True Bots:
Revolutionizing AI in Gaming

Executive Summary

From the lowest logic to move a sprite to unbeatable chess engines, almost every game needs some form of "computer player."

The gaming industry faces a persistent challenge with artificial intelligence: AI opponents and companions are essential for populating single-player worlds, keeping multiplayer matches running, and providing engaging challenges. Yet, game AI remains fundamentally flawed. Most bots rely on rudimentary scripting, state machines, or behavior trees, leading to predictable and limited behavior that fails to engage players. More elaborate scripted AI is prohibitively expensive to develop, and still fails to produce truly dynamic behavior. Convenient server-side implementations can attempt to compensate but rely on privileged access to game state, requiring artificial constraints to avoid breaking fair play.

True Bots eliminates these constraints entirely. Rather than relying on predefined rules, static logic, or hard coded behaviors, True Bots trains AI agents using machine learning, allowing them to adapt dynamically, set their own objectives, and make decisions based on real gameplay experience. Unlike traditional bots, True Bots operate under the same constraints as human players, processing only the available game data and executing actions naturally.

By transforming AI from scripted logic into trained, adaptable agents, True Bots enables game studios to enhance player engagement, improve long-term retention, and reduce AI development overhead. Whether deployed client-side, server-side, or in parallel, True Bots provides a scalable, future-proof AI solution that fundamentally changes how AI is built, deployed, and experienced in games.

The Crutch of Crude AI in Modern Games

Artificial intelligence is not a luxury in modern games: it is a necessity. From populating expansive single-player worlds to ensuring engaging multiplayer matches during off-peak hours, AI opponents and companions are foundational to the gaming experience. However, for far too long, game AI has been treated as a solved problem, relegated to outdated techniques that persist not because they work well, but because they are the industry default.

The Illusion of Intelligence: Scripted Bots and Their Limitations

The need for specific behavior, constrained by software, hardware, and technological limitations, has made some impressive approximations of intelligence in video games, but engaging bots have trade offs.

AI in games is overwhelmingly built on behavior trees, state machines, and scripted logic. While these approaches can produce functional AI, they fundamentally lack the ability to learn, adapt, or exhibit true intelligence. Developers can pour time and effort into crafting more elaborate scripts, but the results remain rigid and predictable—bots that appear intelligent in specific scenarios but are wholly incapable of responding dynamically to new situations.

These approaches suffer from inherent flaws:

- **Predictability:** Players quickly learn the patterns and weaknesses of scripted bots, leading to repetitive and unchallenging gameplay. Once the "code" is cracked, engagement plummets.

- **Lack of Adaptability:** Scripted bots struggle to react intelligently to novel player strategies or dynamic game situations. They often follow predefined paths and fail to exhibit true learning or improvisation.

- **High Development Cost, Diminishing Returns:** Creating even moderately complex behavior trees requires extensive developer time and resources. Yet, the resulting bots often fall short of player expectations, offering a poor return on investment.

- **Immersion Breaking Stagnation:** Encountering predictable and unintelligent bots shatters player immersion, reminding them they are interacting with a program, not a dynamic game world.

Despite these limitations, scripted AI remains the industry norm—not because it is the best solution, but because alternatives have been historically impractical.

The Unfair Advantage: Server-Side Cheating and Broken Immersion

Compounding the issue of limited intelligence are the particular tradeoffs that come with the need to have bot-code running as part of the game server. While seemingly convenient, this approach introduces a fundamental flaw: server-side bots are inherently capable of "cheating," and so developers let them. To compensate for their lack of true intelligence and to maintain a semblance of challenge, these bots are often granted the unfair advantages afforded to them by being privy to the running game engine's code.

These sorts of server-side bots (a standard and reasonable approach) must be heavily augmented then appropriately constrained to create any semblance of fair play. Perfect information about player positions, hidden variables, and future events must be artificially limited. Superhuman reaction times need to be deliberately slowed, and accuracy reduced from perfection. Even basic game mechanics often require

special rules and limitations for bots. These artificial constraints and accompanying necessary balancing create additional development burden on top of scripting the bots' behavior in the first place.

