

Making the Mainstream Accessible

More Than A Game

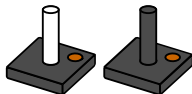
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Context

Then

Now

Future

Online Interaction

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Collaboration

Web-based Communities

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Acknowledgements

References

The Past of Accessible Gaming

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- ▶ **Drawback:** Segregation

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- ▶ AGDev and other developments

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 - ▶ Potential to augment existing practises and assist in teaching

► Global Information

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- ▶ Web-based Communities

Global Navigation

- ▶ Presenting in Parallel with Local Navigation

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- ▶ AudioQuake's approach & Multimodality

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 - ▶ Implicit landmarking, similar to place naming used in Unreal Tournament [Epic Games, 2004] and others

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 - ▶ AudioQuake and Braille displays

Collaboration

► Communication

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- ▶ Positional Information and Strategy

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- ▶ An area for future work

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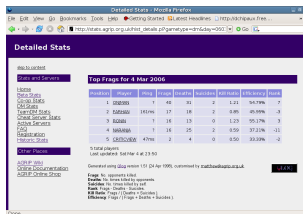
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Detailed Stats

Top Frags for 4 Mar 2006

Rank	Player	Wins	Losses	Deaths	Suicides	Kills	Points
1	000000	1	40	31	2	1.24	94.9%
2	000000	17	18	2	0	0.85	40.9%
3	000000	1	16	13	0	1.23	95.17%
4	000000	1	16	25	2	0.59	37.11%
5	000000	47m	2	4	0	0.50	33.33%

5 total players.
Last updated: Sat Mar 4 at 23:50

Generated using data from 151 (24 Apr 1995), submitted by mathhaskingsquack

Frags: No opponents killed
Deaths: No items killed by opponents
Suicides: No items killed by self
Rank: Frags - Deaths - Suicides
Kills: Frags - Deaths - Suicides
Efficiency: Frags / (Frags + Deaths + Suicides)

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- ▶ Feedback from ICC 2005

Further Work

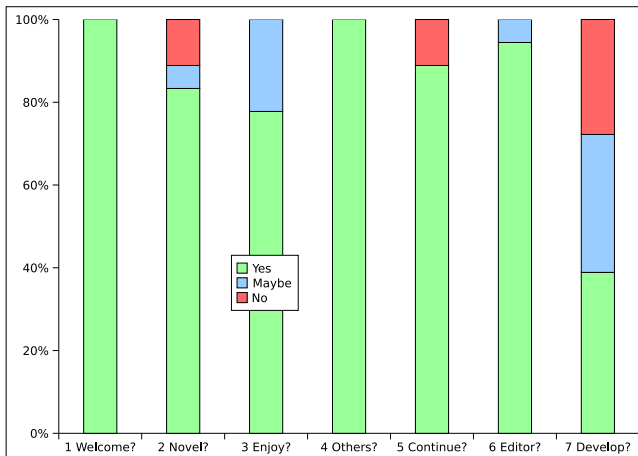
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User Survey

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This small survey covered 18 users of AudioQuake.

Conclusions

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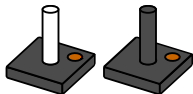
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Thanks for listening!
Any Questions?



References I



Archambault, D. and Burger, D. (2001).

From multimodality to multimodalities: the need for independent models.

In Constantine Stephanidis, L. E. A., editor, *Proceedings of the UAHCI'01 conference "Universal Access in HCI - Towards an Information Society for All"*, pages 227–231, New-Orleans, United States of America.



Atkinson, M. T., Gucukoglu, S., Machin, C. H. C., and Lawrence, A. E. (2006).

Making the mainstream accessible: What's in a game?

In *Proceedings of the 10th International Conference on Computers Helping People with Special Needs (in press)*.



Epic Games (1999,2003,2004).

Unreal Tournament (series).

References II



ESP Softworks (2001).

Monkey business.

<http://www.espssoftworks.com>.



Hampel, T., Keil-Slawik, R., Claassen, B. G., Plohmann, F., and Reimann, C. (1999).

Pragmatic solutions for better integration of the visually impaired in virtual communities.

In *GROUP '99: Proceedings of the international ACM SIGGROUP conference on Supporting group work*, pages 258–266, New York, NY, USA. ACM Press.



NESTA and EA (2005).

Futurelab.

<http://www.nestafuturelab.org/research/teachingwithgames.htm>.

References III



Sánchez, J. and Baloian, N. (2005).

Modeling audio-based virtual environments for children with visual disabilities.

In Kommers, P. and Richards, G., editors, *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2005*, pages 1652–1659, Montreal, Canada. AACE.



Siegfried, R. M. (2002).

A scripting language to help the blind to program visually.
SIGPLAN Not., 37(2):53–56.



Valve Software (1998).

Half-life.

<http://www.valvesoftware.com/>.



Velleman, E., van Tol, R., Huiberts, S., and Verwey, H. (2004).

3d shooting games, multimodal games, sound games and more working examples of the future of games for the blind.

Lecture Notes in Computer Science, 3118:257–263.



Yang, H. and Olson, G. M. (2002).

Exploring collaborative navigation:: the effect of perspectives on group performance.

In *CVE '02: Proceedings of the 4th international conference on Collaborative virtual environments*, pages 135–142, New York, NY, USA. ACM Press.