

- Review of existing curricula in Canada.
- Inventory Required Subject Matter and Stakeholder Inputs.
- Organize Inventory into Logical Structure and Modules.

**Sep 2011 – August 2015**

**CIMA Canada Incorporation**  
Project Manager

**Study Design and Framework for Data Collection and Monitoring VIVAnext Project, MTO,**  
Project Manager

- Develop methodology for data collection and monitoring of Active Transportation Uses
- Study design framework to establish the monitoring plan and operations performance review of Hwy 7 within the vicinity of the interchange with Hwy 404
- Data requirements and data collection methodologies for the 3-year Active Transportation

**Case Management Software (CMS) Review, Assessment, and Recommendation for the Planning & Economic Development Department.** Project Manager

- Functional Requirements Review of business workflow and process diagrams
- Development of Functional Specifications Matrix
- Conduct Market Scan
- Evaluation of Software Vendors
- Software Demonstrations
- Recommendations and the Preferred Software

**Operations Review of Highway 401 and Gardiner's Road: Microsimulation Modelling and Queue Warning System.** Technical Lead

- Assessment and operational review of Highway 401 ramp terminal and the downstream intersections
- Traffic microsimulation modelling, and safety assessment of the roadway network
- Propose a queue warning system with its functional requirements and associated cost



**Simulation Assessment of a Queue Warning System for Highway 401 at Gardiner's Road.**

Technical Lead

- Developing and calibrating a micro-simulation model in VISSIM to assess the study area and to evaluate the potential benefits of recommended solutions.
- Configuration of a queue warning system including message selection logic, detection logic verification, drivers' compliance verification
- Safety (conflicts) and Operational Assessment of the queue warning system (speed differentials).

**Implementation and Maintenance of City of Hamilton Traffic Data Management System, City of Hamilton.** Project Manager

- Traffic data review and analysis
- Integration and implementation of traffic data and GIS system to a web-based open platform system
- Maintenance of system and technical support

**System Integration of Highway Performance Management System for City of Hamilton Data Management System, City of Hamilton.** Project Manager

- Interactive and dynamic enhancement of system visualization and display features
- Expansion of Hamilton Data management system to highway performance system to estimate missing data on the roadway network to enable predicting AADT and traffic volumes for design, planning, and operations of highways

**Development of Concept of Operation of Priority Lanes in Greater Toronto Area for the PanAm Games Toronto 2015, MTO.** Project Manager

- Review of traffic data, travel time studies, and operational performance to identify potential for priority lanes
- Develop concept of operation and performance measures criteria for before and after evaluation of priority lanes
- Production of schematic drawings for priority lanes in the GTA

**Development of Traffic Simulation Capabilities for Evaluation of a Proposed PanAm Priority-Lane Network, MTO.** Project Manager

- Data preparation, GIS system integration, and demand modelling using transportation tomorrow survey
- Development of traffic simulation modelling guidelines and best practices
- Development and calibration of large-scale hybrid simulation for the Greater Toronto Area Freeways and Arterials
- Assessment of priority lane scenarios for the 2015 Toronto PanAm Games

**Development of the Terms of Reference for the Supply and Deployment of an Advance Traffic Management System (ATMS), Region of York.** Technical Lead

- Assessment of York traffic management operations, maintenance and dispatch operations
- Preparation of functionality workshop and functional requirement matrix
- Development of Request for Information (RFI) and Review of RFI responses

**Simulation Modelling of Hamilton Mohawk Ramp Feasibility Study, City of Hamilton.** Technical Lead

- Assessment and operational review of Hamilton Mohawk Ramp
- Travel demand modelling, traffic simulation, and safety assessment of Mohawk Ramp on Highway 403
- Assessment of freeway merging and weaving scenarios with HOV lanes and new ramp design

**SafetyAnalyst Configuration Services for Ontario Ministry of Transportation (MTO), MTO.** Technical Lead

- Development of GIS tools and algorithms for the segmentation of the GTA freeway system
- Spatial analysis of freeways segments and related safety performance functions (SPFs)

**Ontario Traffic Manual Book 15: Pedestrian Crossing Devices, MTO.** Technical Lead

- Oversee literature review and jurisdiction scan to assess pedestrian crossing devices in Canada, US, and Europe
- Stakeholder consultation, conducting surveys, and deploying Delphi method
- Developing a decision support tool variables

**Ministry of Transportation, Ontario: Traffic Volume Information System (TVIS2), MTO.** Technical Lead

- Oversee algorithms development for annual production of Annual Average Daily Traffic (AADT)
- Document the algorithms for MTO programmers to implement the algorithms for TVIS2
- Assisted the development team to implement and code the algorithms

**Ministry of Transportation, Ontario: Review of Ontario Traffic Manual for Traffic Signal Warrants - Projected Volume Justification, MTO.** Technical Lead

- Literature review of signal warrants justification for future developments
- Design and conduct a survey among Canadian municipalities
- Propose alternative approach to OTM Book 12

**Design, Development, and Analysis of Off-Road Vehicle (ORV) and Motorized Snow Vehicles (MSVs) Survey, MTO.** Technical Lead

- Oversee design and development of the online survey
- Coordinate and manage sub consultants deliverables
- Communicate and meet with the client
- Policy recommendation pertained to safety of ORVs and MSVs

**Niagara Region- Development of Queue-Alert Simulation System for the US-Canada Rainbow Bridge Crossing, Region of Niagara.** Technical Lead

- Oversee development and calibration of simulation models
- Develop a queue-alert system for the crossing.
- Evaluate the alternative design using the microscopic simulation model