Beyond the development overhead, server-side bots directly impact performance. Bot behavior trees, raycasts, and navigation calculations all compete for compute, reducing server tick rates and degrading the experience for all players.

Players can sense these compromises. When a bot makes decisions with information it shouldn't have, or suddenly becomes artificially sluggish, it breaks immersion. The very measures taken to make bots "fair" end up highlighting their artificial nature.

The Cost of Inadequate AI: Player Churn and Missed Potential

The consequences of inadequate game AI create a negative feedback loop that undermines the very games they're meant to support. When servers are underpopulated, bots must fill the gap. But poorly implemented bots, whether obviously artificial or frustratingly unfair, drive away the very players needed to create engaging matches. This leads to increasingly bot-filled servers that struggle to maintain a healthy player population.

This cycle is particularly devastating for games that rely on a critical mass of players to create compelling experiences. Players won't wait in servers populated by predictable or poorly balanced bots, leading to more empty servers and further player attrition. Even elaborate scripting and careful bot balancing can only marginally improve this situation - the fundamental limitations of traditional approaches mean bots range from outright repulsive at their worst, to barely tolerable at best.

True Bots: Intelligent AI for a New Era of Gaming

True Bots represents a paradigm shift in game AI, moving beyond the limitations of scripting and server-side compromises. Our platform can quickly and efficiently train AI agents to exhibit whatever behavior your game needs - from basic NPCs to adaptive bosses. Through cutting-edge machine learning techniques, we deliver truly intelligent, engaging, and fair AI that solves the fundamental problems plaguing game AI today.

Training Smart, Fair, Human-Like Bots

We train bots that operate under the same constraints as players, processing the same tier of game information and making decisions and interacting with game-inputs just like a human would. This fundamental shift eliminates the need for artificial advantages or limitations that plague traditional approaches.

- **Same Inputs, Same Outputs:** Our plugin feeds visual observations and selected game data (health, ammo, items, etc.) to the agent just like a player would see them. Agents learn to process this information and make decisions through a hierarchical neural net, and send actions to a software-defined touch screen, keyboard and mouse, or a controller. This fundamental shift eliminates the need for artificial advantages or limitations - True Bots play fair because they interact with the game just like humans do.

- **Authentic and Immersive Experiences:** True Bots create believable experiences because they're actually learning to play, not following scripts. While maintaining human-like constraints, we can tune nuances like decision period (a proxy for reaction time) and combat preferences to create distinct bot personalities, such as a preference for grenades.

True Bots are designed to integrate seamlessly into your game's ecosystem. Whether deployed locally, on a server, or in the cloud, our agents use lightweight ONNX models to ensure minimal performance overhead. This flexibility allows for on-demand bot-players that scale effortlessly to meet your game's needs. You can continue developing while we train.

Our experience and platform make implementing machine learning agents with *wanted* behavior accessible to developers. Our technology makes it possible. Our plugin can efficiently reduce image complexity while simultaneously classifying each object with tags, and parameters.

Below you can see what our drone-pilot True Bot sees when racing through gates. This is passed to a neural network as an observation later. Here it's outputting controls to a pair of joysticks, but it can be configured to use a controller, touch, mouse and keyboard, and more.

1: Column
2: Obstacle
3: Plane Boundary
4: Current Gate
5: Next Gate

*Drone demo rendered view with labeled True Bot "sight" or grid sensor*

Machine Learning at the Core: Adaptability, Unpredictability, and True Intelligence

Need a perfect sidekick? A worthy opponent? A boss that adapts to player strategy? Simple but effective pawns for combat? Our platform can train agents to exhibit these behaviors and more through our hierarchical neural net architecture. By separating concerns between focused component nets managed by a coordinator, we can quickly train specific behaviors while maintaining natural gameplay.

We can effectively put blinders on the trainee, and separate concerns between focused neural nets so that component nets have smaller problem spaces, and higher precision, while managed by a coordinator neural net. Our combination of techniques enable a level of intelligence and adaptability far beyond traditional scripted approaches.

