

Artificial Intelligence for Games

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<https://learn.gold.ac.uk/course/view.php?id=3109>

- What does an AI programmer do?
- What roles do AIs play in games?
- What is AI?
- What is Game AI?




AI Game Prog. Guild
@AIGPG




Following

What is 1 sentence that describes what an AI programmer does for a game so that a non-AI person would have a better understanding of it?

 **Paul Tozour**
@PaulTozour [Follow](#)


[@AIGPG](#) We teach the game to make the decisions that provide the context for the player's own decisions.

12:12 AM - 17 Sep 2015

 **Leonard Ritter**
@paniq [Follow](#)


[@AIGPG](#) [@gamasutra](#) an AI programmer tricks the player into thinking that elements of the game are making informed intelligent decisions.

11:18 PM - 16 Sep 2015

 **Steve Martin**
@Purple_Steve [Follow](#)


[@AIGPG](#) [@gamasutra](#) Take a system that knows everything and can do anything, and dumbs it down just enough to be fun to beat.

11:18 PM - 16 Sep 2015

 **Alex J. Champandard**
@alexjc [Follow](#)

[@krisgraft](#) They build interactive systems in code that generate performances or content.

11:25 PM - 16 Sep 2015

 **Lance Hitchcock**
@lancehit [Follow](#)

[@AIGPG](#) [@IADaveMark](#) AI developers make tools that allow for more interesting worlds to be created

11:54 PM - 16 Sep 2015

Makes decisions

Player experience

Illusion of intelligence

Not “too smart”

Dumb and fun

Performing agents

Generates content

Creates worlds



Rich Welsh
@Welshy31

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[@AIGPG](#) It's not an easy question to answer, however I did put "I make the baddies" on my business cards!

11:26 PM - 16 Sep 2015

  2  4

“Game AI should be about one thing and one thing only: enabling the developers to create a **compelling experience** for the player”

Kevin Dill (2014)

"Too Smart"



<https://youtu.be/UtuGWC7RywK>



“The problem of convincing people they’re **interacting with real people** is immense, particularly when you’re talking about characters whose reactions have to run the gamut **from fear to friendliness to violent enmity**. That’s not a challenge many games take on (with good reason), but it was one we had to take on for DEUS EX. Our sin was, I think, giving people a hint of what human AI could be in games, but delivering the goods **inconsistently**.”

Warren Spector, *Deus Ex* Producer (Game Developer Magazine, Nov 2000)

What's AI for?

What roles can AI play in a game?

What's AI for?

- **Opponent:** Replicant, Punch-Bag, Supervillain
- **Character** or Scenery
- **Helper:** Advisor, Buddy, Minion
- **Controller:** Observer, Analyst, Director
- **Designer**

"Artificial Intelligence"

Russell & Norvig (2010)

Thinking humanly Cognitive modelling	Thinking rationally “Laws of Thought”
Acting humanly The Turing Test	Acting rationally Rational agents

"Artificial Intelligence"

Russell & Norvig (2010)

<p>THINKING HUMANLY</p> <p>“Machines with minds” (Haugeland 1985)</p> <p>“Automation of human thinking” (Bellman 1978)</p>	<p>THINKING RATIONALLY</p> <p>“Computational models of thought” (Charniak & McDermott 1985)</p> <p>“Computations that make is possible to perceive, reason, and act” (Winston 1992)</p>
<p>ACTING HUMANLY</p> <p>“Art of creating machines that perform functions that require intelligence when performed by people” (Kurzweil 1990)</p> <p>“Computers doing things that people are better at right now” (Rich & Knight 1991)</p>	<p>ACTING RATIONALLY</p> <p>“The study of the design of intelligent agents” (Poole et al. 1998)</p> <p>“Intelligent behaviour in artifacts” (Nilsson 1998)</p>

"Artificial Intelligence"

Russell & Norvig (2010)

- Specialised algorithms for extremely specific problems.
- Concerned with **optimal and general** results.
- Historically poor attitude towards games
 - Board games as a testbed
 - Ignored video games and players

Modern Game AI

- IEEE CIG conference (since 2005)
- AIIDE conference (since 2005)
- Nucl.ai developer conference (since 2008)
- IEEE TCIAIG journal (since 2009)

Games

Game AI

Actual AI used
in Games

AI



Game AI Trends

- Giving the AI more responsibility
 - More complex decisions during play
 - Greater role in content creation
- Bringing in new ideas
 - New uses for old AI
 - Domain for AI research

Games

Game AI

Actual AI used
in Games

AI



The Module

- Established techniques from industry
 - *FSMs, Behaviour Trees, Utility, Pathfinding, Steering*
- Some more advanced ideas
 - *Machine Learning, Planning, Procedural Content Generation*
- The cutting edge
 - *Declarative PCG, Neuroevolution, Monte Carlo Tree Search*

The Module

- Playing around with game AI tech
- Reading about game AI (devs and academics)
- Building your own AIs
- Coursework: AI component within group project

The Module

- Lecture ~1 hour
- Followed by break and lab (~ 2 hours)
 - Use your own laptop
 - Mostly Unity / Processing / C++
- Course material on learn.gold
 - <https://learn.gold.ac.uk/course/view.php?id=3109>

WORDWARE GAME DEVELOPER'S LIBRARY

PATH
PLANNING
MOVEMENT
MEMORY
TARGET
SELECTION
SEARCH
FUZZY
LOGIC
STATE
MACHINES
ACTION
SELECTION
GRAPH
THEORY
GOALS
STEERING
SCRIPTING
MEMORY
PERCEPTION
SENSORY
MODELING
WEAPON
SELECTION
HIERARCHICAL
GOALS
TARGET
SELECTION

