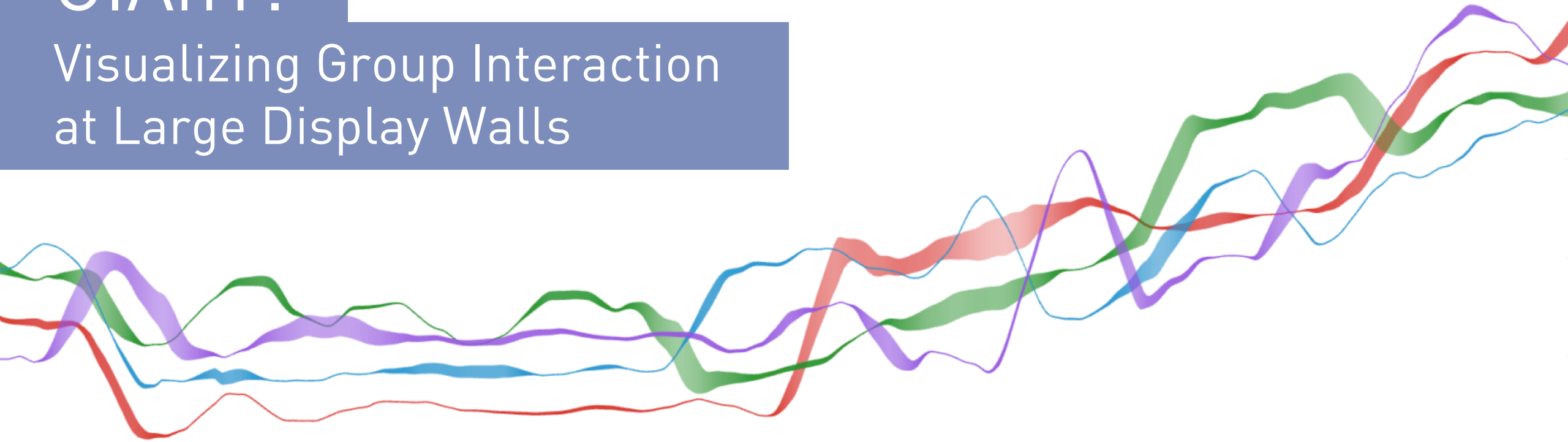


GIAnT:

Visualizing Group Interaction at Large Display Walls



Ulrich von Zadow, Raimund Dachzelt
CHI, May 2017



TECHNISCHE
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Background: Display Walls



GraSp [Kister et al., 2017]



Wild Room
[Beaudouin-Lafon et al., 2008]



NiCE Room [Haller et al., 2008]



CityWall [Morrison et al., 2008]

Display walls:

- Very large surfaces
- Interactive: Touch, tangibles, pen, distal pointing,...
- Very high resolution
- Users move around
- Multiple users
- Public/semi-public

Background: Research in Display Wall Interaction



Application Cases

[Rajabiyazdi et al., 2015]



Collaboration

[Jakobsen and Hornbæk, 2014]



Locomotion [Ball et al., 2008]



Awareness

[von Zadow et al., 2016]

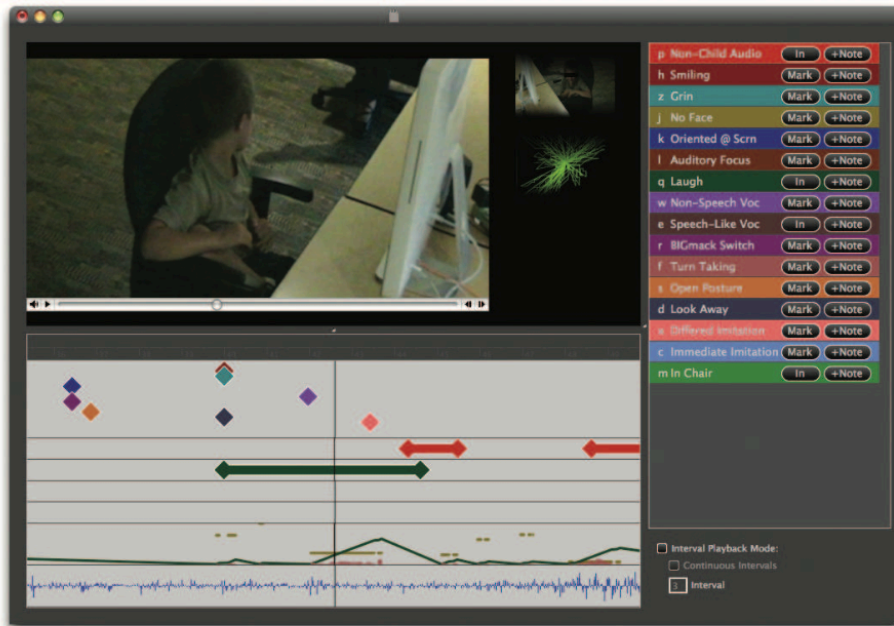
Research Question: What visualizations would allow us to understand multi-user interaction at large display walls more effectively?

Challenges:

- Support **time periods**: Provide visualizations that show user behavior over time periods
- Provide **dimensional mapping**: Display high-dimensional data (e.g., 3D position + time) on a 2D display
- Support relevant **research topics**, e.g., collaboration, locomotion, awareness

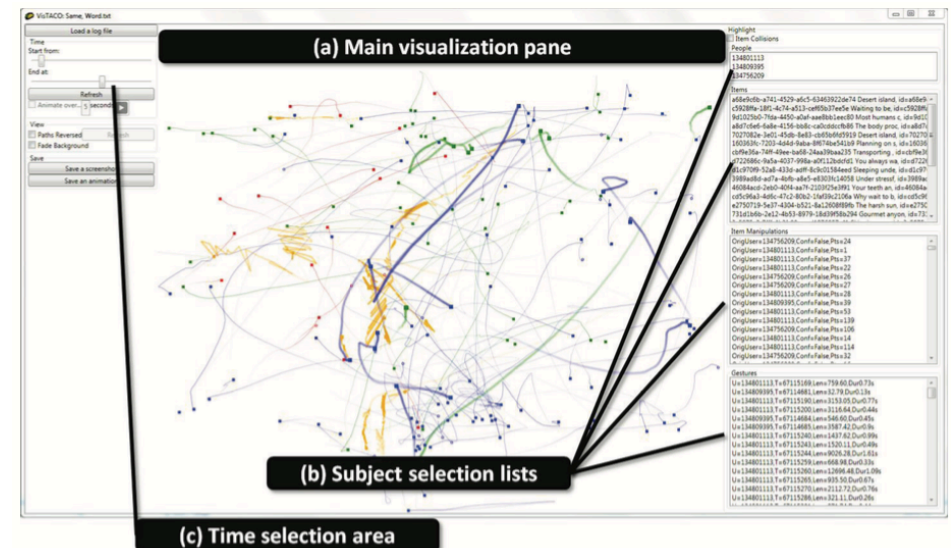
Related Work: Interaction Analysis Tools

Video Coding Tools



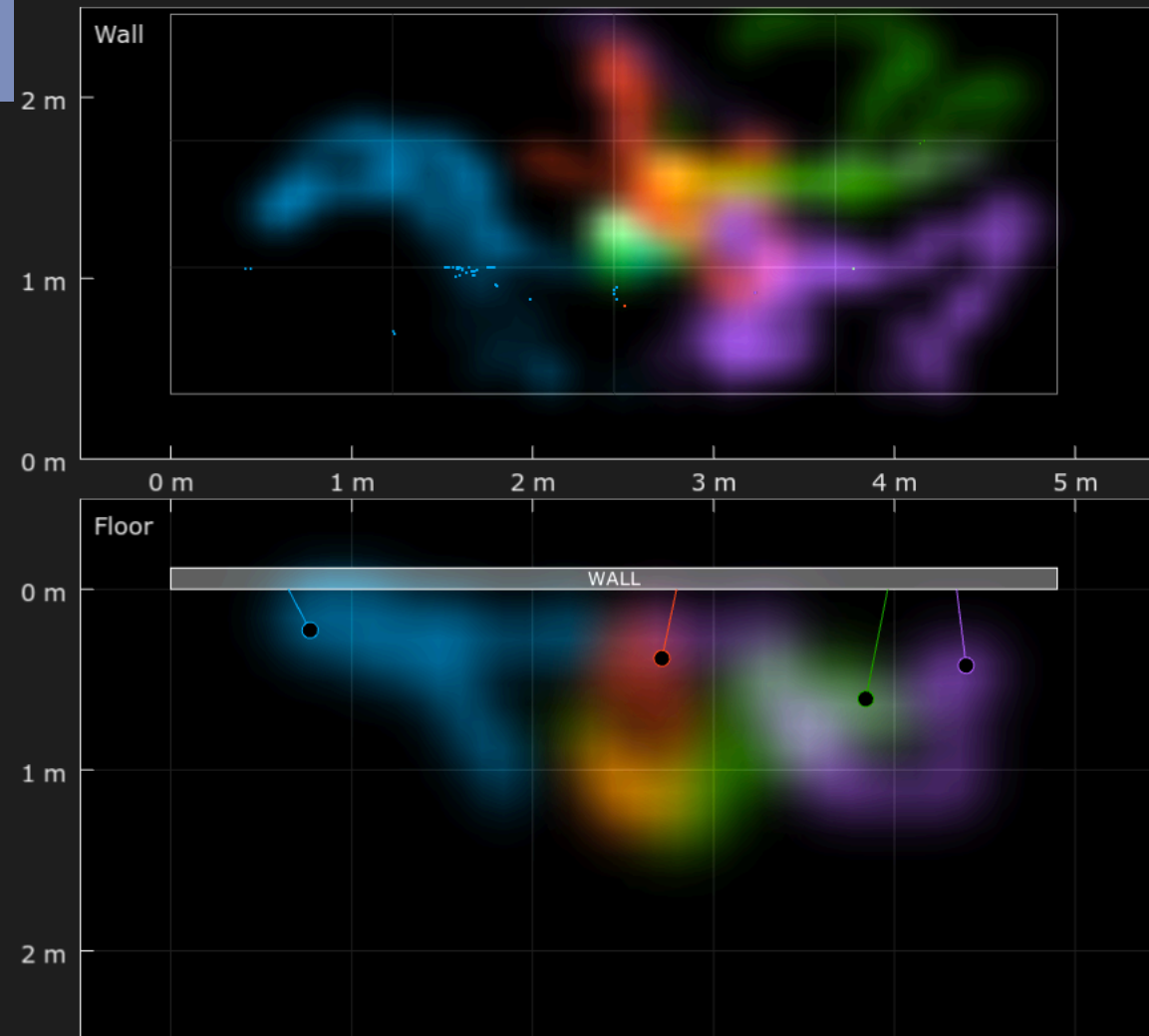
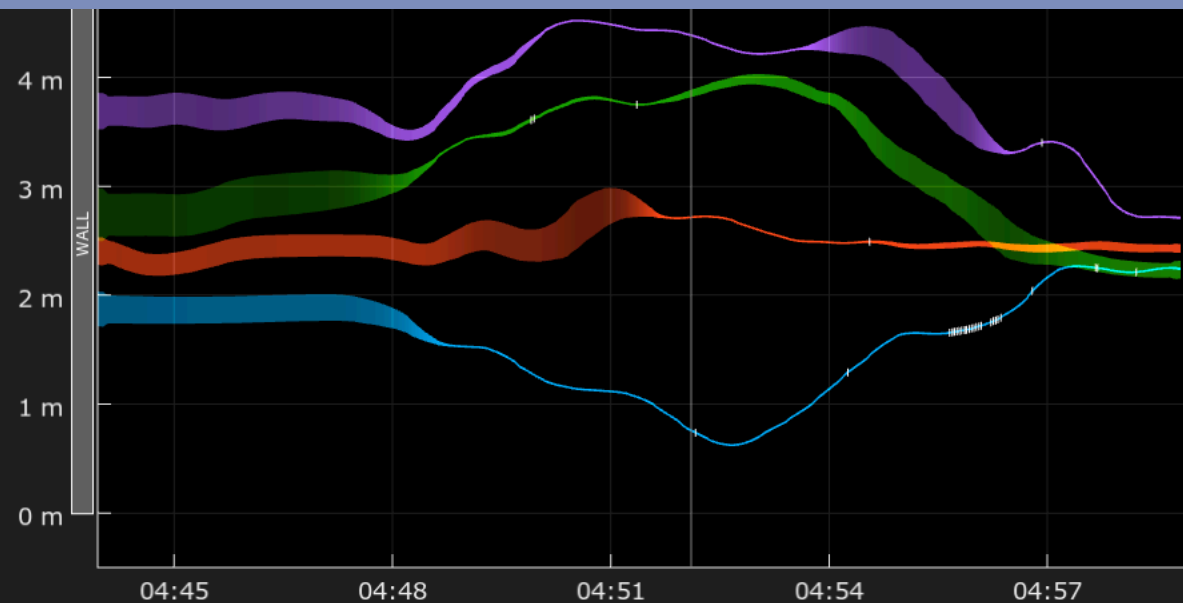
VCode and VData
[Hagedorn et al., 2008]

Tabletop Visualization Toolkits



VisTaCo
[Tang et al., 2010]

Group Interaction Analysis Toolkit GIANt



User 1
User 2

Movement
(meters/min)
28.56

Avg. dist from wall
(meters)
1.89

Touches/min
203

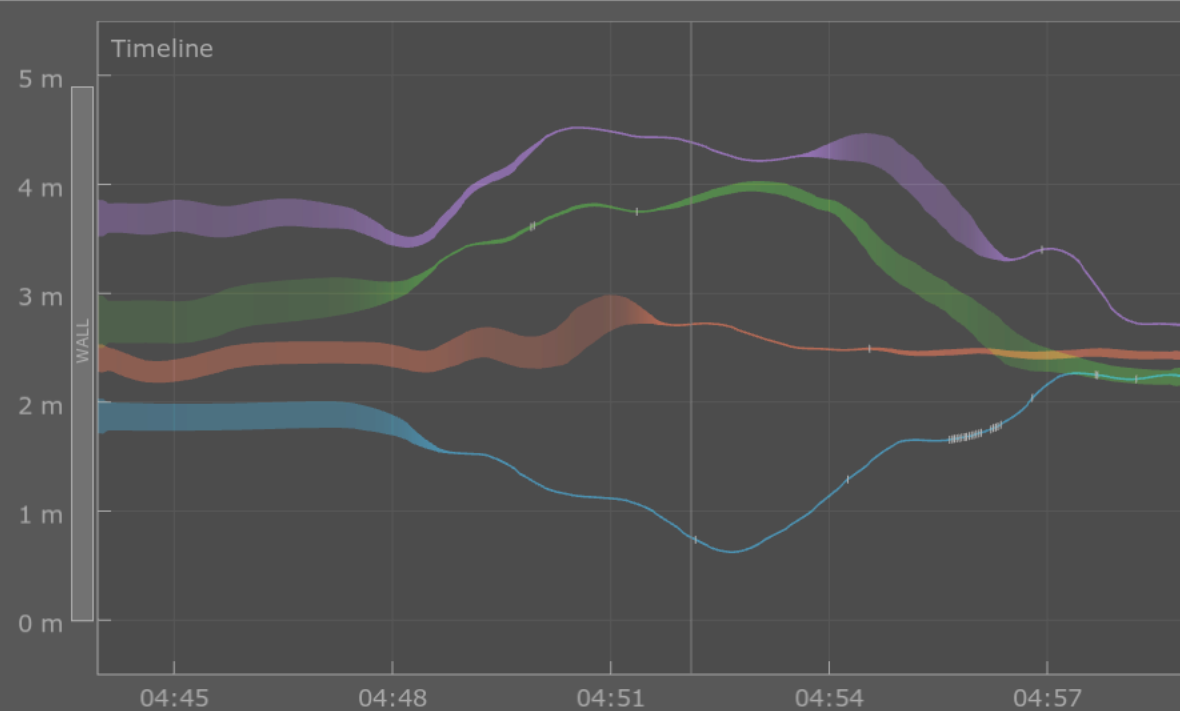
git repository: <https://github.com/imldresden/GIANt>