**Niagara Falls- Thorold Stone Plaza Safety Review and Simulation Modelling, Region of Niagara.** Technical Lead

- Field visit to observe conflicts and perform a safety review of the plaza access
- Develop and calibrate a Paramics microscopic simulation model for the existing conditions
- Design and evaluate alternative designs to the plaza access

**Traffic Study Data Management Functional Specification Study for the City of Hamilton.** Project Manager.

- Obtain and analyze data provided by the City of Hamilton
- Assess data management needs for a wide range of transportation application
- Develop Functional Specifications for Traffic Study Data Management
- Evaluate and identify Traffic Study Data Management Tool

**Adaptive Traffic Signal Control Simulation and Pilot Using Paramics MicroSimulation for the City of Burlington, City of Burlington.** Project Manager

- Development of a microscopic simulation testbed for one of Burlington's busiest areas centered at the intersection of Walkers Line and Harvester Street
- Test "MARLIN", the latest self-learning artificial intelligence based adaptive traffic signal control system developed at the University of Toronto
- Report network-wide and intersection-specific performance measures including: average travel time, average travel speed, intersection delays and throughputs, route travel times, CO<sub>2</sub> emission and fuel consumption

**Evaluation of Alternative Methodologies for Travel Time Studies, MTO.** Project Engineer

- Process travel time data from various technologies including TomTom, INRIX, Bluetooth
- Propose and implement methodical improvements to the provided data using advanced GIS techniques

- Summarize and resolve the data issue by various wireless technologies providers

**Boulevard Pie IX, Montreal: Microsimulation and Analysis of Traffic and Transit Operational Performance and Safety, City of Montreal.** Project Engineer

- Acquiring data from client on traffic volumes, speeds, bus transit line, and operation issues
- Develop a micro simulation model for the AM and PM peak periods
- Model multiple scenarios under normal operations and bus break down on the Montreal Bridge
- Conduct conflict analysis and potential safety issues due to the break down scenario

**Provincial Expansion Prioritization for 25 Pilot Projects using Key Performance and Safety Indicators, MTO.** Project Engineer.

- Obtain and analyze traffic and planning data from MTO for 25 provincial projects
- Calculate key performance factors (congestion index, buffer time index, travel time index, delay index) using the 2010 HCS analysis software
- Summarize the results and provide recommendation to MTO on the appropriateness of each indicator in evaluating expansion projects

**Effective Engineering Measures that Address Speeding Issues on Residential Roadways in Edmonton, City of Edmonton.** Project Engineer

- Assess and study the potential impacts of speed management measures on emergency services and snow removal.
- Develop a toolbox of effective measures for use in the City, along with the development of conceptual designs, application context, recommended implementation practices, and cost estimates
- Apply these measures to two residential roads in the City of Edmonton, selected by the Consultant, as a trial project and document the functionality of the trialed measures.

**Time Series Modelling for Supplementing Traffic Volume Gaps in Loop Detector Data in Ontario, MTO.** Project Engineer

- Review of existing data and missing data periods in 60 Permanent Data Count Station (PDCS).
- Develop a software toolbox to fill in the missing data.
- Build and calibrate a time series model to fit the data and forecast 2011.

**Jun 2010 - Sep 2011**

**Delcan Corporation, Canada**  
ITS Engineering Specialist

**Development, Implementation and Maintenance of a Customized Evacuation and Recovery Model and Simulation Tool (CMST) for Port of New York and New Jersey (PANYNJ)**

ITS Engineering Specialist

- Responsible for coordination between 7 sub-contractors from a transportation modeling perspective
- Container Terminal Simulations of the Port of Newark and Elizabeth in Case of Emergency Evacuation
- Acquire and review emergency evacuation plans from the Port Authority of New York and New Jersey
- Develop and test a matrix of scenarios for evacuation of the Newark International Airport and the Port of Newark/Elizabeth Marine Terminals

**Development and Implementation of Urban Traffic Control System for Imtech (PEEK)**

ITS Technical Lead

- Transportation network modeling of prototype cases and real simulation models
- Writing reports, user manual and test specifications
- Software testing and development of transportation performance measures

**City of Toronto- University Avenue Signal Coordination Review and Optimization**

Technical Lead

- Conduct field survey and site visits
- Transportation network modeling using Synchro and SimTraffic

- Traffic signal optimization and coordination using Synchro

### **City of Toronto- Signalized Intersection Digital Drawings to TransSuite System**

ITS Engineering Specialist

- Obtain background information on digital maps, files, signal phasing information, system detector
- Create intersection drawings by converting the background data to the supported format
- Create static and dynamic components of the system and placing detector legends and required hyperlink control
- Verify the dynamic components functionalities on the TransSuite system

### **City of Toronto- Kipling Avenue Signal Coordination Study**

ITS Engineering Specialist

- Prepare detailed work plan and project schedule.
- Hold meetings with clients to discuss scope of work and project budget.

**Aug 2010 - Jan 2011**

**University of Toronto, Canada**  
ITS Center and Testbed Post-Doctoral Associate

**Sep 2006 - Sep 2010**

Graduate Researcher, Intelligent Transportation Systems

**Sep 2007 - Sep 2009**

Transportation Systems Analyst and Model Developer with  
Infrastructure Canada - University of Toronto.

### **Microscopic Modeling of Pedestrian-Vehicle Conflicts at the First Ring Road in Madinah.**

- Mentoring field surveys and site visits and collection of heavy pedestrian flow and traffic volumes.
- Developed and calibrated a base-case microscopic simulation model to assess the current conditions of the First RR using PARAMICS and UAF.
- Evaluation of alternative strategies (scrambled intersection, pedestrian mall, grade-separated structures) to reduce the pedestrian-traffic conflicts.
- Auditing and reviewing the developed base case model and alternatives.
- Prepared interim report, presentations, final report.