- **Hierarchical Neural Nets for Complex Behavior:** We can implement agents using a set of modular neural networks, where each module specializes in a specific task. Just like a tank crew, where the commander (3), gunner (2), and pilot (1) each have distinct roles, our agents leverage specialized neural nets that work together to achieve complex behavior. These modules can be pre-trained, reused, and coordinated efficiently, allowing for more adaptable and intelligent decision-making**.**

- **Reinforcement Learning for Strategic Depth:** Through reinforcement learning, True Bots learn optimal strategies and tactics by interacting with the game environment and receiving rewards for successful actions. This results in bots that exhibit emergent behavior, adapt to evolving game dynamics, and continuously refine their gameplay.

- **Behavior Cloning for Quick Training:** Our agents can train by observation too. Giving a True Bot expert human gameplay is one of the fastest ways to train functional behavior. Depending on the "expert" the agent learns from, even existing behavior trees are sufficient to start training True Bots. After training to a baseline of competency we use GAIL and Curiosity training features.

- **GAIL for Human-Like Adaptation:** We use Generative Adversarial Imitation Learning (GAIL) to refine our bots' behavior beyond basic imitation. Instead of simply copying expert gameplay, our bots learn the underlying decision-making patterns that drive expert-level performance. This allows them to generalize and adapt to new situations rather than rigidly following predefined strategies.

- **Curiosity for Continuous Improvement:** Curiosity-driven learning enables our bots to explore beyond their training data. By rewarding them for discovering new and unexpected situations, we encourage adaptive problem-solving and creative gameplay. Just as a real tank crew learns to operate in unfamiliar environments, our bots continuously refine their tactics through self-motivated exploration.
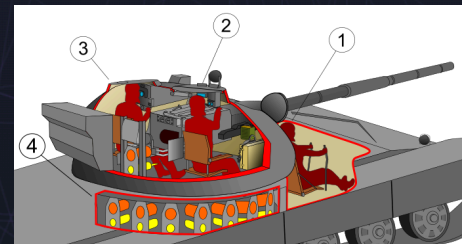
True Bots exit training ready to adapt to player strategies, exploit weaknesses, and surprise your players.

Cost-Effective and Seamless Integration: A Practical Solution for Game Studios

True Bots are a practical and deployable solution for game studios. We recognize that every game is bespoke: our platform and plugin make it easy to get agents with the behavior you want quickly and efficiently. We're bringing a turnkey solution to better bots in gaming.

Our training and deployment pipeline, shown in below, streamlines the entire process from integration to deployment. The training phase connects your game through our plugin to our training platform, where we develop and refine agent behavior. The deployment phase provides flexible options for integrating these trained agents back into your game.
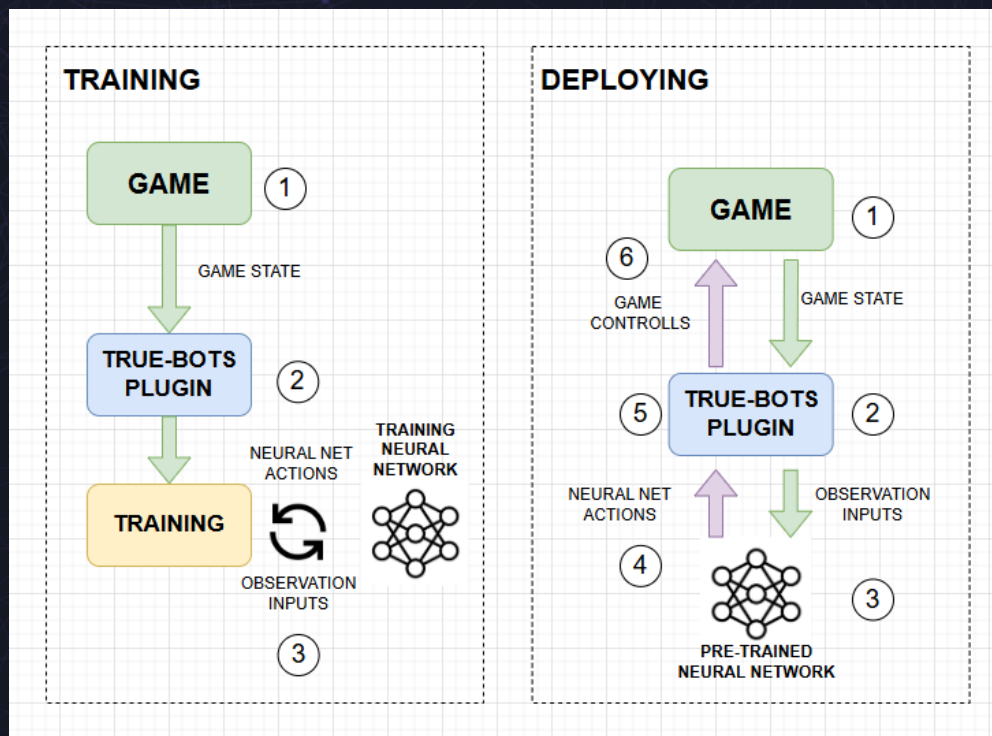
Training and Deployment with True Bots