Time range

Current time: 04:52

0:00

05:53



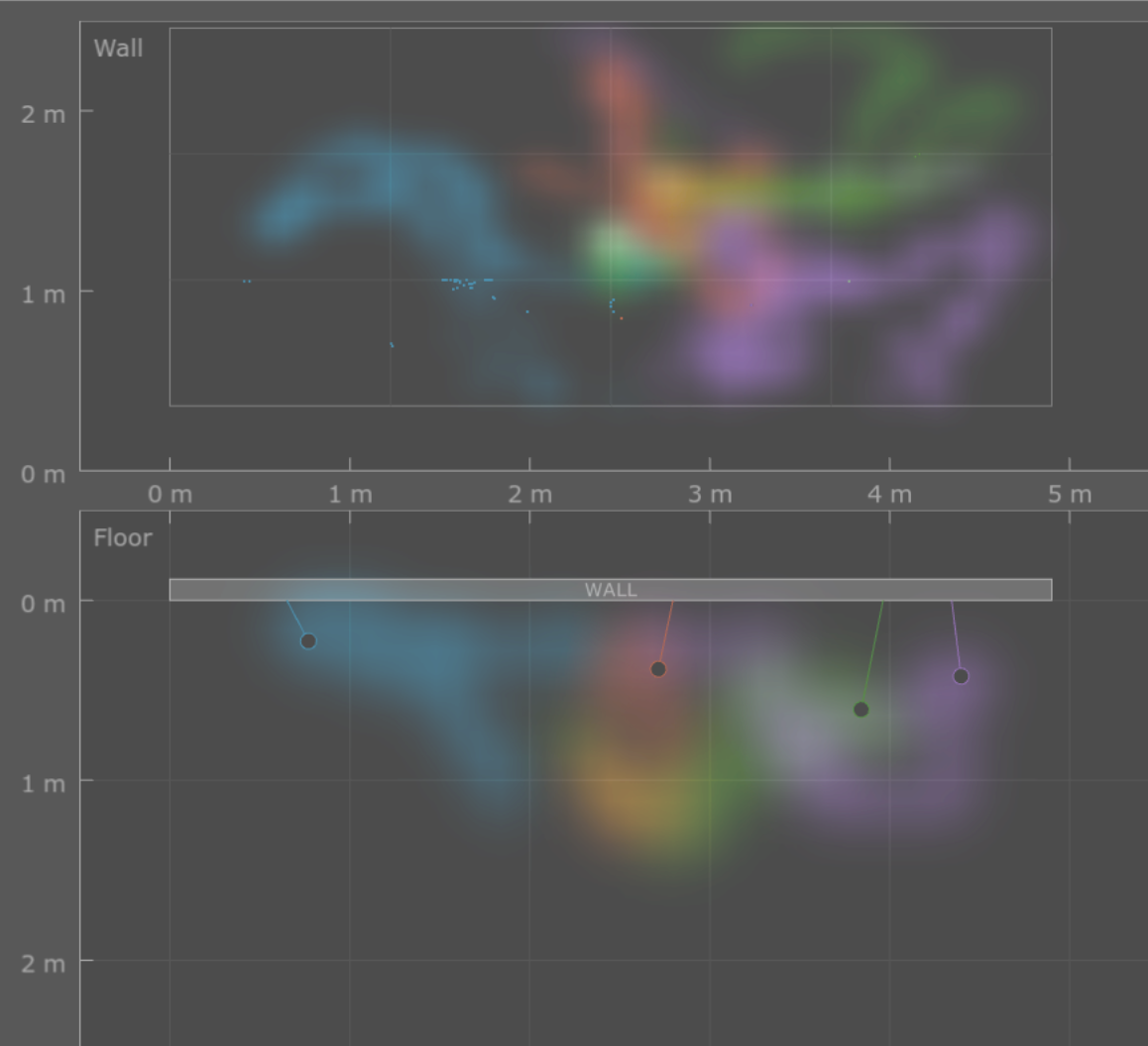
Time Slider

Time range

0:00

Current time: 04:52

05:53



User 1

User 2

User 3

User 4

Movement
(meters/min)

28.56

0.0

Avg. dist from wall
(meters)

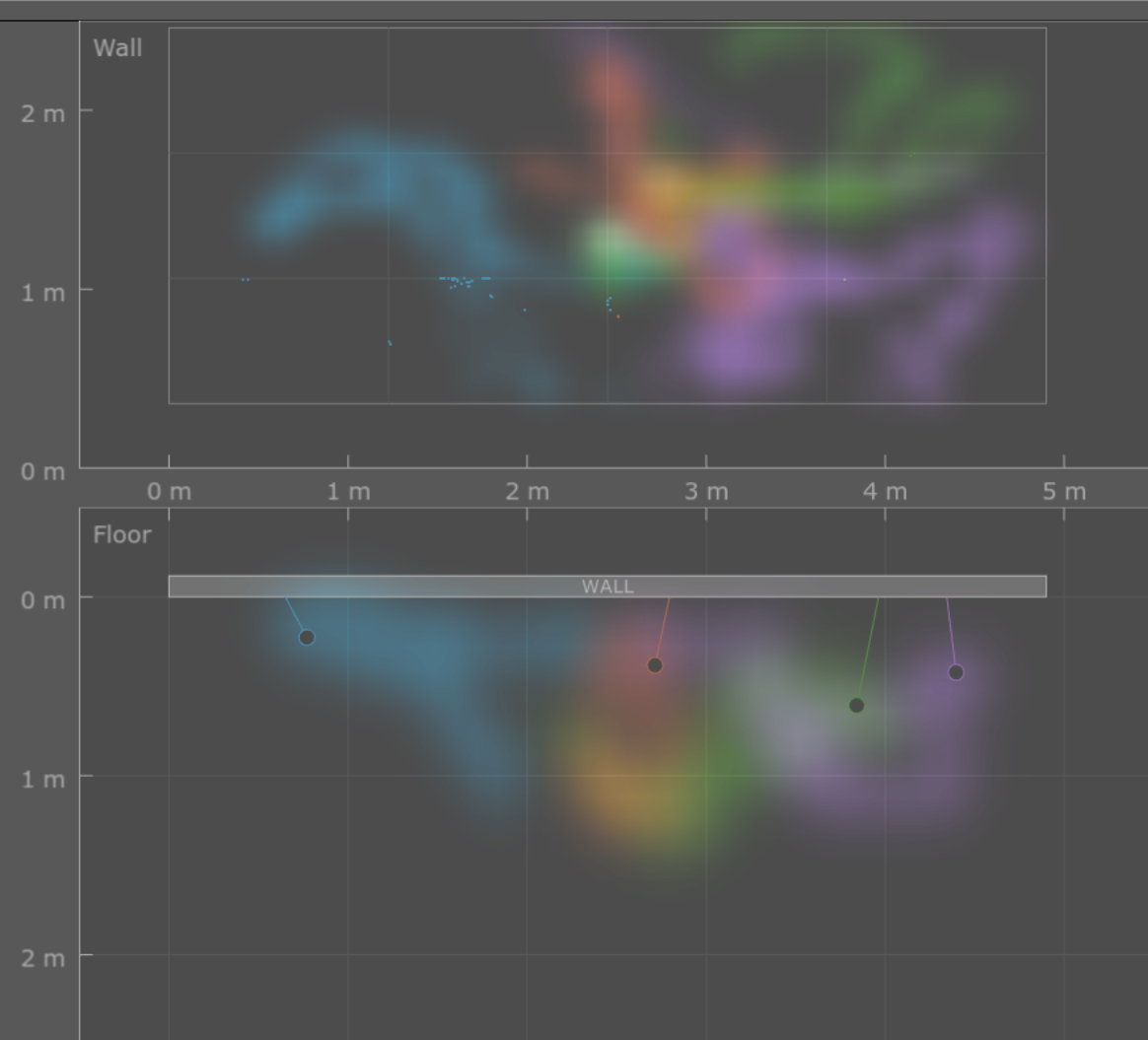
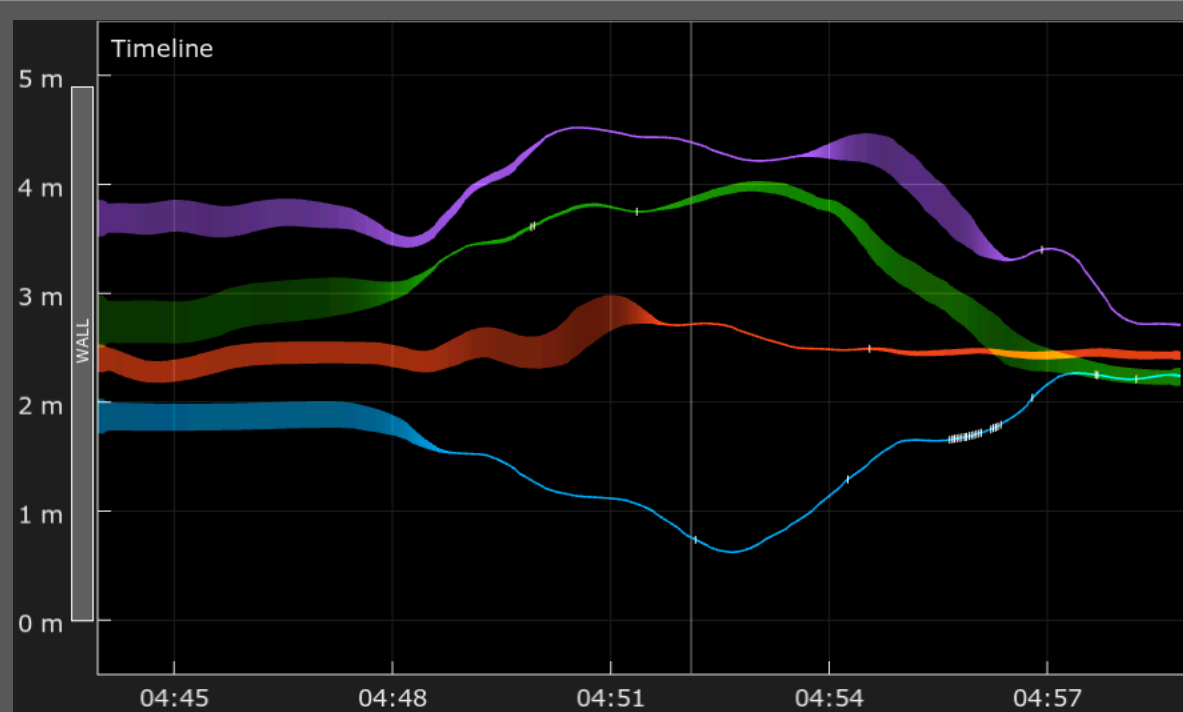
1.89