### **Optimization of Multimodal Evacuation of Large Scale Transportation Networks**

- Estimated the evacuation demand from a regional travel survey in the absence of historical data or post-surveys from previous disasters/threats in Toronto.
- Developed an optimal spatio-temporal evacuation model that synergizes evacuation scheduling, destination choice and dynamic route choice.
- Developed a comprehensive mesoscopic simulation model for the GTA roadway network using DynusT.
- Developed a new variant of the Vehicle Routing Problem (VRP) to model the operation (routing and scheduling) of transit vehicle and subway lines in emergency situations.

### **Truck-only Transportation Options for the Central GTA Corridor: Analysis of Truckway Infrastructure Alternatives**

- Developed a comprehensive microsimulation model for the GTA freeway network using PARAMICS.
- Modeled dynamic origin-destination demand matrices for cars and trucks imported from the EMME2 planning model.
- Modeled dedicated truckway options through Highway 401 and the Hydro Corridor.
- Managed data provided by the Transportation Tomorrow Survey (TTS), Freeway Traffic Management System (FTMS) and Intersection Count Data.
- Calibrated the microscopic simulation model and documented the results.

**Jan 2006 - Jun 2007**

**IntelliCAN Transportation Systems, Canada**  
Transportation Systems Analyst

### **Development of Comprehensive Traffic Microsimulation Models for the Toronto Queens Quay Corridor for the Toronto Waterfront Revitalization Corporation**

- Developed a microscopic simulation model using PARAMICS.

- Managed and filtered observed data provided by the City of Toronto through the count stations located in downtown Toronto.
- Calibrated the microscopic simulation model and documented the results.

**Dec 2004 - Aug 2006**

**Cairo University, Transportation Programme, Development Research and Technological Planning Center (DRTPC-TP)**

**Transportation Programme, Development Research and Technological Planning Center (DRTPC-TP)**

Airport Engineering Modeller and System Analyst

- Designed and prepared of tender documents for Airfield Upgrade of Sharm El-Sheikh International Airport to accommodate A380.
- Evaluation of Airfield Pavements According to ICAO Standards for 9 Int. Airports in EGYPT (Hurghada , Sharm El Sheikh , Borg El Arab , El Nozha , El Arish , Aswan , Asuit , Luxor , and Alexandria).
- Zeit Bay Airstrip Evaluation and Repair Project for pavement assessment study for Suez Oil company-SUCO.
- Evaluation of Al-Alamin International Airport Airfield pavement and Identification of PCN value.

**Highway Engineering Modeller and System Analyst**

- Upgrading of Alexandria Market to accommodate larger trucks and containers, including drainage site grading optimization.
- Design and preparation of complete set of drawings for Procter & Gamble Synthetic Detergent Powder Production Plant in Ibdan, NIGERIA.
- Design and preparation of complete set of drawings for Badr Land Port and Truck Parking Lot.
- Design and preparation of complete set of drawings (site plan, rigid pavement design, earthwork, grading and drainage) for El Fujira Cement Plant in Dubai, UAE.

**Aug 2004 - Aug 2006**

**Road Consulting Group, Egypt**

Highway Engineering Modeller and System Analyst. Full design of working drawings (horizontal, vertical alignment and typical cross section) for the following projects: New Cairo Extension, New Cairo City, Shooting Club, El Futtaim Real Estate Development (AFRED) American school.

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## **SCHOLARSHIPS AND SCIENTIFIC AWARDS**

### **International**

- Young Researcher Award, The International Transport Forum, 2010  
Out of 52 countries, Hossam Abdelgawad honoured the Yong Researcher Award on the Transportation and Innovation for 2010. The forum was attended by the Transportation Ministers from the 52 countries.  
<http://www.internationaltransportforum.org/2010/prizes.html>
- **Paramics, 2012**  
Across the Paramics software community worldwide, Dr. Hossam Abdelgawad was the only winner of the Paramics Competition by the following project:  
<http://www.paramics-online.com/insight/case-study-microsimulation-and-analysis-of-traffic-and-transit-operational-performance-and-safety-for-boulevard-pie-x/>

### **University**

- 2015 – Cairo University Incentive Award- Engineering Science, Egypt
- 2006-2010 Connaught Scholarship, University of Toronto, Canada
- 2006-2010 The University of Toronto Open Fellowships, Canada

### **Provincial**

- 2009: Ontario Graduate Scholarship in Science and Technology (OGSST): Government of Ontario / Doherty Family Graduate Scholarship in Science and Technology, 2009. University of Toronto, Canada

#### **Industrial**

- 2009/2010: Alan Tonks Scholarship in Transportation Engineering
- 2008/2009: FORTRAN Scholarship; Fellowships, Teaching Assistantships and Research Assistantship, University of Toronto, Canada
- 2008/2009: Transportation Association of Canada (TAC) Scholarship Award
- 2008/2009: Canadian Transportation Research Forum (CTRF) Scholarship Award: Transport Canada Scholarship in Safety and Security

#### **Departmental**

- Highway, Traffic and Airport Engineering Research Laboratory, Cairo University Award for being ranked the 1st student in the Highway and Airport Engineering Graduation Project
  - Annual Award for being ranked as the 2nd student each B.Sc. year
  - Hydraulics and Irrigation Department, Cairo University Award for highest grades in Harbor Engineering
  - Soil Mechanics and Foundations Laboratory, Cairo University Award for highest grades in Soil Mechanics
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### **LEADERSHIP, ORGANIZATIONAL, ENTREPRENEURSHIP, & MANAGEMENT DEVELOPMENT**

