# A LOW COST INDOOR POSITIONING SYSTEM USING COMPUTER VISION

**By**
**Youssef Nagui Elias Naggar**

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

**MASTER OF SCIENCE**

in

**Aerospace Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Approved by the Examining Committee

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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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**Title of Thesis:**

A LOW COST INDOOR POSITIONING SYSTEM USING COMPUTER VISION

**Keywords:**

Indoor positioning systems; Indoor navigation; Computer vision; Object tracking

**Summary:**

The research focuses on developing a low cost optical indoor positioning system solution where a static commercial camera is the only sensor used. The system is tested on tracking a group of robots characterized by simple colored markers. High accuracy in localization within the range of 1 cm is achieved. Detection, classification, and tracking techniques of an object are tested on mobile robots. The system is ideal for an indoor robotic warehouse environment application, where minimal infrastructure and cost parameters are required.

# ACKNOWLEDGMENT

After an intensive period of several months, writing this note of gratitude is the last touch on my dissertation. It has been a period of intense learning for me, not only in the scientific aspect, but also on a personal level. Writing this dissertation has had a large impact on me. I would like to reflect on the people who have supported and helped me so much throughout this period.

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Youssef Nagui Naggar
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# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES