Axel Antoine

R&D Engineer

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I am a R&D Engineer at Inria, France. I have a PhD in Computer Science specialized in Human Computer Interaction (HCI). I am interested both in the interaction techniques that facilitate the manipulation of 3D objects and the computer graphics algorithms used to render them. I am currently the only developer on the *Esquisse* project, a web application that eases the manipulation of 3D objects and renders 3D scenes as Vector Graphics images with a custom NPR rendering engine.

Education

PhD, Computer Science
University of Lille, France *Oct. 2017 – Jan. 2021*
Speciality in Human Computer Interaction (HCI).

Master's Degree, Computer Science
University of Lille, France *Sept. 2015 – Sept. 2017*
Speciality in Image Processing, Computer Vision and Interaction.

Bachelor's Degree, Computer Science
University of Lille, France *Sept. 2012 – Sept. 2015*

Research achievements

Publications
5 international publications in HCI conferences
2 publications in french HCI conferences

Awards
Best thesis of 2021 in the french HCI community
1 international publication with Honorable Mention

Experience & Projects

Inria, France
R&D Engineer, Loki team *Jan. 2021 – Ongoing*

Esquisse Web
Web application built in React, Typescript and Three.js to export 3D scene as Vector Graphics images.
- Designed and developed techniques to manipulate 3D objects and skeletons via an IK system.
- Developed a NPR Rendering engine using state-of-the-art techniques and external C++ libraries with Web Assembly.
- Established a Continuous Integration process on a GitLab repository with runners.
- Contributed and proposed open-source projects on 3D tools and algorithms (e.g. *fast-triangle-triangle-intersection*, *three-mesh-bvh*).

Google, Canada
Software Engineer Intern, Chromium team *May 2019 – Sept. 2019*

Chromium Scrolling Latency [Project page]
Solving a scrolling visual jitter issue in Chromium caused by asynchronous input and output frequencies of the mobile device used.
- Developed and deployed a C++ software solution to overcome the issue in Chromium using trajectory prediction algorithms.
- Designed and deployed new metrics to measure the scrolling visual jitter on a large set of android devices.
- Run users testing and published the work to a top ranked HCI conference [1].

University of Lille, France
R&D Intern, Ph.D Student *Sept. 2015 – Jan. 2021*

Esquisse Blender [GitHub]
Blender add-on developed in Python to export 3D scenes as Vector Graphics images.
- Designed and developed interaction techniques to ease the manipulation of 3D objects and augment Blender default controls.
- Developed a custom NPR rendering engine using state-of-the-art techniques on top of the built-in engine Freestyle.
- Integrated support of external libraries: LeapMotion to manipulate hand-based skeletons, OpenCV to export pixel-based images.
- Run users testing and published the work to a top ranked HCI conference [2].

3D Rotations [Demo]
Web application for testing various trackball techniques to rotate 3D objects.
- Designed and developed a web application using Three.js and Javascript.
- Reproduced state-of-the-art trackball techniques to rotate 3D objects and analyse their behaviour.
- Run users testing and published the work to a local french HCI conference.

TurboMouse [Project page]
Predict mouse position using an embedded accelerometer to compensate system latency.
- Designed and developed a proof of concept using C++ Qt and Arduino.
- Designed an optimized pipeline to merge inputs from both the mouse and the accelerometer at high frequency and predict mouse position using trajectory prediction algorithms.
- Run users testing and published the work to a top ranked HCI conference [3].

References

Géry Casiez
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Publications

International Conferences & Journals

[1] Axel Antoine et al. “Modeling and Reducing Spatial Jitter caused by Asynchronous Input and Output Rates”. In: *UIST 2020 - ACM Symposium on User Interface Software and Technology*. Virtual (previously Minneapolis, Minnesota), United States, Oct. 2020. DOI: 10.1145/3379337.3415833. URL: https://hal.inria.fr/hal-02919191.

[2] Axel Antoine et al. “Esquisse: Using 3D Models Staging to Facilitate the Creation of Vector-based Trace Figures”. In: *17th IFIP Conference on Human-Computer Interaction (INTERACT)*. Vol. LNCS-11747. Human-Computer Interaction – INTERACT 2019 Part II. Part 6: Human-Robot Interaction and 3D Interaction. Paphos, Cyprus: Springer International Publishing, Sept. 2019, pp. 496–516. DOI: 10.1007/978-3-030-29384-0_30. URL: https://hal.inria.fr/hal-02293837.

[3] Axel Antoine, Sylvain Malacria, and Géry Casiez. “Using High Frequency Accelerometer and Mouse to Compensate for End-to-end Latency in Indirect Interaction”. In: *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2018)*. Montréal, Canada, Apr. 2018, pp. 1–11. DOI: 10.1145/3173574.3174183. URL: https://hal.inria.fr/hal-01714204.

[4] Axel Antoine, Sylvain Malacria, and Géry Casiez. “ForceEdge: Controlling Autoscroll on Both Desktop and Mobile Computers Using the Force”. In: *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI ’17)*. Denver, United States, May 2017. DOI: 10.1145/3025453.3025605. URL: https://hal.inria.fr/hal-01444366.

[5] Axel Antoine et al. “Interaction Illustration Taxonomy: Classification of Styles and Techniques for Visually Representing Interaction Scenarios”. In: *CHI 2021 - ACM Conference on Human Factors in Computing Systems*. Yokohama, Japan, May 2021. DOI: 10.1145/3411764.3445586. URL: https://hal.archives-ouvertes.fr/hal-03137867.

Local Conferences

[6] Axel Antoine, Sylvain Malacria, and Géry Casiez. “Utilisation de la force sur pavés tactiles pour le défilement automatique”. In: *Actes de la 28ième conférence francophone sur l’Interaction Homme-Machine*. Actes de la 28ième conférence francophone sur l’Interaction Homme-Machine. Fribourg, Switzerland, Oct. 2016, pp. 264–270. DOI: 10.1145/3004107.3004137. URL: https://hal.archives-ouvertes.fr/hal-01384315.

Demonstrations

[7] Axel Antoine, Sylvain Malacria, and Géry Casiez. “TurboMouse: End-to-end Latency Compensation in Indirect Interaction”. In: *Adjunct Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2018), Demonstration*. Montreal, Canada, Apr. 2018. DOI: 10.1145/3170427.3186542. URL: https://hal.inria.fr/hal-01726763.