

Tic-Tac-Toe – Python + Tkinter

A graphical Tic-Tac-Toe game with Player vs Player, Player vs Computer (AI), difficulty levels, win-line animation, persistent scoreboard, and unit tests.

Created by Ruslan Sabitov (University of Europe for Applied Sciences).

Features

Game Modes

- Player vs Player
- Player vs Computer (AI)
 - Easy (random moves)
 - Medium (blocking logic)
 - Hard (minimax-based, near-perfect AI)

Choose Your Symbol

- Option to play as X or O in Player vs Computer mode

AI Capabilities

- Smart move selection
- Blocking imminent opponent wins
- Predictive minimax strategy
- Hard mode does not lose

Scoreboard (Persistent)

- Saves and loads match results
- Tracks:
 - X wins
 - O wins
 - Draws
- Stored in `scores.json`

User Interface Enhancements

- Dark theme
- Animated win-line
- Highlighted winning cells
- Clean layout
- “New Game” button
- Mode and difficulty selection menu

How to Run

Requirements

- Python 3.10+
- Tkinter (standard Python library)

Launch the Game

```
python main.py
```

Unit Tests

The project includes unit tests covering core logic:

- Winner detection
- Draw detection
- Row, column, and diagonal evaluation

Running Tests

```
python -m unittest test_tictactoe.py
```

Test file:

```
test_tictactoe.py
```

Project Structure

```
tic_tac_toe/
├── main.py           # Main program (GUI, game logic, AI)
├── test_tictactoe.py # Unit tests
├── scores.json       # Scoreboard persistence
└── README.md         # Project documentation
```

Demo Video

Demo/
tic-tac-toe_demo.mp4

Technologies Used

- Python
- Tkinter
- Object-Oriented Programming
- Minimax algorithm
- Python unittest framework

License

Free to use for educational purposes.

Author

Ruslan Sabitov 99774243

Software Engineering 3 Sem C – University of Europe for Applied Sciences

