شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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شبكة المعلومات الجامعية

بالرسالة صفحات لم ترد بالأصل

Enhancement of Parking Management System in Cairo Using Smart Phones

A Thesis
Submitted to the Public Works Department
Faculty of Engineering
Ain Shams University
for the Fulfillment of the Requirements of M. Sc. Degree
In Civil Engineering (Transportation Planning and Traffic Engineering)

Prepared by

Ahmed Abdelwahed Gomaa Osman

B.Sc. in Civil Engineering, July 2013
Faculty of Engineering, Ain Shams University

Supervisors

Prof. Dr. Mostafa Sabry Aly Sabry

Professor of Transportation Planning and Traffic Engineering
Faculty of Engineering, Ain Shams University, Cairo, Egypt

Prof. Dr. Hatem Mohamed Abdel-Latif

Professor of Transportation Planning and Traffic Engineering
Faculty of Engineering, Ain Shams University, Cairo, Egypt

Dr. Mohamed Shawky Ahmed

Associate Professor of Transportation Planning and Traffic Engineering
Faculty of Engineering, Ain Shams University, Cairo, Egypt

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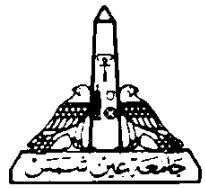

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THESIS APPROVAL

EXAMINERS COMMITTEE	**SIGNATURE**
Prof. Dr. Ibrahiem Mabrouk Professor of Transportation Planning and Traffic Engineering Faculty of Engineering, El-Azhar University	----------
Prof. Dr. Mostafa Sabry Aly Sabry Professor of Transportation Planning and Traffic Engineering Faculty of Engineering, Ain Shams University	----------
Prof. Dr. Hatem Mohamed Abdel-Latif Professor of Transportation Planning and Traffic Engineering Faculty of Engineering, Ain Shams University	----------
Prof. Dr. Khaled Adel Ismail El-Araby Professor of Transportation Planning and Traffic Engineering Faculty of Engineering, Ain Shams University	----------

Date: ...../...../ 2020

Researcher data

Name:	Ahmed Abdelwahed Gomaa Osman
Date of Birth:	26th January 1991
Place of Birth:	Cairo, Egypt
Academic Degree:	B.Sc. in Civil Engineering
Field of Specialization:	Public Works Department – (Transportation Planning and Traffic Engineering)
University Issued the Degree:	Ain Shams University
Date Issued the Degree:	July 2013
Current Job:	Demonstrator, Public Works Department, Faculty of Engineering, Ain Shams University

Statement

This dissertation is submitted to Ain Shams University, Faculty of Engineering, public works department for the degree of M. Sc. in Civil Engineering (Transportation Planning and Traffic Engineering).

The work included in this thesis was carried out by the author in the Department of Public Works, Faculty of Engineering, Ain Shams University, from 2017 to 2019.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

Date: 23/ 03 /2020

Signature: ……..

Name: Ahmed Abdelwahed

Abstract

Car parking is a central element in the urban traffic management system; finding a proper parking space is a big challenge for drivers in congested cities. Lack of parking spaces or the absence of information on available parking spaces leads to an increase in travel time, congestion, pollution, and also affect traffic safety. Therefore, solving this problem has a significant positive impact on both traffic performance and the economy. Being aware of when, where, and how many parking spaces are available is essential for travelers who make decisions about when and where to go. Accordingly, Parking Guidance and Information (PGI) systems are widely implemented around the world. This system provides dynamic information about the available parking spaces to the drivers within controlled areas. In such systems, data is commonly disseminated by Variable Message Signs (VMS) and/or through the internet, cellular phones. These systems significantly increase the probability of locating vacant parking spots, decrease frustration of those drivers unfamiliar with the city center, reduce queues in front of parking garages, decrease total vehicle-miles traveled, decrease average travel time, energy consumption, and air pollution.

Cairo, the capital of Egypt, is considered as one of the largest cities in the Middle East and the world. According to the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), the population of Cairo in 2019 was 9,876,923 inhabitants, who were nearly 10.5% of the total population of Egypt. Also, based on Bulletin of licensed vehicles statistics published by CAPMAS in 2018, about 1,768,389 private

vehicles (37.5% of the total number of licensed private vehicles in Egypt) are running in Cairo roads (CAPMAS, 2018). Traffic congestion is a severe problem in Cairo with significant and adverse effects on both the quality of life and the economy. In addition to the time wasted standing still in traffic, congestion results in unnecessary fuel consumption, causes additional wear and tear on vehicles, increases harmful emissions lowering air quality, and makes Cairo an unattractive location for businesses and industry.

Based on a study by the World Bank group in 2014, the economic costs of congestion in Cairo are estimated at 3.6 % of Egypt's total Gross Domestic Product (World Bank Group, 2014). Also, this study showed that several factors contribute to congestion, one of these factors is the parking supply and behavior (limited parking capacity, limited information on car parks, illegal on-road parking, etc.). As a result, drivers spend time driving along the streets, searching for available parking spaces. This means that a significant number of vehicles are searching for parking spaces, which increases the number of cars on the streets unnecessarily.

In an attempt to mitigate the traffic congestion caused by Poor parking management, the PGI system was implemented in Cairo in June 2015 by the ministry of state for environmental affairs in cooperation with Cairo Governorate. The system provides the available real-time number of parking spaces for ten garages located at Cairo city center. This information is disseminated by using 14 VMS located at main routes leading to the city center. These garages are Tahrir, Opera, Bostan, Omar