

**TRAINING TRAINS**

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IT Services and IT Consultancy \ Internship-Inplant Training \ Software Training Institute

உங்கள் கடை மற்றும் வியாபாரத்திற்கு ஏற்ற **Website & Andriod App** மற்றும் **Software** மிகச்சிறந்த முறையில் செய்து கொடுக்கப்படும்.

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# AI Agents – 100+ Lab Exercises (Basic, Intermediate, Advanced)

## □ Basic Level (30+ Exercises)

**Objective:** Build foundational understanding of AI agents, basic machine learning, and rule-based agent systems.

### □ AI Agents Fundamentals

- Understand AI agent concepts: types, architectures, and environments.
- Implement simple rule-based agents using if-else logic.
- Explore state-based agents and basic agent design.
- Study environment types: deterministic, stochastic, fully/partially observable.
- Build a reflex agent for a simple environment (e.g., vacuum cleaner).
- Introduction to search algorithms: BFS, DFS.
- Understand agent perception, sensors, and actuators basics.
- Create simple agents using Python functions and classes.
- Explore agent decision-making via utility-based functions.
- Basic implementation of goal-based agents.

### □ Practice Exercises

- Build a reflex agent to navigate a grid environment.
- Implement BFS and DFS for pathfinding in a maze.
- Create a simple agent that reacts to sensor input (light, sound).
- Simulate a basic vacuum cleaning agent in a 2D environment.
- Build a utility-based agent that chooses actions based on predefined utility values.

## □ Intermediate Level (40+ Exercises)



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**Objective:** Develop AI agents using machine learning, NLP, and planning techniques with enhanced autonomy.

### □ Learning & Planning

- Implement Markov Decision Processes (MDPs) and policy iteration.
- Build reinforcement learning agents (Q-Learning, SARSA).
- Develop agents using supervised learning for classification tasks.
- Implement simple chatbots as conversational AI agents.
- Integrate natural language understanding (NLU) using libraries like spaCy or Hugging Face Transformers.
- Explore partially observable environments using POMDP concepts.
- Design agents with memory and learning capabilities (LSTM networks).
- Use OpenAI Gym to create and train agents in simulated environments.
- Plan agent actions with STRIPS or classical planning algorithms.
- Multi-agent systems basics: cooperation and competition.

### □ Practice Exercises

- Train a Q-Learning agent to play a simple game (e.g., FrozenLake).
- Build a chatbot with intent recognition and slot filling.
- Implement a reinforcement learning agent to balance a cart-pole.
- Use Transformers to create an AI agent that summarizes text.
- Develop a multi-agent simulation with cooperative tasks.

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## □ Advanced Level (40+ Exercises)

**Objective:** Master advanced AI agent architectures, deep reinforcement learning, multi-agent systems, and deployment.

### □ Advanced Architectures & Deployment

- Develop Deep Q-Network (DQN) agents using TensorFlow/PyTorch.
- Explore policy gradient methods (REINFORCE, PPO).
- Build multi-agent reinforcement learning (MARL) systems.
- Implement AI agents for real-time strategy games or robotics simulation.
- Develop autonomous agents with computer vision capabilities.



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- Integrate agents with cloud-based APIs and IoT devices.
- Design and deploy agents using containerization (Docker, Kubernetes).
- Implement hierarchical reinforcement learning agents.
- Develop ethical AI agents considering fairness and transparency.
- Create explainable AI (XAI) for agent decision-making processes.

### □ Practice Exercises

- Train a DQN agent to master Atari games (e.g., Breakout).
- Build a multi-agent environment with competitive and cooperative strategies.
- Deploy an AI agent as a microservice using Docker and Kubernetes.
- Integrate vision-based perception into an autonomous navigation agent.
- Implement XAI techniques to explain agent actions in critical applications.

### □ Capstone Projects

- Develop a fully autonomous delivery drone agent using reinforcement learning and computer vision.
- Create a conversational AI agent for customer support with multi-turn dialogue management.
- Build a multi-agent traffic simulation system with intelligent routing and congestion control.
- Deploy a cloud-based AI agent for real-time fraud detection in financial transactions.
- Design an AI agent for dynamic resource allocation in cloud computing environments.

### □ Tools & Technologies

- Python, TensorFlow, PyTorch
- OpenAI Gym, Stable Baselines3
- Hugging Face Transformers, spaCy
- Docker, Kubernetes
- Cloud Platforms: AWS, GCP, Azure
- Reinforcement Learning Libraries: RLlib, Dopamine



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- Explainable AI Libraries: SHAP, LIME