0.0

Touches/min

203

0



Timeline View



- User 1
- User 2
- User 3
- User 4

Movement
(meters/min)
28.56

Avg. dist from wall
(meters)
1.89

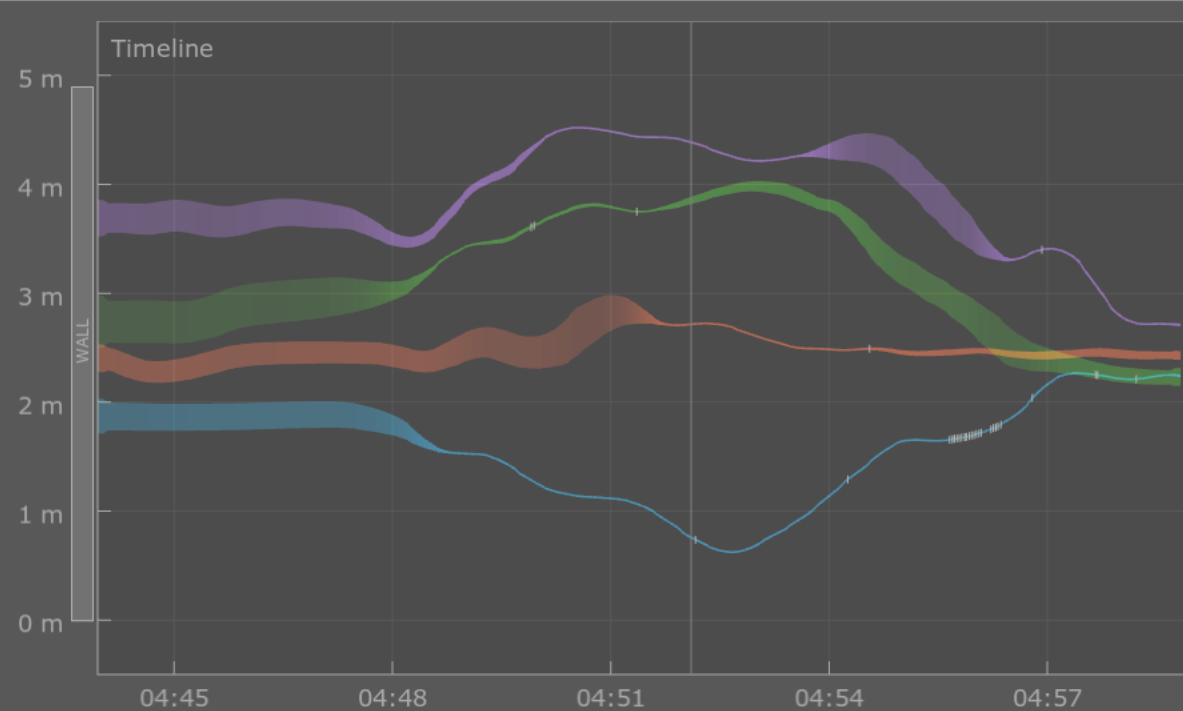
Touches/min
203

Time range

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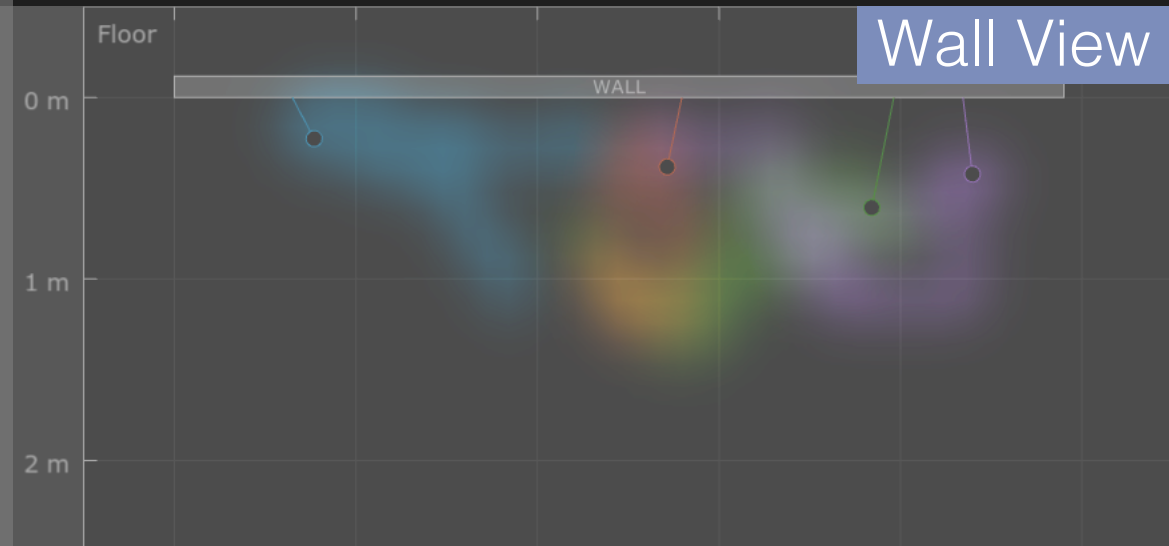
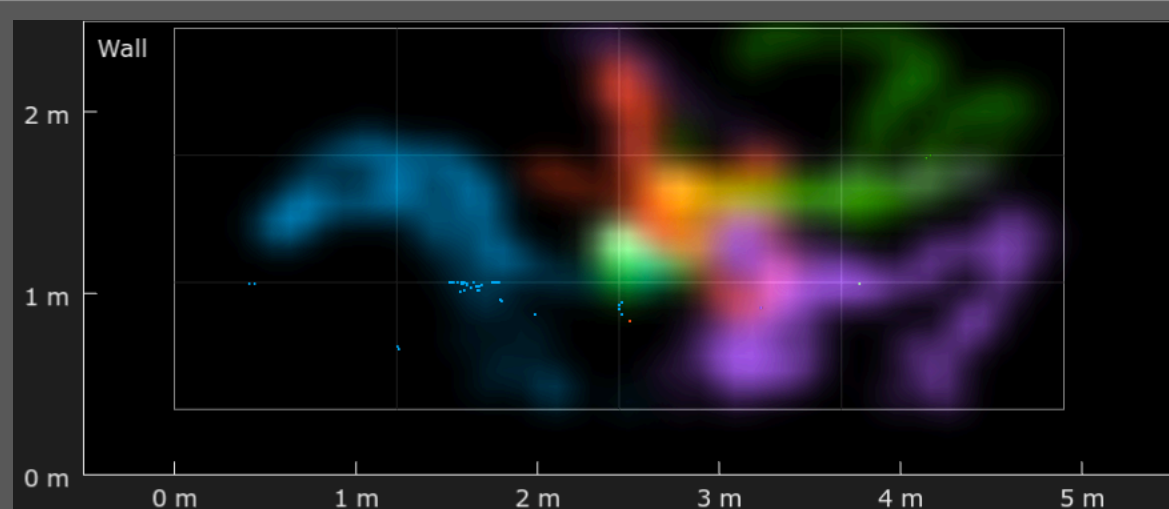