Our approach emphasizes both ease of integration and practical deployment:

- **Plugin-based integration** ensures minimal effort for developers while preserving source code privacy. Our system allows games to seamlessly connect with True Bots through a lightweight plugin, requiring only basic configuration to get started. For developers who need alternative methods, we provide flexible connection options to accommodate various architectures and workflows.

- **Flexible deployment options** allow True Bots-trained agents to function in diverse environments, whether on a client, server, or cloud-based infrastructure. Using standard ONNX models, these

agents maintain consistency across different platforms while minimizing runtime resource consumption. This ensures a smooth and optimized experience without imposing heavy computational demands on any single system.

- **Rapid behavior development** enables developers to quickly create, modify, and refine AI behaviors. Starting with baseline gameplay behaviors, new traits and strategic nuances can be incrementally introduced through focused training sessions. Existing behavior trees can be leveraged to produce functional behavior almost immediately.

- **Specialized AI solutions** allow True Bots to create agents tailored to specific roles within a game. Agency allows neural nets to take action, and we can deliver bots that wield your spells and weapons in your worlds. We can even train an agent to play like you. We'll work with you to understand your game and tailor connections and rewards to make True Bots *your* bots.

Our in-house tools orchestrate this entire process, from initial connection through training and deployment. This comprehensive platform approach means you can focus on defining the behavior you want, while we handle the complexity of delivering it.
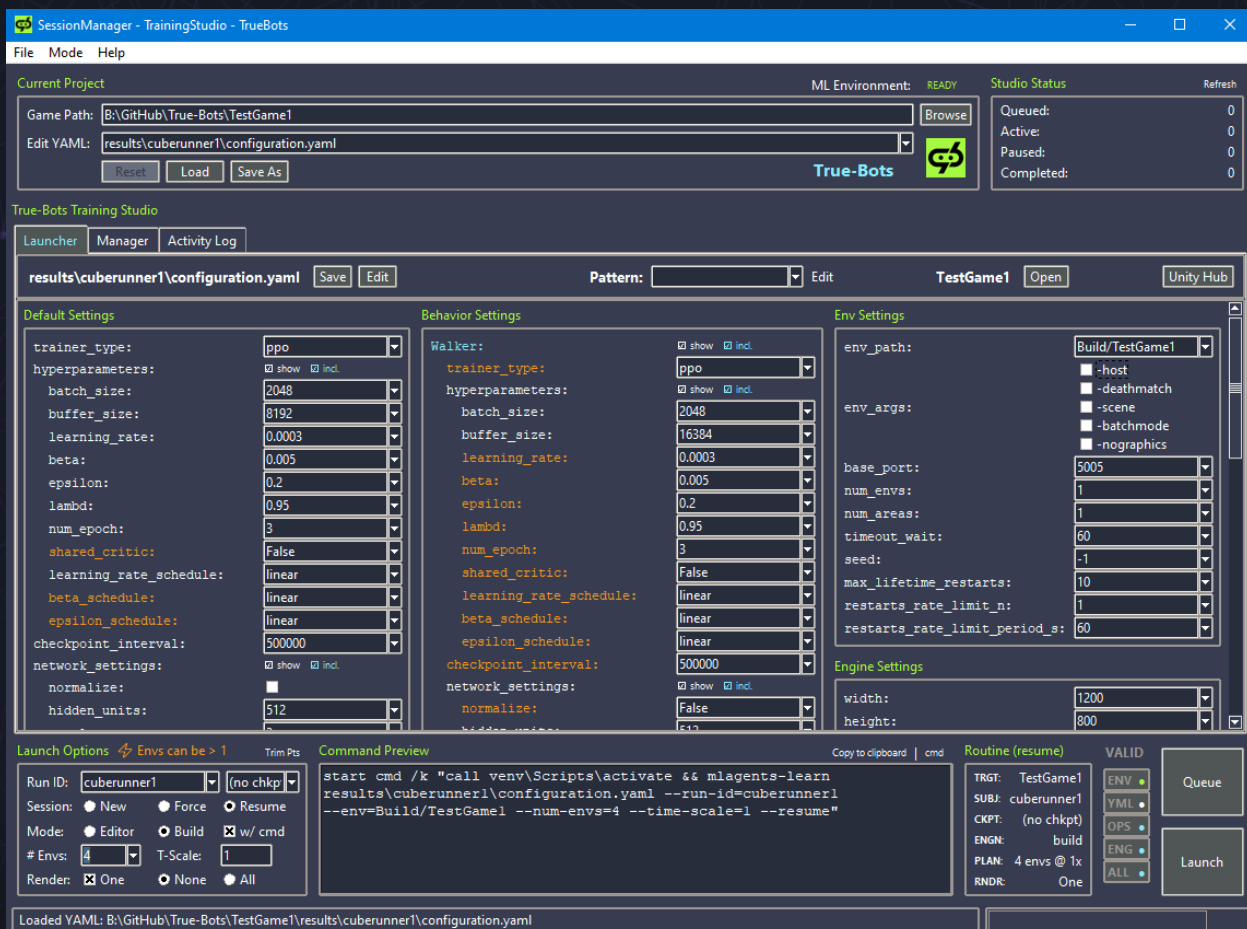
True Bots Training Studio Session Manager