- **May 2013-2107: A Practical Guide to Public Transit Planning, Modelling and ITS Applications.**  
This course was designed to provide participants with knowledge on key concepts and best practices related to public transit service planning and technology. The first course, Public Transit Planning and ITS, provides an overview of key concepts and best practices related to transit planning, network and service design, service standards, transit and land use, and the application of ITS technologies. The second course, Public Transit Modelling, provides a complementary but more focused and advanced exploration of tools that can be used for forecasting demand at both the system and route levels, transit assignment, and microsimulation- based analysis.
- **March 2013: Non-Monetary Recognition Training and Development**  
This workshop was given jointly with the firm CFC Dolmen Human Capital. With the following objectives: Identify the basis of recognition at work, Recognize the different types of recognition, Identify fundamental recognition needs at work and act accordingly, and Help apply a customized approach for each of your employees.
- **Dec 2012: Smart Customization Seminar, MIT**  
Dr. Abdelgawad is active in the mass customization programs and seminars presented by highly-ranked institutions such as the seminar on Micro-Macro Customization held on Dec 2012 at the MIT Media Lab. This seminar was focused connecting CEOs, new business developers, consultants, corporate entrepreneurs, innovators, the investment community, and leading researchers from MIT and other leading institutions in peer-to-peer interactions to foster an intense discussion and to co-create an agenda for the Personal Economy.
- **Dec 2012: WHMIS (Workplace Hazardous Materials Information System)**  
The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labelling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education and training.
- **Oct 2012: Workplace Violence and Harassment Awareness Training**  
Workplace violence is a serious issue that affects all business sectors and occupations and the safety and security of every employee and employer. This course is offered by CCOHS to promote the awareness of this very important issue.
- **Sept 2012 - May 2013: Entrepreneurship 101 - MaRS Discovery District**  
This one year program provides essential information for emerging entrepreneurs. In the Entrepreneurship 101 business training course, the lectures and material related resources provides startup business training online to help you start and grow your company.
- **June 2012: Accredited Paramics User Certificate**

Dr Abdelgawad is an APU certified since June 2012. This certificate provides an impartial authentication of his technical expertise and knowledge about Paramics microsimulation modelling, calibration, and validation.

- **Dec 2011: ITS Architecture and Awareness Workshop, ITS Canada**  
This workshop creates awareness of the current state of the ITS industry, illustrates how the ITS Architecture addresses deployment and integration challenges, and prepares participants for the process of creating regional architectures using the Turbo tool
- **Oct, 2011: ISO Standard Training, CIMA+**
- **Sept 2011: CANstruction Design and Exploring Team, Delcan**  
CANstruction is using one can of food as a catalyst for change. Canstruction has contributed over 15 million pounds of food to community food banks demonstrating that we can win the fight against hunger.
- **Aug-2011: Project Management Fundamentals: Managing Projects that Succeed**  
In this hands-on training course I learnt how to:
  - ✓ Apply proven methods for keeping projects on schedule and on budget.
  - ✓ Increase support and buy-in to avoid unnecessary delays and rework.
  - ✓ Apply steps for recognizing and avoiding potential "hot spots."
  - ✓ Harness available tools for increasing collaboration, communication, and accountability.
- **May-July 2010: MiniMBA Intensive Course, Graduate Management Consulting Association, University of Toronto**  
The 10 lecture miniMBA program provide: grounding in fundamental business concepts, the opportunity to learn from experts across a range of business fields, and the chance to apply this new knowledge by solving business cases.
- **March 2010: High Impact Leadership Training Program**  
Leaders of Tomorrow (LoTGrad) hosted a unique and intensive three-day Leadership Training by ANIMA Leadership, an internationally-recognized consulting company. The course introduced the new paradigm of high impact leadership through three-day classes that focus on: 1) The Drive to Lead, 2) The Courage to Lead, and 3) The Vision to Lead.
- **2009/2010: Organizing Committee of the Canadian Transportation Research Forum (CTRF) Conference.**
- **2006-2008: A Member of the Geometric Design Committee**  
The Egyptian Code for the Works of the Urban and Rural Road. Tasks include upgrading the Egyptian Code according to the ministry decision No. 159 for 1998 year

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## **PUBLICATIONS AND PRESENTATIONS**

### **Book Chapters**

- Abdelgawad H. and Osman, K. "**Multifaceted Synthesis of Autonomous Vehicles' Emerging Landscape** – *In press*
- Abdulhai, B. and Abdelgawad, H. "Towards Fully Integrated Adaptive Urban Traffic Control". Book Chapter in "**Efficient Transportation and Pavement Systems**" Print ISBN: 978-0-415-48979-9.
- Abdelgawad H. and Abdulhai, B. "Optimization of Multimodal Evacuation of Transportation Networks" Book Chapter in "**Handbook of Transportation Engineers**", **McGraw Hill Publishing, 2011.**

### **Peer-Reviewed Journal Papers**

- El, M., Osman, H., **Abdelgawad, H.**, & Thabet, M. (2019). Behavioral Responses of Commuters in Cairo Dealing With Traffic Congestion. Journal Homepage: www. feng. bu. edu. eg, 1(42), 123-131.
- Aboudina, A., Kamel, I., Elshenawy, M., **Abdelgawad, H.**, & Abdulhai, B.. Harnessing the Power of HPC in Simulation and Optimization of Large Transportation Networks: Spatio-Temporal Traffic Management in the Greater Toronto Area. IEEE Intelligent Transportation Systems Magazine, 10(1), 95-106. 2018.
- Ollia, A., Razavi, S., Abdulhai, B., **Abdelgawad, H.** *Traffic Capacity Implications Of Automated Vehicles Mixed With Regular Vehicles.* Journal of Intelligent Transportation