0:00

05:53



Time range

0:00



User 1

User 2

User 3

User 4

Movement
(meters/min)

28.56

0.0

Avg. dist from wall
(meters)

1.89

0.0

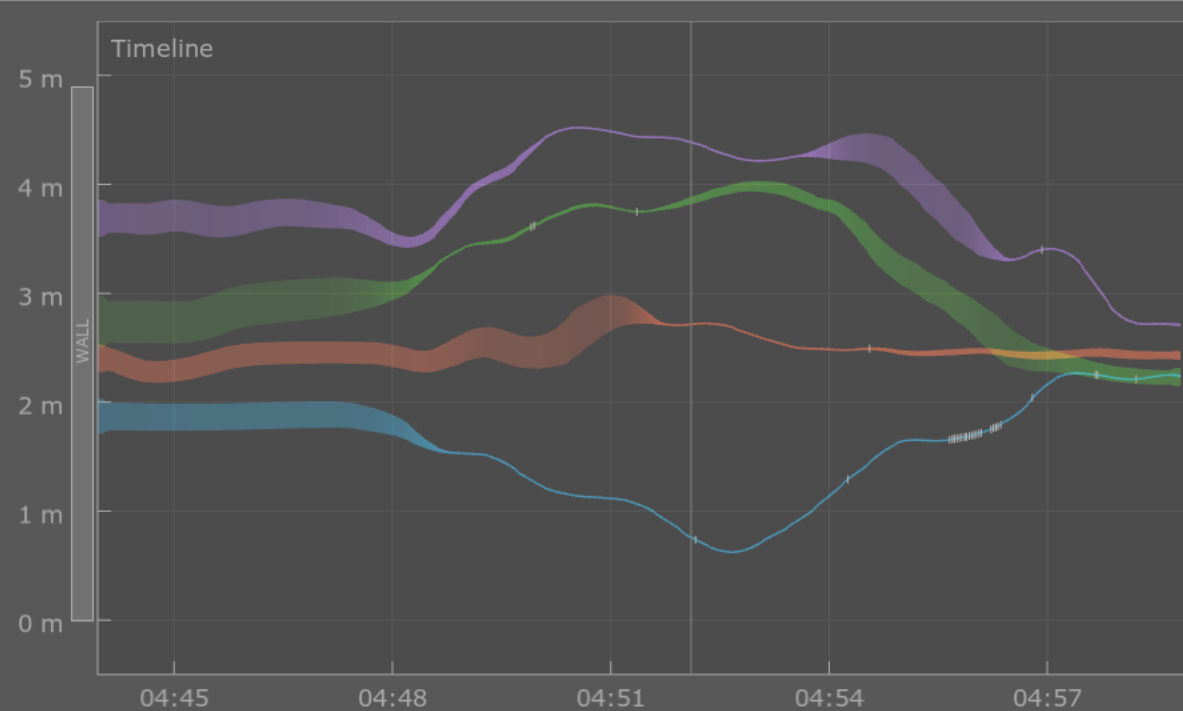
Touches/min

203

0

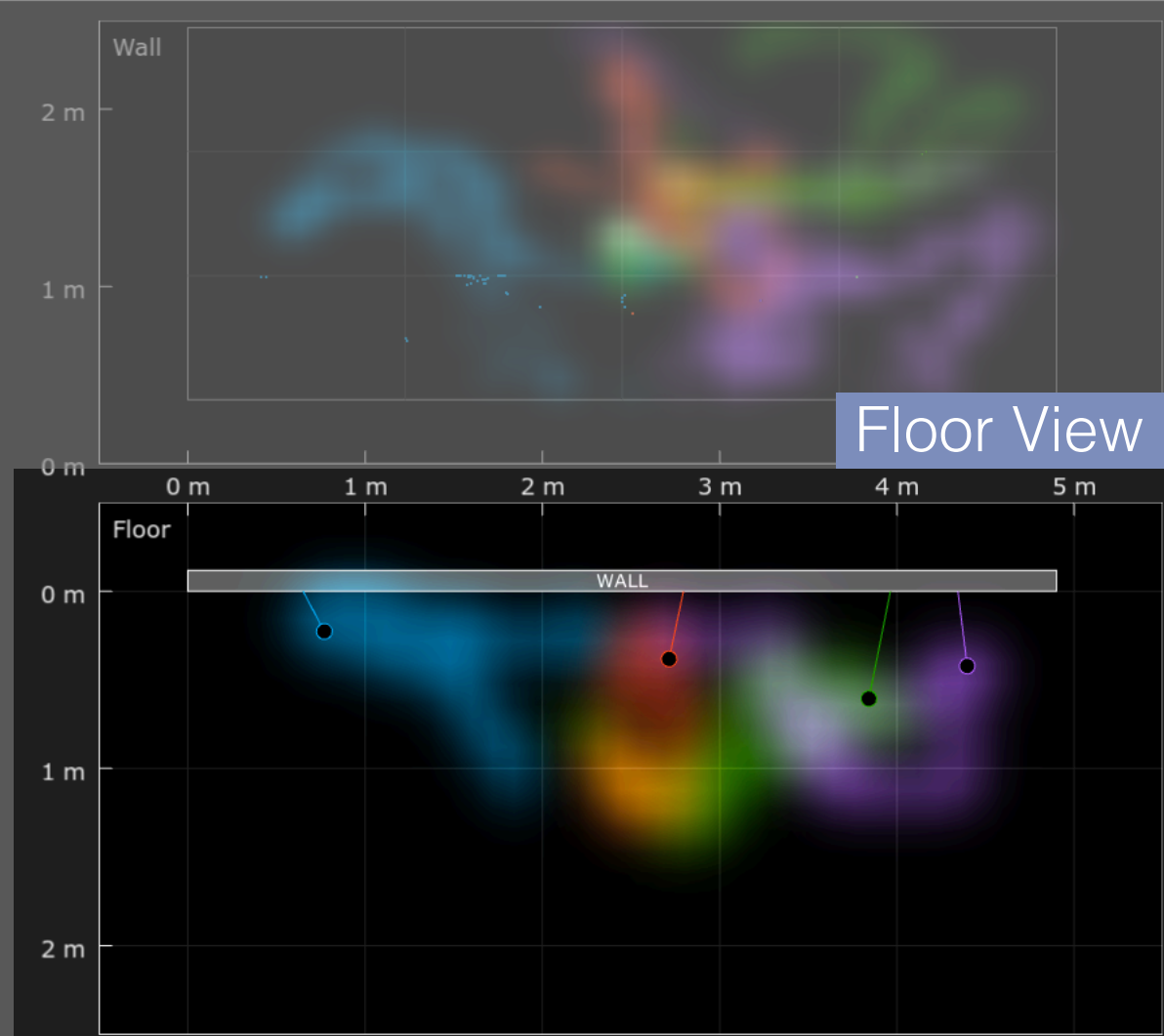
Current time: 04:52

05:53



Time range

0:00



User 1

User 2

User 3

User 4

Movement
(meters/min)

