Quake III Arena Bot

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Delft
Contents

- Introduction
- Requirements
- Bot architecture
- Subsystems
- Conclusion

All about what makes my clock tick.
Introduction

Who am I?

What game do I play?
Introduction

- Quake 1 (Omicron bot)
- Quake 2 (Gladiator bot)
- Quake 3 Arena
What do we need? Guns, lots of guns!

- Introduction
- **Requirements**
- Bot architecture
- Subsystems
- Conclusion
Requirements

- Hard to distinguish from human player
- Same game rules apply to bots and humans
- Not allowed to cheat
- Different bot characters
- Play team games
- Resource efficient (CPU & memory)
- Commercial quality code
- Easy extendable/modifiable architecture and implementation
Hey now! I’m more than just bones!

- Introduction
- Requirements
- Bot architecture
- Subsystems
- Conclusion
Bot architecture

4th
Team leader AI

3rd
Misc. AI | AI Network | Commands

2nd
Fuzzy | Character | Goals | Navigation | Chats

1st
Area Awareness System | Basic Actions
Bot architecture
(information flow)

4th
Team leader AI

3rd
Misc. AI
AI Network
Commands

2nd
Fuzzy
Character
Goals
Navigation
Chats

1st
Area Awareness System
Basic Actions

Mediamatics / Knowledge based systems
Bot architecture
(integration with game engine)

Game

Server

Bot AI (3rd & 4th layer)

Bot Lib (1st & 2nd layer)

networking

Client

Client Game

Renderer

Player input

Sound

3D image

Client code providing the IO functionality for human players
• Introduction
• Requirements
• Bot architecture
• **Subsystems**
• Conclusion
Basic Actions

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1st
Area Awareness System  |  Basic Actions
Area Awareness System

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1st
--- Area Awareness System | Basic Actions
Area Awareness System

Maze

Waypoint system

AAS
Area Awareness System
Area Awareness System
Area Awareness System

- Quake3 maps much more complex than maze
- Multi-level routing algorithm
- Areas grouped in clusters.
Navigation

4th
- Team leader AI

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- Fuzzy
- Character
- Goals
- Navigation
- Chats

1st
- Area Awareness System
- Basic Actions

Mediamatics / Knowledge based systems
Navigation
Bot Characters

4th
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1st
Area Awareness System | Basic Actions
## Bot Characters

**(characteristics)**

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the bot.</td>
</tr>
<tr>
<td>Gender</td>
<td>Gender of the bot (male, female, it - mechanical creature).</td>
</tr>
<tr>
<td>Attack skill</td>
<td>How skilled the bot is when attacking.</td>
</tr>
<tr>
<td>Weapon weights</td>
<td>File with weapon selection fuzzy logic.</td>
</tr>
<tr>
<td>View factor</td>
<td>Scale factor for difference between current and ideal view angle to view angle change.</td>
</tr>
<tr>
<td>View max change</td>
<td>Maximum view angle change per second.</td>
</tr>
<tr>
<td>Reaction time</td>
<td>Reaction time in seconds.</td>
</tr>
<tr>
<td>Aim accuracy</td>
<td>Accuracy when aiming, a value between 0 and 1 for each weapon.</td>
</tr>
<tr>
<td>Aim skill</td>
<td>Skill when aiming, a value between 0 and 1 for each weapon.</td>
</tr>
<tr>
<td>Chats</td>
<td>File with individual bot chatter.</td>
</tr>
<tr>
<td>Characters per minute</td>
<td>How fast the bot types.</td>
</tr>
<tr>
<td>Chat tendencies</td>
<td>Tendencies to use specific chats when things happen.</td>
</tr>
<tr>
<td>Croucher</td>
<td>Tendency to crouch.</td>
</tr>
<tr>
<td>Jumper</td>
<td>Tendency to jump.</td>
</tr>
<tr>
<td>Walker</td>
<td>Tendency to walk instead of run.</td>
</tr>
<tr>
<td>Weapon jumper</td>
<td>Tendency to rocket jump.</td>
</tr>
<tr>
<td>Item weights</td>
<td>File with item goal selection fuzzy logic.</td>
</tr>
<tr>
<td>Aggression</td>
<td>Aggression of the bot.</td>
</tr>
<tr>
<td>Self preservation</td>
<td>Self preservation of the bot.</td>
</tr>
<tr>
<td>Vengefulness</td>
<td>How likely the bot is to take revenge.</td>
</tr>
<tr>
<td>Camper</td>
<td>Tendency to camp.</td>
</tr>
<tr>
<td>Easy fragger</td>
<td>Tendency to go for cheap kills.</td>
</tr>
<tr>
<td>Alertness</td>
<td>How alert the bot is.</td>
</tr>
<tr>
<td>Fire throttle</td>
<td>Tendency to fire continuously instead of pausing between shots.</td>
</tr>
</tbody>
</table>

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**Mediamatics / Knowledge based systems**
Goal Selection

4th: Team leader AI
3rd: Misc. AI, Al Network, Commands
2nd: Fuzzy, Character, Goals, Navigation, Chats
1st: Area Awareness System, Basic Actions

Mediamatics / Knowledge based systems
Goal Selection

Fuzzy weight = 0.8
Fuzzy weight = 0.7
Fuzzy weight = 0.5
Communication with chats

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Mediamatics / Knowledge based systems
Communication with chats

- Generating chat messages
- Interpreting chat messages
- Synonyms
- Match templates
Communication with chats
(match templates)

<variable> get the <variable>

Grunt get the rocket launcher.

Grunt rocket launcher.
Communication with chats

(Eliza chats)

MrElusive: this game is fun!
Bot: are we having fun?
MrElusive: I like to shoot things.
Bot: I like to shoot things too.
MrElusive: I’m going to shoot you.
Bot: I don’t believe you are going to shoot me.
MrElusive: just wait and see!
Bot: don’t wait.
MrElusive: you are history when I find you
Bot: maybe I’m history when you find me, and maybe not.
MrElusive: be afraid.
Bot: are you afraid of big, mean gooses?
AI Network

Seek Long Term Goal — Seek Short Term Goal — Seek Active Entity

Stand — Respawn — Battle Fight — Battle Chase — Battle Retreat — Battle Short Goal

Mediamatics / Knowledge based systems
AI Network
(Seek LTG node example)

- Am I dead? If so go to ‘respawn’ node.
- Is there an enemy I want to fight with? If so go to the ‘battle flight’ node.
- If I reached my long term goal select new long term goal.
- If there is a short goal go to the ‘seek short term goal’ node.
- Predict obstacles that need to be handled (doors opened with buttons).
- Navigate towards long term goal.
- If I am blocked figure out how to deal with the obstacle.
Miscellaneous AI

4th
Team leader AI

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AI Network
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Area Awareness System
Basic Actions

Mediamatics / Knowledge based systems
Fighting behaviour

- Acquiring enemies (visibility/audibility)
- Selecting weapons (fuzzy logic)
- Aiming at the enemy
- Taking position and avoiding projectiles
Obstacles & Puzzles
Conclusion

- Fairly good artificial player
- Cannot be distinguished from human at first sight
- Same game rules apply and the bot does not cheat
- Versatile set of bot characters
- Plays team based game types
- Communicates with other players (bot/human)
- Resource efficient (AAS)
- Easy extendable/modifiable architecture and implementation. Several other games and mods use the bot AI base.
Future directions

- Better anticipation of enemies
- Environment analysis
- Planning

You’re saying you can improve me?