Our Session Manager, one of several in-house tools, lets us efficiently manage training sessions between different games. Our pipeline and toolchain let us iterate quickly so you can too.

Unlocking a New Level of Player Engagement and Game Potential

True Bots offers a compelling value proposition for game studios seeking to elevate their player experiences and gain a competitive edge:

- **Significantly Improved Player Retention:** By delivering truly engaging and challenging AI opponents and companions, True Bots directly addresses player dissatisfaction and fosters longer player lifecycles, boosting long-term revenue.

- **Enhanced Game Quality and Player Satisfaction:** True Bots elevate the overall quality of gameplay, creating more dynamic, immersive, and rewarding experiences that lead to higher player satisfaction and positive word-of-mouth.

- **Reduced Development Costs and Increased Efficiency:** By providing a readily available and highly capable AI solution, True Bots reduces the need for extensive in-house AI development, freeing up developer resources and accelerating game development cycles.

- **Unlock New Gameplay Innovations:** True Bots empowers game designers to explore entirely new forms of gameplay, personalized AI experiences, and dynamic narrative possibilities previously limited by the constraints of traditional AI.

The Future of AI in Gaming

True Bots envisions a future where AI is central to gaming excellence. From AI companions that evolve alongside players to dynamic game worlds filled with lifelike NPCs, our approach unlocks unprecedented possibilities.

Beyond gaming, our technology extends to broader applications, such as robotics, interactive training simulations, and automation. Industries like aviation, emergency response, and healthcare stand to benefit from our adaptive AI training pipeline: we can train *wanted* behavior quickly and efficiently.

Whether you're a game studio looking for smarter bots or an industry leader seeking AI-driven innovation, let's build the next generation of intelligent systems—together.

Partner with True Bots to Define the Future of Gaming AI

The limitations of current game AI are no longer acceptable. Players demand more, and game studios deserve better. True Bots offers a transformative solution – intelligent, client-side AI that is fair, engaging, and cost-effective. By partnering with True Bots, game studios can revolutionize their games, enhance player satisfaction, and step into the future of gaming AI.

Contact us today to explore partnership opportunities and discover how True Bots can revolutionize your games.

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