

# ERFAN KHADIV

Computer Engineering Graduate | Algorithms, Software & Artificial Intelligence

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## PROFILE

Computer Engineering graduate with a strong foundation in algorithms, programming, computer networks, and artificial intelligence. Designed and implemented HBALS, a hybrid metaheuristic for the Travelling Salesman Problem, combining population-based search with adaptive local optimization.

## RESEARCH INTERESTS

- Artificial Intelligence & Machine Learning
- Algorithms & Combinatorial Optimization
- Heuristic & Metaheuristic Optimization
- Constraint Satisfaction & Search Algorithms

## EDUCATION

**B.Sc. Computer Engineering**, Islamic Azad University, Ardabil Branch *Sept 2022 – July 2026*

- Overall GPA: 18.05/20 (152 credits); ranked 4th among graduates in the second semester of academic year 2025–2026.
- Key computer science courses average: 19.7/20, across Algorithm Design, Data Structures, Artificial Intelligence and Expert Systems, Advanced Programming, Automata and Language Theory, and Special Topics 1 (AI and Heuristic Algorithms).

## RESEARCH & ACADEMIC WRITING

**HBALS — Hybrid Bees Algorithm with Adaptive Local Search** | [GitHub](#) *Bachelor's Final Project | Sole Author*  
*Python | Heuristic Optimization | Combinatorial Optimization*

- Designed a hybrid metaheuristic for the Travelling Salesman Problem (TSP), combining the Bees Algorithm with adaptive 2-opt and lightweight 3-opt-style local search.
- Evaluated HBALS against four baseline algorithms—Bees Algorithm, Ant Colony Optimization, Genetic Algorithm, and Particle Swarm Optimization—on six TSPLIB instances (51–195 cities), with 20 independent runs per instance. HBALS achieved the shortest best-tour length among the five algorithms on all six instances, with reductions of 15.3%–68.0% relative to the Bees Algorithm baseline (41.5% mean reduction).
- Released the implementation, benchmark data, and experimental results as a reproducible open-source project under the MIT License.
- Preprint:** Khadiv, E. (2026). *HBALS: A Hybrid Bees Algorithm with Adaptive Local Search for the Traveling Salesman Problem (TSP)*. Zenodo. <https://doi.org/10.5281/zenodo.23450862>
- Ongoing work:** Refining the manuscript and strengthening the experimental analysis ahead of submission to a peer-reviewed journal.

**Li-Fi (Light Fidelity) Research Report** | [GitHub](#) *Course research report*  
*Research Methods and Presentation | Wireless Communication*

- Prepared a research report on Li-Fi, examining visible-light communication as an alternative wireless communication approach.

## SELECTED PROJECTS

**Workfolio — Browser-based Resume Builder** | [GitHub](#) | [Live Demo](#) *Portfolio project*  
*JavaScript | HTML5 | CSS3 | AI Job Match*

- Developed a browser-based resume builder using vanilla JavaScript, HTML and CSS, featuring five customizable templates, live previews, PDF export, and AI-powered job matching with resume scores, missing-skill detection and tailoring suggestions.

**CS50AI — Artificial Intelligence Problem Sets** | [GitHub](#) *Harvard CS50AI*  
*Python | Q-learning | Constraint Satisfaction | NLP | CNN (TensorFlow/Keras)*

- Implemented Q-learning (Nim), k-nearest-neighbours classification (Shopping), crossword generation as a constraint satisfaction problem with AC-3 and backtracking search (Crossword) and CFG-based sentence parsing (Parser).
- Built and trained a convolutional neural network with TensorFlow/Keras to classify traffic sign images (Traffic).

Python | Object-Oriented Programming | NumPy

- Implemented CRUD applications with object-oriented design (library management system, password manager, software company management system) and a NumPy-based monthly sales analysis.

Kouman — E-commerce Front-End | [GitHub](#) | [Live Demo](#)

Portfolio project

React | JavaScript | React Router | Vite | HTML/CSS

- Built a multi-page online-shop front end in React with client-side routing, with the interface inspired by an existing Iranian e-commerce site, for learning and portfolio purposes.

## EXPERIENCE

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IT & Networking Intern, Ports & Maritime Organization of Iran

July 2025 (120 hours)

- Gained hands-on exposure to network infrastructure, TCP/IP and routing.
- Worked with VLANs, Cisco switches, VPN, DNS and DHCP in an IT and network administration setting.
- Practiced network security fundamentals and troubleshooting procedures.

## TECHNICAL SKILLS

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**Programming:** Python, C, JavaScript, SQL

**AI & Algorithms:** Heuristic and metaheuristic optimization, Bees Algorithm, local search, constraint satisfaction, search algorithms, Q-learning, k-NN, CNNs (TensorFlow/Keras)

**Libraries & Tools:** Git, GitHub, NumPy, Pandas

**Database:** PostgreSQL

**Networking:** TCP/IP, routing, VLANs, Cisco switches, VPN, DNS, DHCP

**Web Development:** React, React Router, HTML, CSS, Vite

## SELECTED COURSEWORK

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|                                            |       |                                                |       |
|--------------------------------------------|-------|------------------------------------------------|-------|
| Algorithm Design                           | 20/20 | Special Topics 1 (AI and Heuristic Algorithms) | 20/20 |
| Advanced Programming                       | 20/20 | Computer Networks                              | 19/20 |
| Data Structures                            | 19/20 | General Mathematics 2                          | 20/20 |
| Automata and Language Theory               | 20/20 | Network Security                               | 20/20 |
| Artificial Intelligence and Expert Systems | 19/20 | Embedded and Real-Time Systems                 | 20/20 |
| Research and Presentation Method           | 20/20 | Computer Networks Laboratory                   | 20/20 |

## CERTIFICATIONS & COURSES

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|----------------------------------------------------------------------------------------------------------------|----------|
| CS50x — Introduction to Computer Science, Harvard University   <a href="#">Certificate</a>                     | May 2024 |
| CS50P — Introduction to Programming with Python, Harvard University   <a href="#">Certificate</a>              | Oct 2024 |
| CS50AI — Introduction to Artificial Intelligence with Python, Harvard University   <a href="#">Certificate</a> | May 2025 |
| Network Plus and Practical Networking Fundamentals, FaraDars   <a href="#">Certificate</a>                     | Dec 2025 |

## LANGUAGES

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**Persian:** Native

**English:** Advanced — IELTS Academic 8.0 (Listening 8.5, Reading 9.0, Writing 7.0, Speaking 6.5), Sep 2026

## REFeree

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**Dr. Zeinab Rezaei**

Faculty Member, Islamic Azad University, Ardabil Branch

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