

**SURVEILLANCE CAMERA PLACEMENT OPTIMIZATION
USING PARTICLE SWARM OPTIMIZATION (PSO)
ALGORITHM AND MIXED-INTEGER LINEAR
PROGRAMMING (MILP) MODEL**

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ABSTRACT

This project explores the optimization of surveillance camera placements using Particle Swarm Optimization (PSO) and Mixed-Integer Linear Programming (MILP). PSO, inspired by the social behaviour of birds flocking or fish schooling, is a heuristic algorithm known for its flexibility and exploration capabilities. On the other hand, MILP is a deterministic optimization approach that provides precise solutions through linear programming. The project aimed to find optimal camera placements to minimize the total number of cameras used while maximizing coverage, and to perform a comparative analysis between PSO and MILP. MATLAB was chosen as the primary software due to its robust capabilities in numerical computing and optimization, enabling efficient implementation and analysis of both algorithms. The study applied these optimization techniques to various Binary Integer Programming (BIP) matrix sizes (11×9 , 39×24 , and 172×49) representing the same 2D layouts, to evaluate their performance in different spatial configurations. The results indicated that both PSO and MILP could achieve high coverage rates, with PSO demonstrating superior flexibility and adaptability in identifying optimal camera placements.

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TABLE OF CONTENTS

DECLARATION BY THE SUPERVISOR	i
DECLARATION BY THE CANDIDATE	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
INTRODUCTION OF RESEARCH	1
1.1 Introduction	1
1.2 Background of Study	1
1.3 Problem Statement.....	3
1.4 Objectives	4
1.5 Significance of the Project.....	4
1.6 Scope of the Project.....	5
1.7 Project Benefits	5
1.8 Definition of Terms and Concept.....	6
1.9 Organization of Report	7
LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Literature Review	9
2.3 Conclusion.....	13
METHODOLOGY	14
4.1 Introduction	14
4.2 Research Steps.....	14
4.3 Particle Swarm Optimization (PSO).....	17
3.3.1 Equations.....	17
3.3.2 Parameters.....	18
3.3.3 Flow of PSO Algorithm	20
4.4 Mixed-Integer Linear Programming.....	23
4.5 Conclusion.....	25
IMPLEMENTATION.....	26
4.1 Introduction	26
4.2 Implementation of BIP	26

4.2.1	Construct BIP Matrix	27
4.3	Implementation of the PSO Algorithm.....	29
4.3.1	Data Preparation.....	29
4.3.2	Parameter Initialization	30
4.3.3	Iterative Process	31
4.3.4	Evaluation of Effectiveness.....	32
4.4	Implementation of the Mixed-Integer Linear Programming (MILP).....	34
4.4.1	Data Preparation.....	34
4.4.2	MILP Model Formulation.....	35
4.4.3	Configuration of the Optimization Solver.....	36
4.5	Conclusion.....	36
RESULTS AND DISCUSSION.....		37
5.1	Introduction	37
5.2	Result for PSO and MILP.....	37
5.2.1	Result for 11×9 Layout.....	38
5.2.2	Result for 39×24 Layout.....	40
5.2.3	Result for 172×49 Layout.....	42
5.3	Conclusion.....	44
CONCLUSION AND RECOMMENDATION.....		45
6.1	Introduction	45
6.2	Conclusion.....	45
6.3	Recommendation.....	47
REFERENCES		48
APPENDICES		50
APPENDIX A1: 11×9 BIP Matrix Representing An Office Layout		50
APPENDIX B1: 39×24 BIP Matrix Representing An Office Layout.....		51
APPENDIX C1: 172×49 BIP Matrix Representing An Office Layout.....		52
APPENDIX C2: 172×49 BIP Matrix Representing An Office Layout.....		53
APPENDIX D1: MATLAB Code of PSO Algorithm Implementation		54
APPENDIX D2: MATLAB Code of PSO Algorithm Implementation		55
APPENDIX E1: MATLAB Code of MILP Implementation.....		56