- Systems. *Journal of Intelligent Transportation Systems: Technology, Planning, and Operations*. 2017. <https://doi.org/10.1080/15472450.2017.1404680>
- Olia, A., **Abdelgawad, H.**, Abdulhai, B., & Razavi, S. *Optimizing the Number and Locations of Freeway Roadside Equipment Units for Travel Time Estimation in a Connected Vehicle Environment*. *Journal of Intelligent Transportation Systems*, (just-accepted). 2017
  - Aboudina, Aya, **Abdelgawad H.**, Abdulhai B, Habib KN, *Time-dependent congestion pricing system for large networks: Integrating departure time choice, dynamic traffic assignment and regional travel surveys in the Greater Toronto Area*, *Transportation Research Part A: Policy and Practice* 94 (2016): 411-430.
  - Olia, A., **Abdelgawad, H.**, Abdulhai, B., & Razavi, S. N. *Assessing the potential impacts of connected vehicles: mobility, environmental, and safety perspectives*. *Journal of Intelligent Transportation Systems*, 20(3), 229-243, 2016.
  - Koulakezian, A., **Abdelgawad, H.**, Tizghadam, A., Abdulhai, B., & Leon-Garcia, A. *Robust network design for roadway networks: Unifying framework and application*. *IEEE Intelligent Transportation Systems Magazine*, 7(2), 34-46, 2015.
  - Abdulazim T., **Abdelgawad H.**, Habib K., and Abdulhai, B., *Using Smartphones and Sensor Technologies to Automate the Collection of Travel Data*, *Journal of the Transportation Research Board*, issue 2383, pp 44-52, 2013
  - Rezaee, Kasra, Baher Abdulhai, and **Hossam Abdelgawad**. *Self-Learning adaptive ramp metering: analysis of design parameters on a test case in Toronto, Canada*, *Transportation Research Record: Journal of the Transportation Research Board Issue 2396*, pp: 10-18, 2013.
  - Abdulazim T., **Abdelgawad H.**, Habib K., and Abdulhai, B. *Framework for Automating Travel Activity Inference Using Land Use Data: The Case of Foursquare in the Greater Toronto and Hamilton Area, Ontario, Canada*, *Transportation Research Record: Journal of the Transportation Research Board*, Issue: 2526, Pages136-142, 2015.
  - El-Tantawy, S., Abdulhai, B., and **Abdelgawad H.**, *Multi-agent Reinforcement Learning for Integrated Network of Adaptive Traffic Signal Controllers (MARLIN-ATSC): Methodology and Large-Scale Application on Downtown Toronto*, *IEEE Transactions on Intelligent Transportation Systems*, Issue:99, ISSN: 1524-9050 (10.1109/TITS.2013.2255286), April 2013.
  - Eltantawy, S., Abdulhai, B., and **Abdelgawad H.** *Design of Reinforcement Learning Parameters for Seamless Application of Adaptive Traffic Signal Control*, *Journal of ITS* (10.1080/15472450.2013.810991), June 2013.
  - Omrani R., Izadpanah P., Nikolic G., Hellinga B., Hadayeghi A., **Abdelgawad H.** *Evaluation of Wide-Area Traffic Monitoring Technologies for Travel Time Studies*, *Journal of Transportation Record*, Issue 2380, pp 108-119, 2013.
  - **Abdelgawad, H.**, Shalaby A., Abdulhai, B., *Microscopic Modeling of Large-Scale Pedestrian-Vehicle Conflicts in the City of Madinah, Saudi Arabia*, *Journal of Advanced Transportation*, ISSN: 2042-3195, (10.1002/atr.1201), July 2012.
  - **Abdelgawad H.** and Abdulhai, B. *Large-Scale Evacuation Using Subway and Bus Transit: Approach and Application on City of Toronto*, the *Journal of Transportation Engineering*, American Society of Civil Engineers, Volume: 138, Issue 10, pages 1215-1232, Nov 2011.
  - Abdelgawad, H, B. Abdulhai, G. Amirjamshidi, M. Wahba, C. Woudsma, and M. Roorda, *Simulation of Exclusive Truck Facilities on Urban Freeways*, *Journal of Transportation Engineering*, Volume 137, Issue 8, pp 547-563, 2011.
  - **Abdelgawad, H.**, Abdulhai, B., and Wahba, M., *Multi-Objective Optimization for Multi-Modal Evacuation*, *The Journal of the Transportation Research Record # 2196*, pp21-33, 2010.
  - **Abdelgawad H.** and Abdulhai, B. *Managing Large-Scale Multimodal Emergency Evacuations*, *The Journal of Transportation Safety and Security*, Volume 2, Issue 2 , pages 122 – 151, 2010.
  - **Abdelgawad H.** and Abdulhai, B. *Emergency Evacuation Planning as a Network Design Problem: A Critical Review*, Vol 1, Issue 1, pp. 41-58, *Transportation Letters: The International Journal of Transportation Research*, 2009.

#### **Peer-Reviewed Conference Papers (presenter\*)**

- Koulakezian, A., **Abdelgawad, H.\***, Tizghadam, A., Chiu, Y. C., Abdulhai, B., & Leon-Garcia, A. *Robustness in Roadway Networks: A Hybrid Approach (No. 17-02557)* *Transportation Research Board 96th Annual Meeting*, 2017.



- Kamel IR, **Abdelgawad H**, and Abdulhai B “Transportation Big Data Simulation Platform for the Greater Toronto Area (GTA)”, ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 2016 Smart City 360°, 443-454
- **Abdelgawad, H.\***, Mahmoud, M. S., & Kinawy, S. N. “Understanding cycling behavior and barriers to cycling in Egypt”. In Transportation Research Board 95th Annual Meeting (No. 16-3177), 2016.
- Olia A., **Abdelgawad H.**, Abdulhai B., and Razavi S.” Traffic Flow Characteristics of Cooperative vs. Autonomous Automated Vehicles”, in Transportation Research Board 94th Annual Meeting. 2015.
- **Abdelgawad, H.**, Rezaee, K., El-Tantawy, S., Abdulhai, B., & Abdulazim, T. “Assessment of adaptive traffic signal control using hardware in the loop simulation”. In Intelligent Transportation Systems (ITSC), 2015 IEEE 18th International Conference on (pp. 1189-1195). IEEE, 2015.
- Abdulazim T., **Abdelgawad H.**, Habib K., and Abdulhai, B. “A Framework to Automate Travel Activity Inference Using Land-Use Data: The Case of Foursquare in the Greater Toronto and Hamilton Area” Transportation Research Board 94th Annual Meeting. 2015
- Rezaee K., Abdulhai B., and **Abdelgawad H.** “Decentralized Coordinated Optimal Ramp Metering: Application to the Gardiner Expressway in Downtown Toronto”, Transportation Research Board 94th Annual Meeting. 2015
- **Abdelgawad H.**, Kinawy, S. “The Role of Citizen-Based Innovation in Transportation: The Case of Egypt’s Largest Metropolitan Area, Greater Cairo” Transportation Research Board 94th Annual Meeting. 2015
- **Abdelgawad H.**, Garcia J., Hadayeghi A., Karunaratne K.. “Effective Speed Management Measures: Methodology and Application in City of Edmonton, Canada” Transportation Research Board 93rd Annual Meeting. 2014.
- Rezaee K., Abdulhai B., and **Abdelgawad H.** “Closed-Loop Optimal Freeway Ramp Metering Using Continuous State Space Reinforcement Learning with Function Approximation”, in Transportation Research Board of the National Academics, Washington, D.C, 2014.
- Olia A., **Abdelgawad H.**, Abdulhai B., and Razavi S.” Assessing Potential Impacts of Connected Vehicles: Mobility, Environmental, and Safety Perspectives”, in Transportation Research Board of the National Academics, Washington, D.C, 2014.
- **Abdelgawad H.** and Abdulhai B. “The Future of Open Intelligent Transportation Systems (Open-ITS), World Conference on Transportation Research, 2013.
- El-Tantawy S., Abdulhai B., **Abdelgawad, H.** “ A Novel Self-Learning Intelligent Traffic Signal Control System for Congested Urban Areas” World Conference on Transportation Research, Brazil, July 2013.
- Omrani R., Izadpanah P\*, Nikolic G., Hellinga B., Hadayeghi A., **Abdelgawad H.** “Evaluation of Wide-Area Traffic Monitoring Technologies for Travel Time Studies” Presentation in the Transportation Research Board of the National Academics, Washington, D.C, 2013.
- **Abdelgawad H.** and Abdulhai, B. “Managing Large-Scale Multimodal Emergency Evacuations” National Evacuation Conference, New Orleans, Feb, 2010.
- **Abdelgawad H.\*** and Abdulhai, B. “Multi-Objective Optimization for Multimodal Evacuation” Accepted for Presentation in Transportation Research Board of the National Academics, Washington, D.C, 2010.
- **Abdelgawad H.\*** and Abdulhai, B. “Optimizing Mass Transit Utilization in Emergency Evacuation of Congested Urban Areas” Accepted for Presentation in Transportation Research Board of the National Academics, Washington, D.C, 2010.
- **Abdelgawad H.\*** et al. “Simulation of Exclusive Truck Facilities on Urban Freeways” Accepted for Presentation in Transportation Research Board of the National Academics, Washington, D.C, 2010.
- **Abdelgawad H.\*** and Abdulhai, B. “Optimal Spatio-Temporal Evacuation Demand Management: Methodology and Case Study in Toronto” Poster Presentation in the Transportation Research Board of the National Academics, Washington, D.C, 2009.
- **Abdelgawad, H.**, and Abdulhai, B. (2009). Multi-Modal Evacuation-II: Multi-Objective Optimization of Mass Transit Evacuation in Congested Urban Areas. Paper presented at the 1st International Conference on Evacuation Modeling and Management, Scheveningen, Netherlands.
- **Abdelgawad H.\*** and Abdulhai, B. “Mass Transit Utilization in Emergency Evacuation” Canadian Transportation Research Forum, 44th Annual Conference Victoria, British Columbia, 2009.

- Roorda M.\*, Cavalcante R., **Abdelgawad, H.**, and Abdulhai B. "Exclusive Truck Facilities in the Toronto Area: Rationale and Model Development" Canadian Transportation Research Forum, 44th Annual Conference Victoria, British Columbia, 2009.
- Abdulhai, B.\* and **Abdelgawad, H.** "Towards Fully Integrated Adaptive Urban Traffic Control". Fourth International Gulf Conference in Roads, Doha, Qatar, 2008.
- **Abdelgawad H.\***, El Mitiny M. and Omar O. "Evaluation of the Performance of Hot Mix Asphalt Concrete Mixtures with 40/50 and 60/70 Asphalt Grades". Proceeding of the Canadian Society of Civil Engineers, Quebec, 2008.