28.56

0.0

Avg. dist from wall
(meters)

1.89

0.0

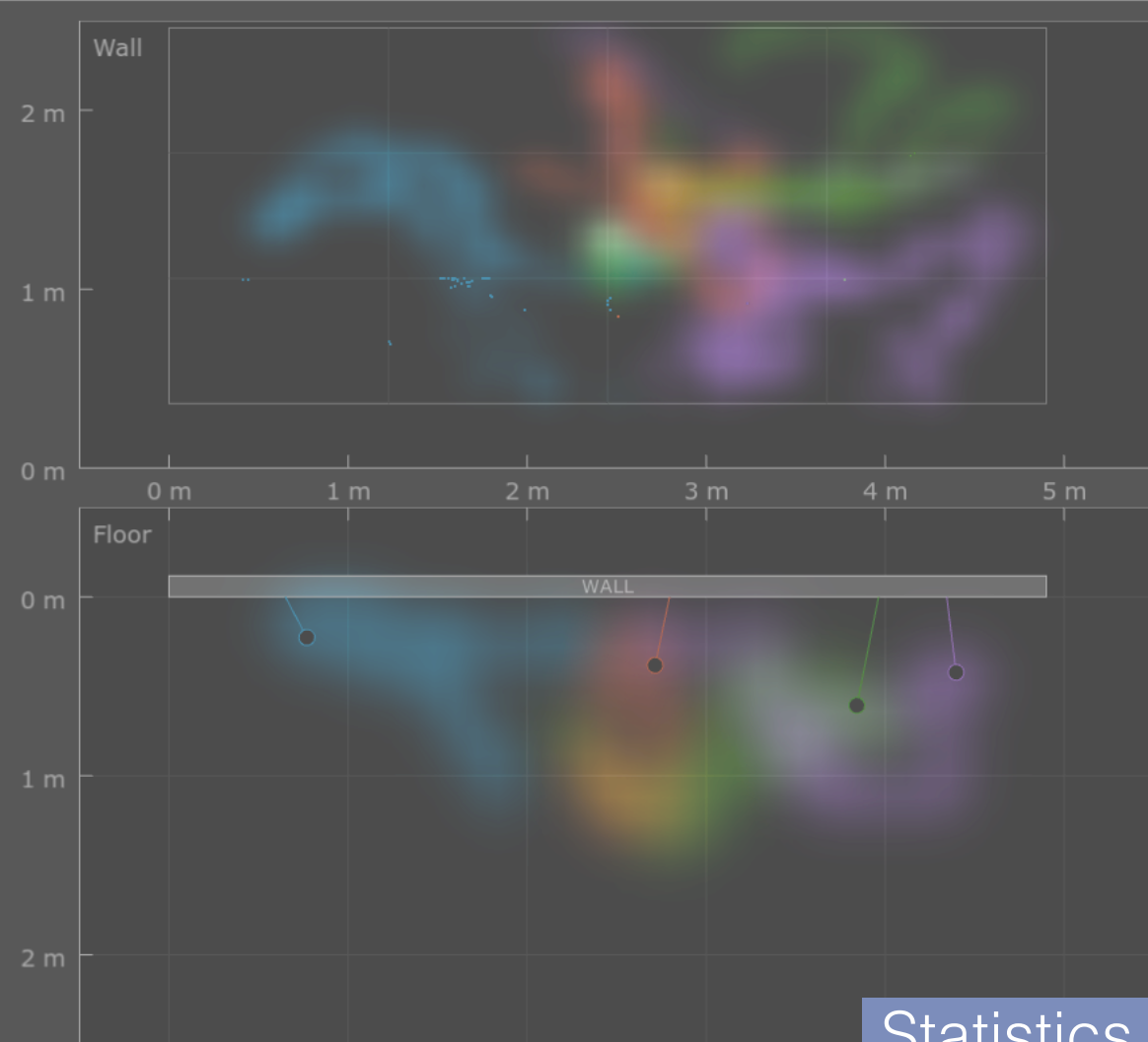
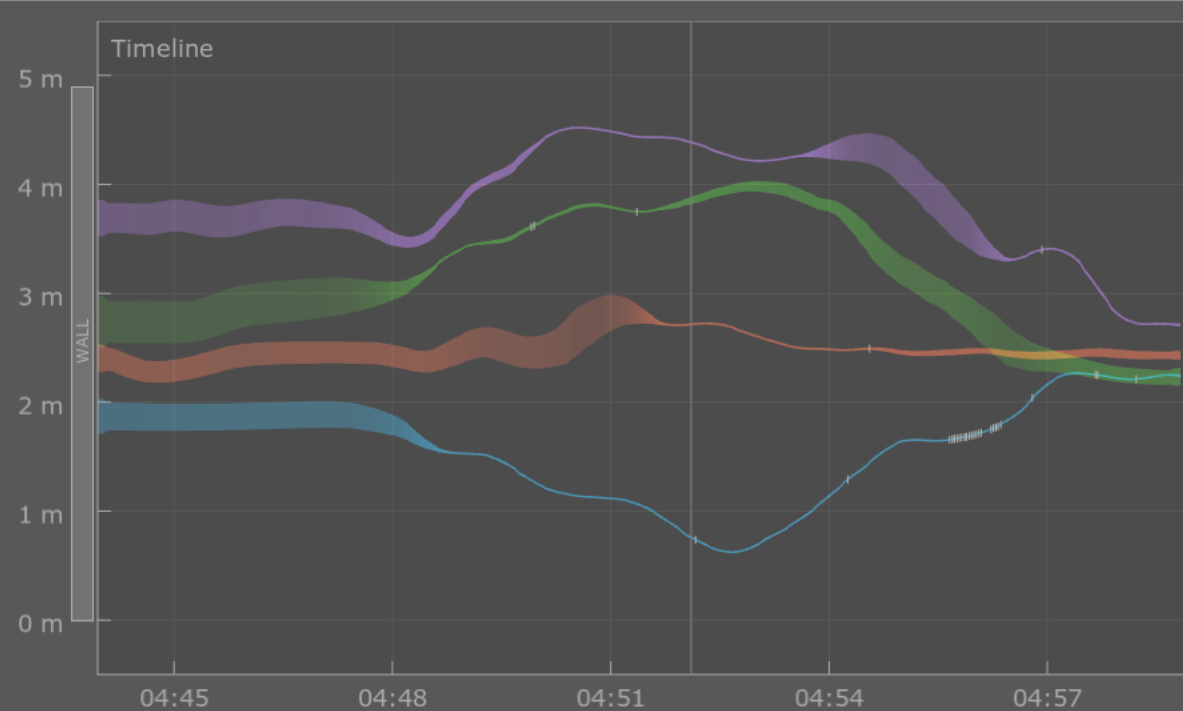
Touches/min

