



Stereo and Mono Vision Sorting of Known Objects and Grasping Using Industrial Robot Arm

By

Eng. /Mahmoud Ahmed Hassan

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
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In
Electrical Power and Machines Engineering

Faculty of Engineering, Cairo University

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Under Supervision

Prof. Dr. AHMED BAHGAT
Electrical power & Machines
Dept.
Faculty of Engineering, Cairo University

Prof. Dr. HASSAN RASHAD
Electrical Power & Machines
Dept.
Faculty of Engineering, Cairo University

Assoc. Prof. Dr. Mohamed Shawky
Electrical power & Machines Dept.
Faculty of Engineering, Cairo University

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Approved by the Examining Committee

Prof. Dr.	Ahmed Bahgat Gamal Bahgat	(Main Advisor)
Prof. Dr.	Hassan Mohamed Rashad Emara	(Advisor)
Prof. Dr.	Mohamed M. Fahim Sakr	(Internal Examiner)
Prof. Dr.	Iymen E. Ibrahim Eldesoky	(External Examiner)

(Electronic Research Institute)

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT

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Engineer: Mahmoud Ahmed Hassan Hussein
Date of Birth: 10 / 8 / 1991
Nationality: Egyptian
E-mail: Mahmoud.ahmed2013@gmail.com
Phone. : 01007148378
Address: 96 mosque street, Cairo
Registration Date: 1/10 / 2015
Awarding Date: / /
Degree: Master of Science
Department: Electrical Power Engineering



Supervisors: **Prof. Dr.** Ahmed Bahgat Gamal Bahgat
Prof. Dr. Hassan Mohamed Rashad
Assoc.Prof.Dr. Mohamed Shawky Saad

Examiners: **Prof. Dr.** Iymen Eldoseky Ibrahim Eldoseky (Electronic Research Institute)
Prof. Dr. Mohamed Mohamed Fahim Sakr
Prof. Dr. Ahmed Bahgat Gamal Bahgat
Prof. Dr. Hassan Mohamed Rashad

Title of Thesis:

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Key Words: Stereo vision – Mono vision – Robot arm – Grasping - Sorting

Summary:

This thesis presents the development and experimental implementation of an automated system to check the dimensions and grasp a classified object using an industrial robot arm. The system consists of a 6 DOF Mitsubishi robot arm, PC, customized vision system and also Ethernet communication to transfer data from the computer to robot controller to enable robot arm to grip the target product. The vision system begins with a stream video and sends the video to vision system algorithm that analyzes the video frame by frame. The vision system algorithm extracts the data from the video and obtains the three dimensional coordinate of a point on the surface of the classified object and sends this location to the robot controller via Ethernet communication, and also checks the dimensions of the object. The robot controller receives this location from the PC then converts the robot pose into joint angles using inverse kinematics algorithm. The vision system is single camera or stereo camera. The task of vision system is to obtain 3D coordinate of a point on the surface of the object, classifies between different object based on shape detection algorithm and also checks the dimensions of the object. Different techniques are used to find the object depth for single camera, where the best technique is the depth estimation using Artificial Neural Network (ANN). Also different techniques are used to recognize the object, where the best technique in timing is the shape detection algorithm based on taking image after background subtraction.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name:

Date:

Signature:

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