### **Technical Reports**

- Congestion Management in the Greater Toronto and Hamilton Area: Balancing the Inverted Pendulum, RCCAO, 2013
- Cairo Congestion Study - Phase 2 - Interim and Final Report, World Bank, 2012
- Abdelgawad H., Shalaby A., Abdulhai B. "Microscopic Simulation of Pedestrian-Traffic Conflicts at the First Ring Road, Al-Madinah Al-Munawara" Submitted to Centre of Research Excellence in Hajj and Umrah, Saudi Arabia, 2011.
- Roorda M., Abdulhai B, Woudsma C., Cavalcante R., Abdelgawad, H., and Smith C. "Microscopic Simulation of Truck-only Transportation Options for the Central GTA Corridor: Model Development" Submitted to Infrastructure Canada, 2009.
- Abdulhai B, Roorda M., Wahba, M., Abdelgawad, H., and Georgi, A. "Development Of Comprehensive Microsimulation Models For The Toronto Queens Quay Corridor" Model Development" Submitted to Arup, Water Front Revitalization Plan, 2007.

### **Invited Talks and Presentations**

- Data-Driven Cities, Intelligent Cities Exhibition and Conference, Cairo, 2017
- Public Transit Modelling and Operations 101: "Regional Exchange Project: Public Transport in MENA" Amman, Beirut and Cairo, Cairo. 2017.
- Digital Entrepreneurship: Context and Leading Questions, Egypt Entrepreneurship Summit , Hurghada, 2017
- CityScape Egypt, Smart Cities Panel, Cairo, 2016
- The Future of Open Intelligent Transportation Systems, Roads & Highways Egypt, IQPC, Cairo, 2016.
- Beyond Smart Cities, Toward Wise. Ministry of Transport, Egypt, Cairo 2016.
- Smart Cities: Harnessing the Power of IoT, Big Data, Open Data, Open-Service Innovation Models, Building Innovatively Interactive Cities, 7th International Conference, Cairo, 2017.
- Beyond Smart Cities Toward Wise Cities - A Data-Driven Approach, International Open Data Conference, and Open Cities Summit, 2015
- Data-Driven Innovation: A Catalyst for Entrepreneurship and Youth Employment in Egypt. Egypt Entrepreneurship Summit , Gouna, 2016
- Big Data, Big Questions: From Data to Knowledge in the MENA Region, American University of Cairo, 2016.
- Data Driven Innovation in Transportation, Data-Driven Innovation MENA Regional Conference, Cairo University, 2015
- "Roadway Safety and Speed Management": PTRC Education & Research Services Ltd, *The Principles of Urban Traffic and Transportation*, Feb, 2014.
- "Traffic Lights that Learn" Ontario Society of Professional Engineers (OSPE): The Case for Technology Innovations in Infrastructure, Feb, 2013.
- "What is After Vehicles Are Connected: How Do We Control Traffic and Congestion", The 22<sup>nd</sup> Annual International Conference hosted by the Centre for Advanced Studies Research, IBM Canada Software Laboratory. Nov, 2012.
- "Intelligent Transportation Systems State-of-the-Art Portfolio Solutions at the Toronto ITS Centre and Testbed", International Association for Travel Behaviour Research (IATBR), Toronto, July, 2012.
- "Introduction to Simulation Modelling and Applications of Microscopic Models", Third Year Students Class, Transportation Performance II Course (CIV 332), University of Toronto, 2012
- "Young Researcher Award of the Year 2010, International Transport Forum" Bureau of Culture and Official Affairs in Canada, June, 2010.
- "Static and Dynamic Traffic Assignment: Basic Definitions and Properties" Fundamental of ITS and Traffic Control (CIV 359/1532), University of Toronto, 2010, 2011.

- "Optimization of Multimodal Evacuation of Transportation Networks: Evacuation of the City of Toronto" Fundamental of ITS and Traffic Control (CIV 359/1532), University of Toronto, 2010, 2011.
  - "Queueing Theory and Evacuation Demand Management: Analogy and Case Study" Third Year Students Class, Transportation Performance II Course (CIV 332), University of Toronto, 2009.
  - "Microsimulation Modelling of the GTA Freeway System", Transportation Association of Canada Annual Conference, 2008.
  - "Emergency Evacuation Problem: Overview and Preliminary Results" Development Research & Technological Planning Center (DRTPC) Transportation Program, Cairo University, 2008.
  - "Transportation Engineering & Planning Research at UofT", March Break ITS Lab Tour for High School Students, 2007, 2008, 2009.
  - "Transportation Engineering & Planning Research at UofT", ITS Lab Tour for the Departmental Advisory Board, 2010.
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## **TEACHING AND ACADEMIC WORKING EXPERIENCE**

### **Fall 2015 – Current, Assistant Professor, Highway & Airport Engineering, 3 Appointments**

- Enrolment is 300-400 undergraduate students
- Introduction to materials for pavement design, including new pavement design methods
- Designing interactive laboratory sessions
- Assessing and evaluating student term work based on attribution tables and individual peer review forms

### **Fall 2015 – Current, Assistant Professor, Applied Statistics, 3 Appointments**

- Enrolment is 7-10 Graduate students
- Introduction to probabilistic modelling, queueing theory, network modelling, and mathematical programming.
- Designing interactive sessions
- Design projects and student weekly presentations
- Assessing and evaluating student term work based on attribution tables and individual term projects.