Programming Game AI by Example



Mat Buckland

TLFeBOOK

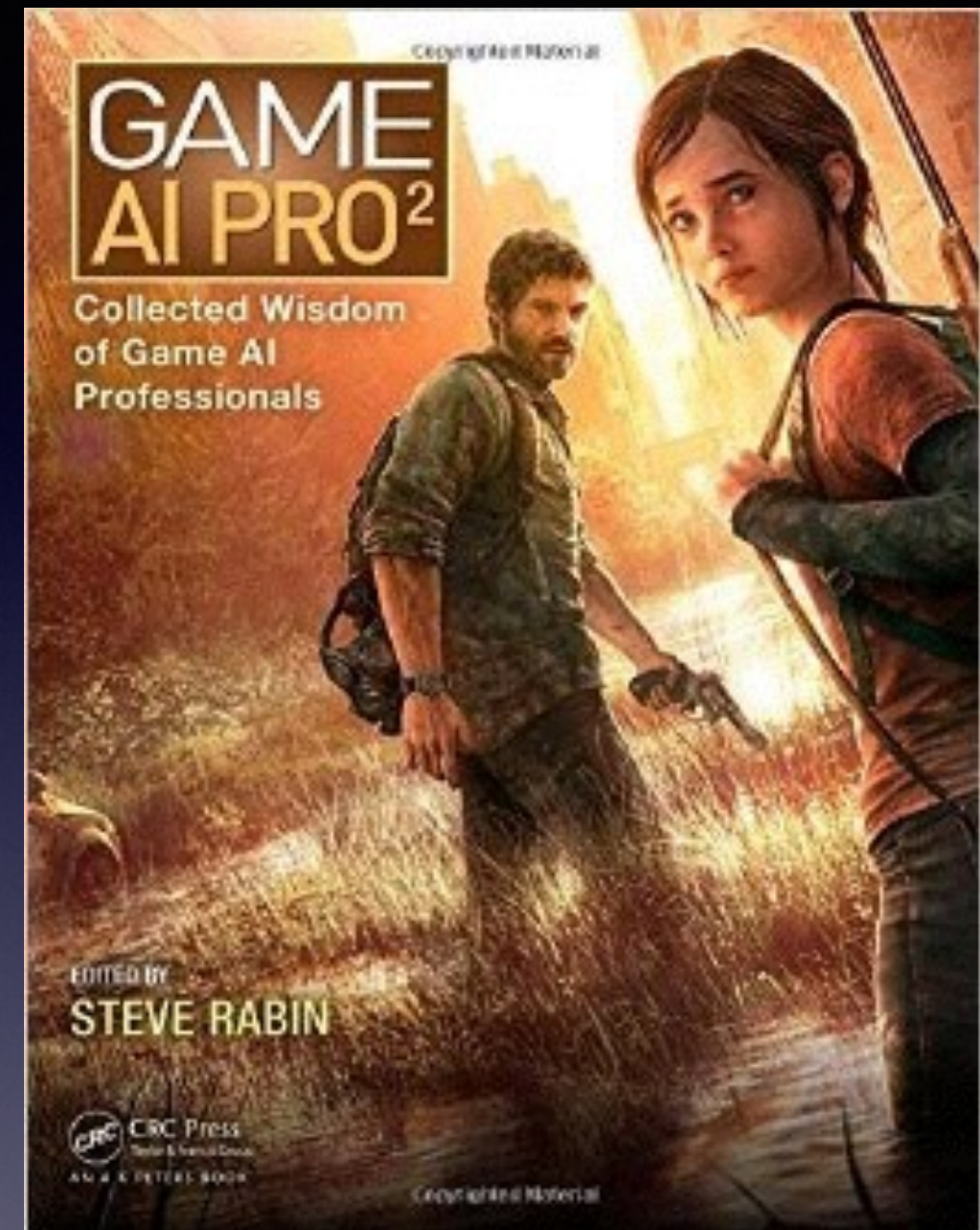