203

0

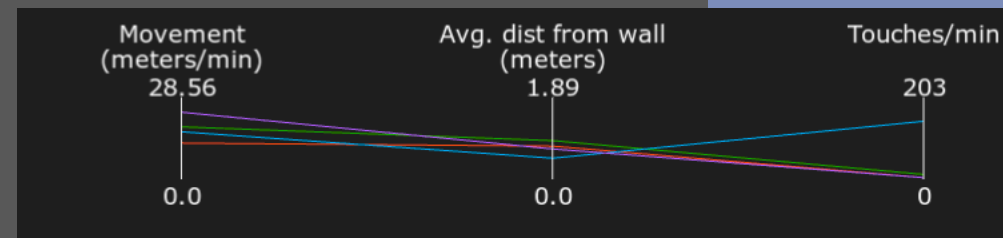
Current time: 04:52

05:53



Statistics

- User 1
- User 2
- User 3
- User 4



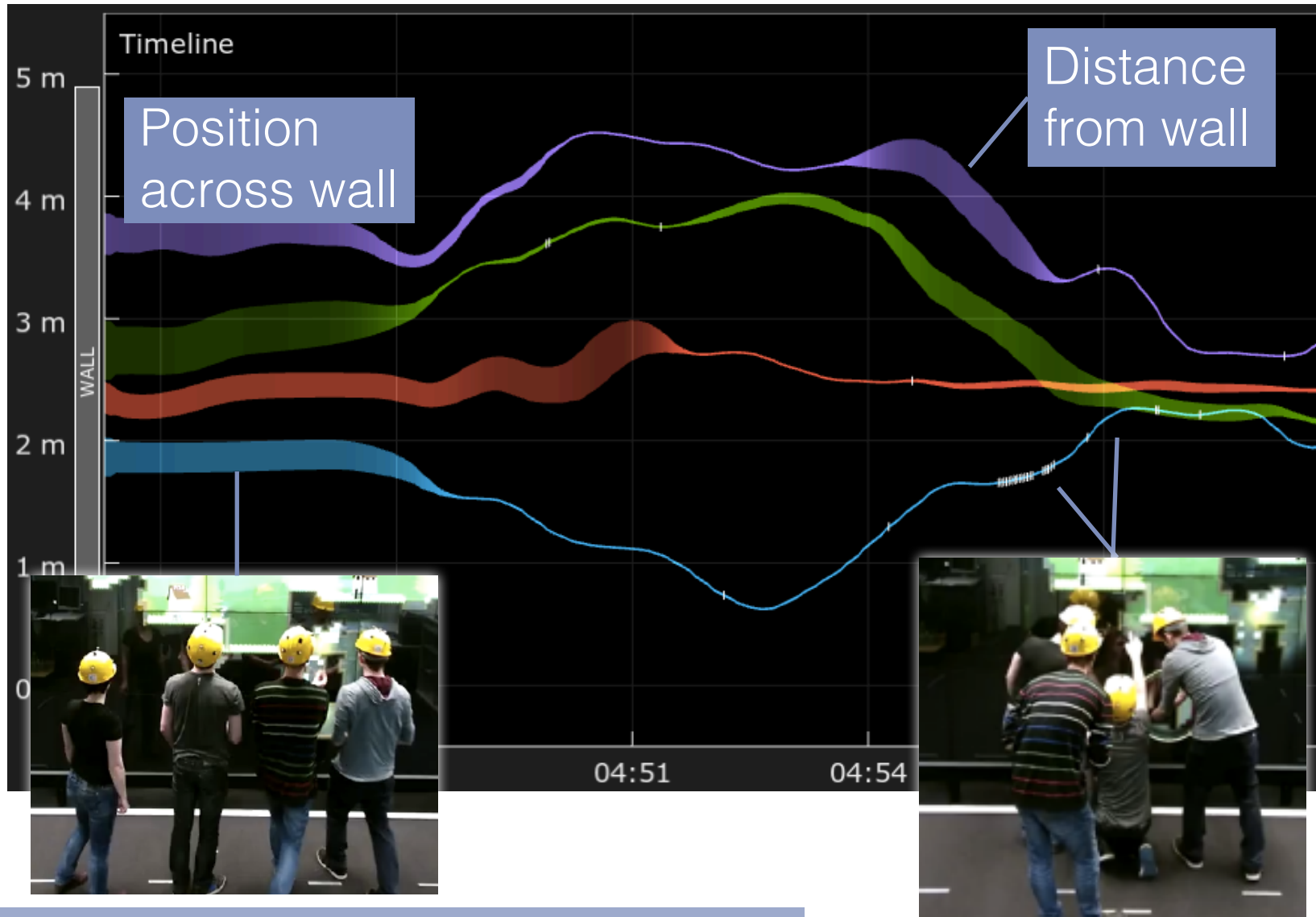
Time range

Current time: 04:52

0:00

05:53

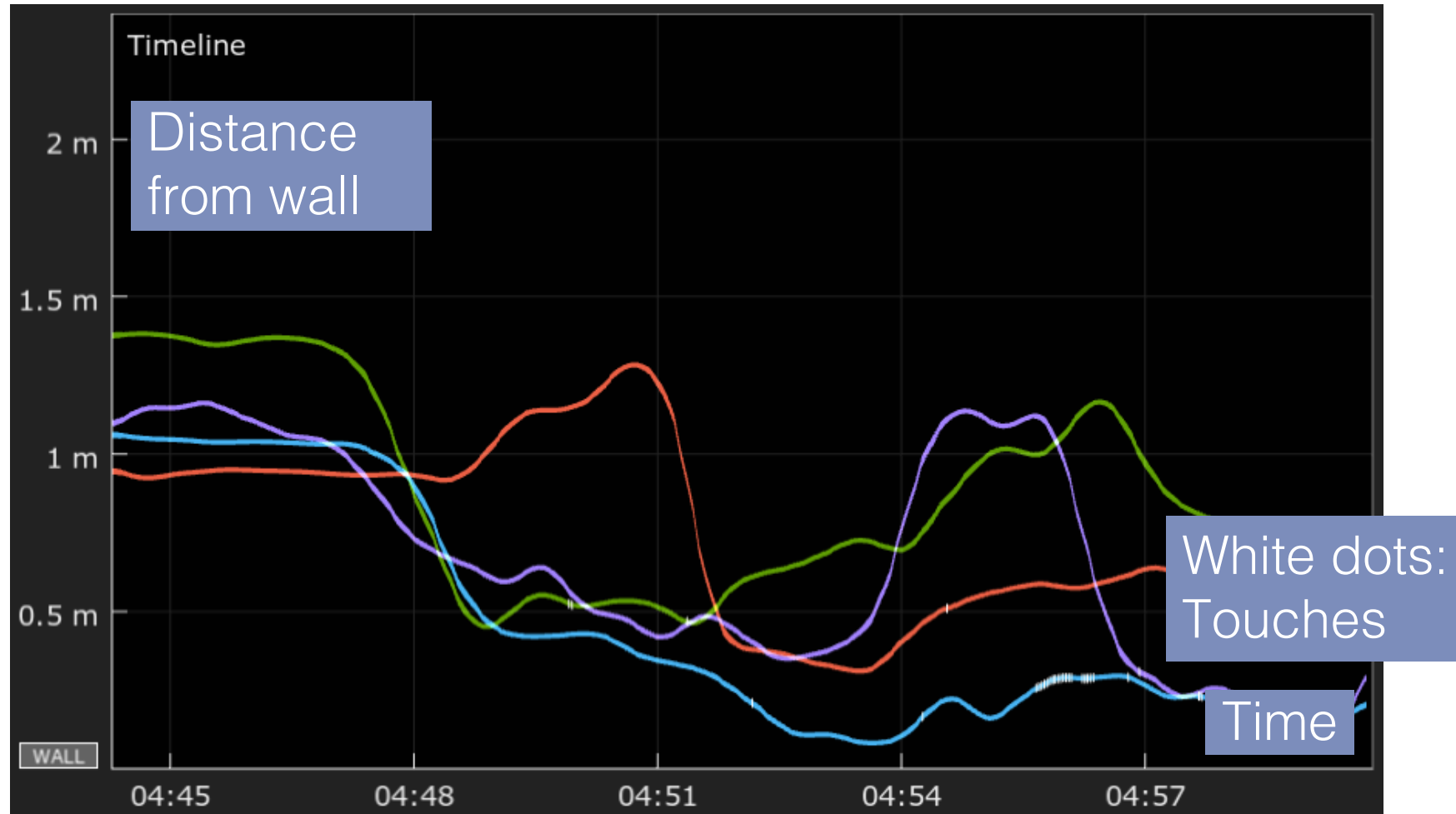
Visualizations: Timeline View