### **Winter 12- Fall 14: Instructor, UofT, Collaborative Design Project: Transportation and Structure Module (CIV 455, CIV 456, CIV 498) - 3 Appointments**

- Enrolment is 15-20 students
- Designing Lectures for 40 hrs over four weeks
- 
- Inviting Weekly Guest Speakers from Industry and UofT researchers
- Weekly follow up and individual group discussions and consultation
- Demonstration for Paramics as microsimulation tool
- Marking Proposals, Interim and Final Reports
- Assessing and evaluating team work based on attribution tables and individual peer review forms

### **Winter 11: Visiting Professor, Nile University- Fundamentals of ITS and Traffic Control/Management (ITS 601) - 1 Appointment**

- Designing Lectures for 40 hrs over four weeks  
ITS Architecture Design Project for the Greater Cairo Ring Road (GCRR) using Ramp Metering as Test Case.
- Preparing and marking Midterm and Final examinations
- Assisting students outside class hours

### **Fall 09: Instructor, UofT - Transportation Seminars, (CIV1505)- 1 Appointment, offered to graduate students in Transportation**

- Enrolment is 10 students
- Choosing the seminar topics
- Contacting and meeting speakers
- Organizing the seminar series and discussing potential topics with students
- Preparing materials to support the seminar

**Fall 09: Lecturer, UofT - Urban Operations Course, (CIV355/1599) - 1 Appointment, offered to 3<sup>rd</sup> year undergraduate engineering science student**

- Enrolment is 29 students
- Designing Lectures for 3 hrs weekly sessions and assignments
- Preparing and marking Midterm and Final examinations
- Assisting students outside class hours

**Fall 07/current: Teaching Assistant, UofT**

- Urban Operations Research (CIV355/1599)- 1 Appointment
  - ✓ Enrolment is 25 students
  - ✓ Preparing and teaching a weekly tutorial and problem solving sessions
  - ✓ Marking assignments
  - ✓ Assisting students during office hours
- Fundamentals of ITS and Traffic Control (CIV359/1532) - 3 Appointments
  - ✓ Average enrolment is 35 students
  - ✓ Designing and evaluating course project
  - ✓ Discussing the challenges that face the students in their course project during weekly tutorial time
  - ✓ Assisting students during office hours

**Fall 04/Fall 06: Teaching Assistant, Cairo University**

- Highway and Airports Engineering - 2 Appointments
  - ✓ Average enrolment is 55 students
  - ✓ Preparing and teaching a weekly tutorial and problem solving sessions
  - ✓ Marking assignments and (sometimes) midterms
  - ✓ Assisting students during office hours
- Fundamentals of Traffic Engineering - 2 Appointments
  - ✓ Average enrolment is 250 students
  - ✓ Preparing and teaching a weekly tutorial and problem solving sessions
  - ✓ Marking assignments and (sometimes) midterms
  - ✓ Assisting students during office hours
- Geometric and Structural Design of Highways - 2 Appointments
  - ✓ Average enrolment is 250 students
  - ✓ Preparing and teaching a weekly tutorial and problem solving sessions
  - ✓ Marking assignments and (sometimes) midterms
  - ✓ Conducting sample experiments in the highway and airports laboratory
  - ✓ Assisting students during office hours
- Highway, Airports, and Traffic Engineering for B.Sc. Project - 2 Appointments
  - ✓ Average enrolment is 55 students
  - ✓ Designing and evaluating course project
  - ✓ Discussing the challenges that face the students in their course project during weekly tutorial time
  - ✓ Assisting students during office hours

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## **PROFESSIONAL AND ACADEMIC DEVELOPMENT**

**Fall 2013: The Fundamentals of University Teaching**

This course was designed for faculty/librarians who have an interest in improving their teaching and furthering their understanding of teaching and learning at the University of Toronto. The course is structured both for those faculty/librarians new to teaching and experienced in all fields. Basic concepts in education will be introduced and discussed and participants will have the opportunity to explore how to apply these concepts to improve their teaching.

**Fall 2012: Centre for Teaching Support and Innovation and Office of Teaching Advancements**

Attended the following workshops to enhance the leadership in teaching and learning by harnessing pedagogy and pedagogy-driven instructional technology:

- From Principles to Practice: Examining the Structure and Content of Multiple-choice Items
- Demystifying Library Research
- Clear as Mud: The Challenge of Teaching Effective Scholarly Writing and Honest Academic Work
- Leading Graduate Seminars Both Online and Classroom-Based
- Making Your Syllabus Work for You and Your Students
- Roundtable Discussion: Confidence in the Classroom

**Fall 2008-Fall 2009: Prospective Professors in Training (PPIT) Program**

Selected to participate and successfully completed the Prospective Professors in Training (PPIT) Program at the University of Toronto. The PPIT program aims to prepare senior Ph.D. students to become successful junior faculty members. A core component of the program is to attend a series of lectures towards developing teaching skills. A list of seminars attended as part of the PPIT program can be found at: <http://www.engineering.utoronto.ca/about/programs/ppit.html>

**Fall 2008-Fall 2009: "Engineering Learning and Teaching" Course at the University of Toronto**

The course aims to develop the necessary skills required for course design, classroom management and handling of teaching responsibilities.

**Fall 2007-Fall 2008: Teaching Assistants' Training Program (TATP) at the University of Toronto**

Successfully completed the Teaching Assistants' Training Program (TATP) at the University of Toronto. The TATP Certificate provides TAs with a practical and productive way to reflect on their teaching, implement new teaching strategies and engage in dialogue with colleagues from across campus about teaching experiences.

**Journal, Editorial Reviewer and Task Force Member**

- Journal of Simulation Modelling Practice and Theory
- Transportation Science
- Transportation Research Part A: Policy and Practice
- TRB Task Force on Emergency Evacuation ANB80T
- Transactions on Intelligent Transportation Systems
- Journal of Transportation Engineering, American Society of Civil Engineers
- Transportation Research Journal
- Journal of the Transportation Research Record
- Transportation Research Board
- The International Journal of Transportation Research
- Kuwait Journal of Science and Engineering
- Center of Research Excellence in Hajj and Omrah