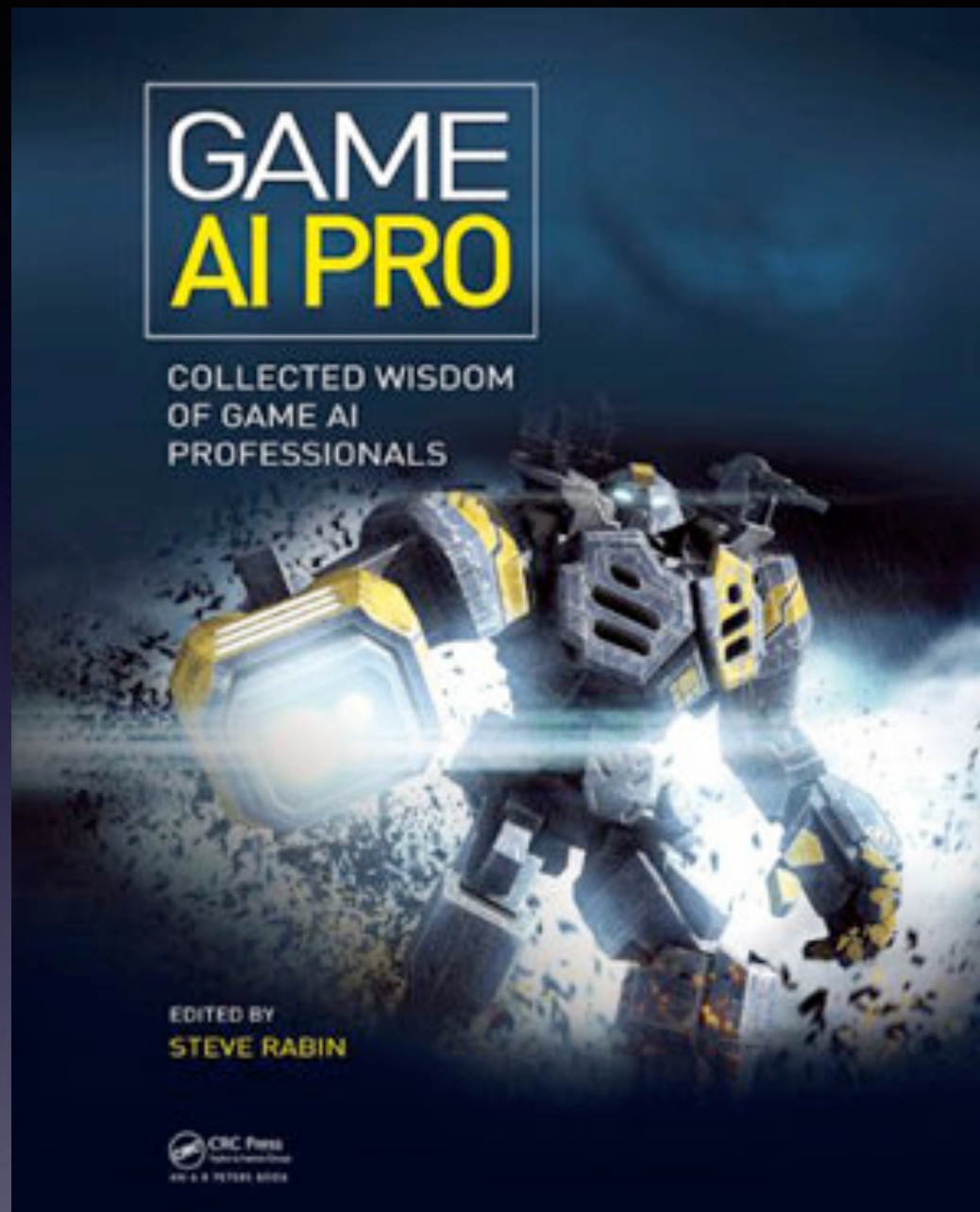
ARTIFICIAL INTELLIGENCE FOR GAMES

SECOND EDITION

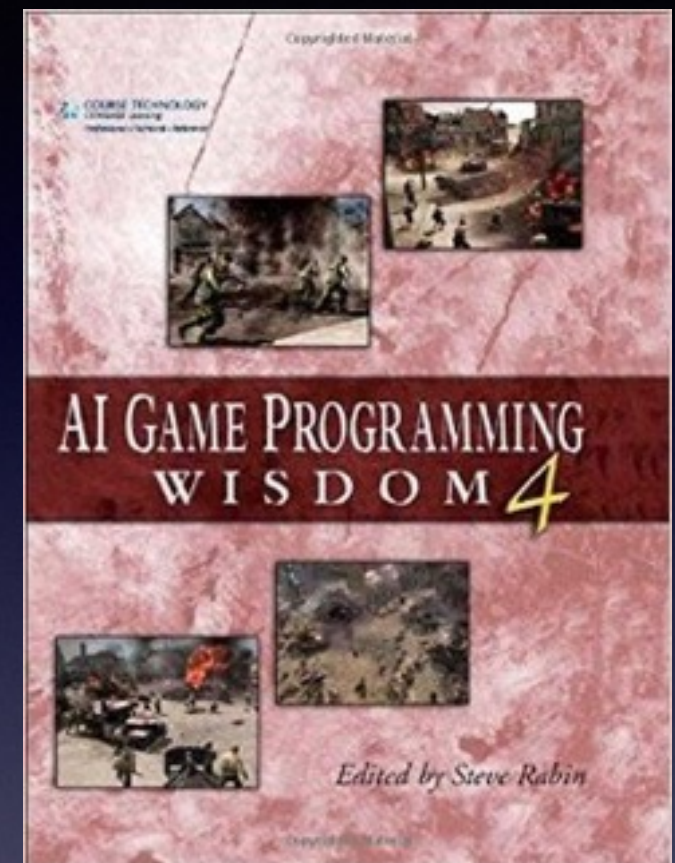
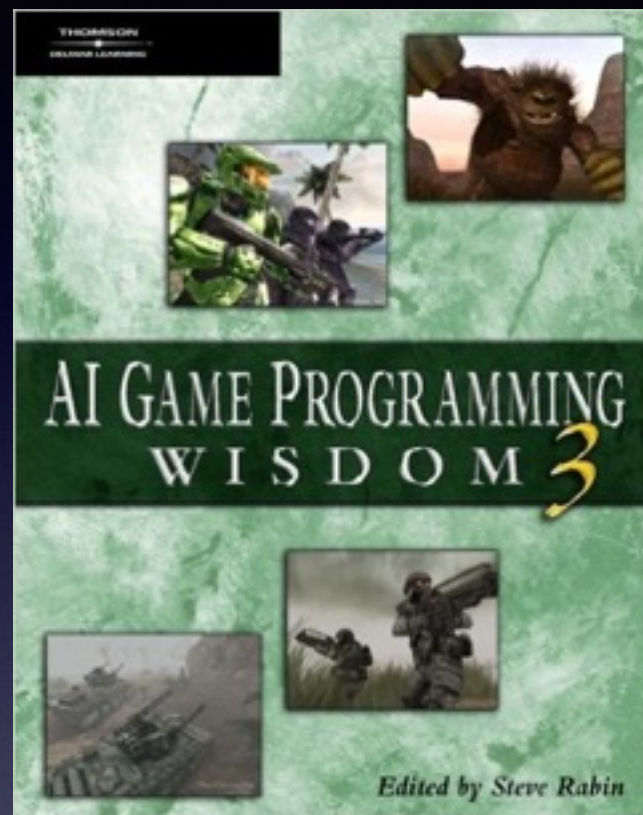
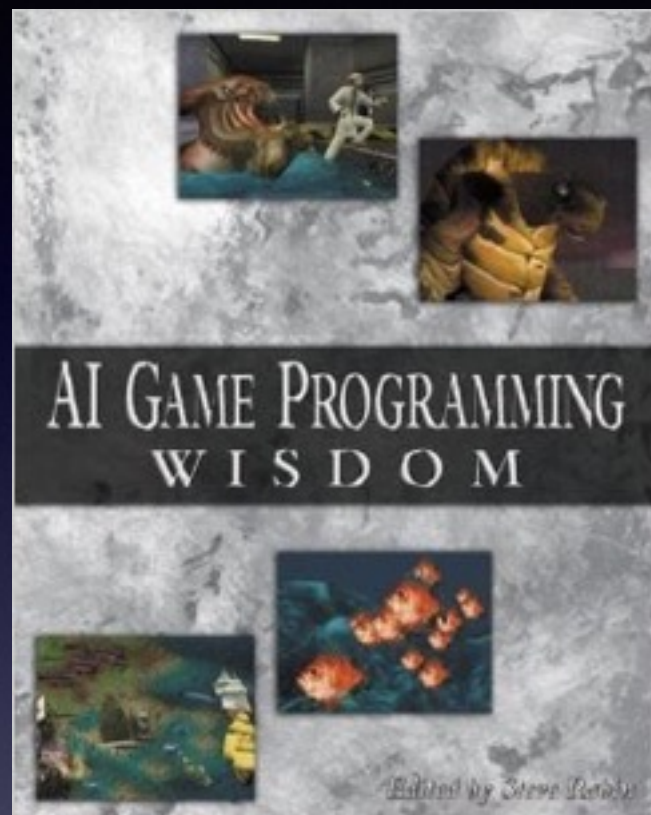


IAN MILLINGTON • JOHN FUNGE





Steve Rabin's "Game AI Pro" series (gameaipro.com)



Steve Rabin's "Game AI Programming Wisdom"

Online Resources

- Game AI Programmers Guild @AIGPG
- AiGameDev.com @AiGameDev
- redblobgames.com