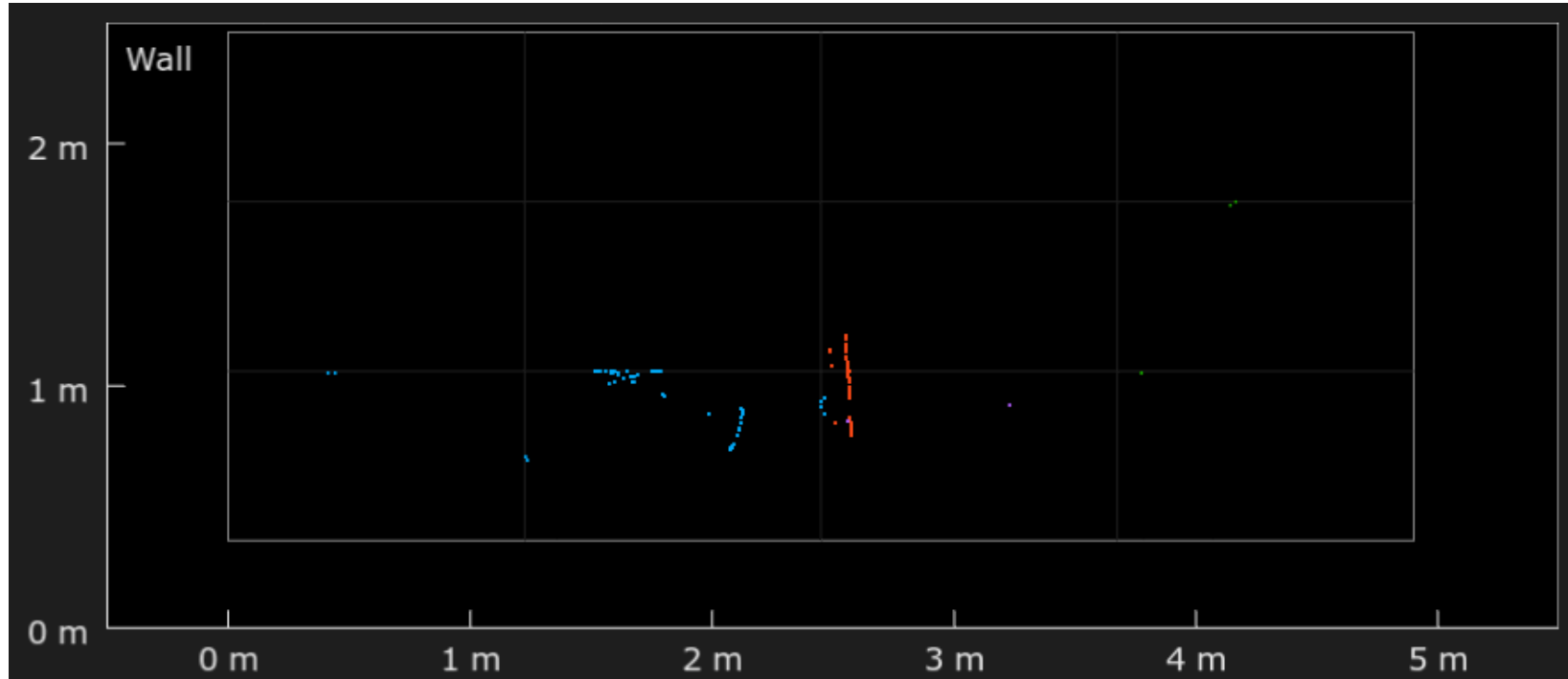
Colors

- L*C*h Color Space
- Different hues
- Equal perceptual brightness

Visualizations: Alternative Timeline



Visualizations: Wall View

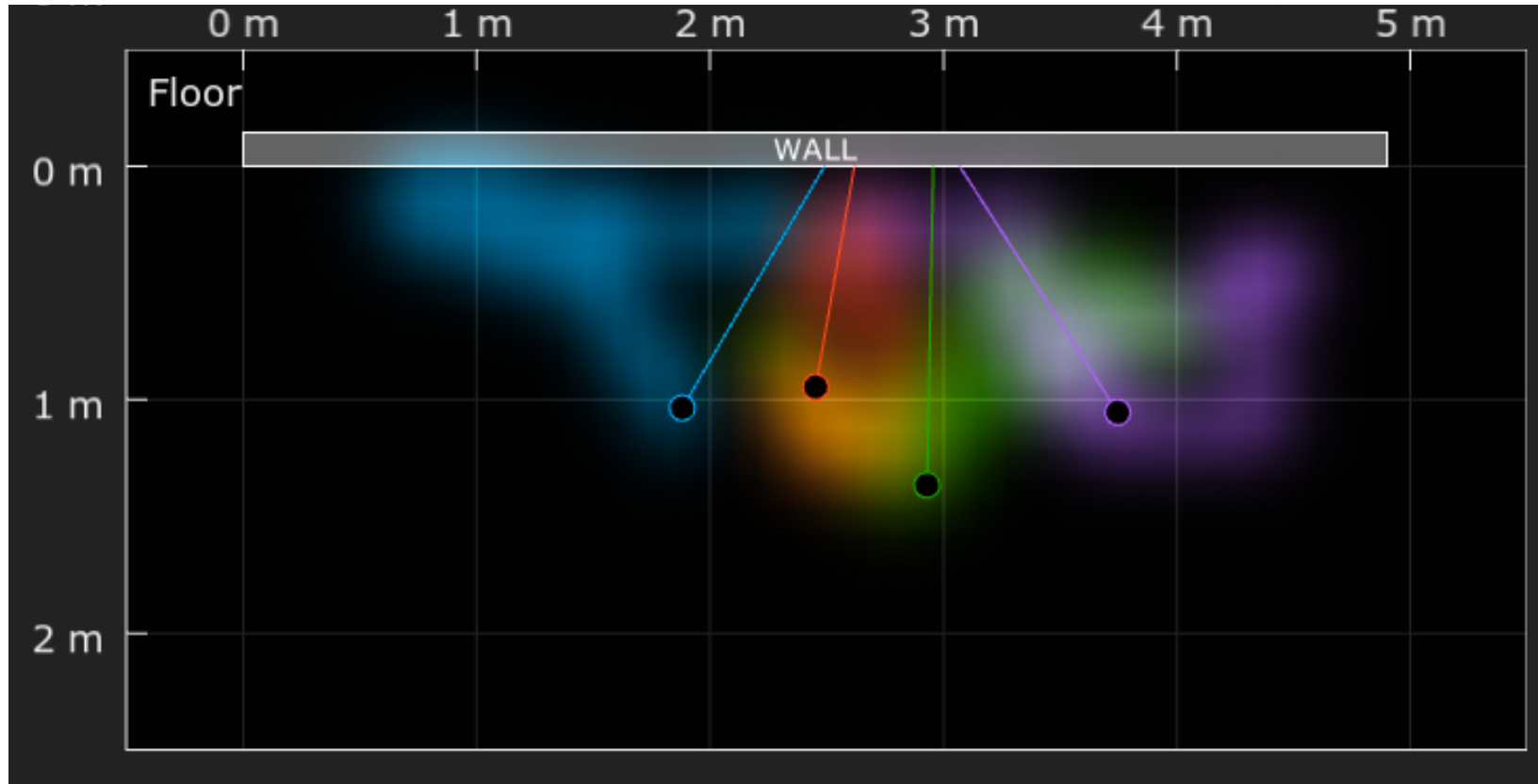


- Color-coded heat map of gaze points
- Scatterplot of touches

Colors

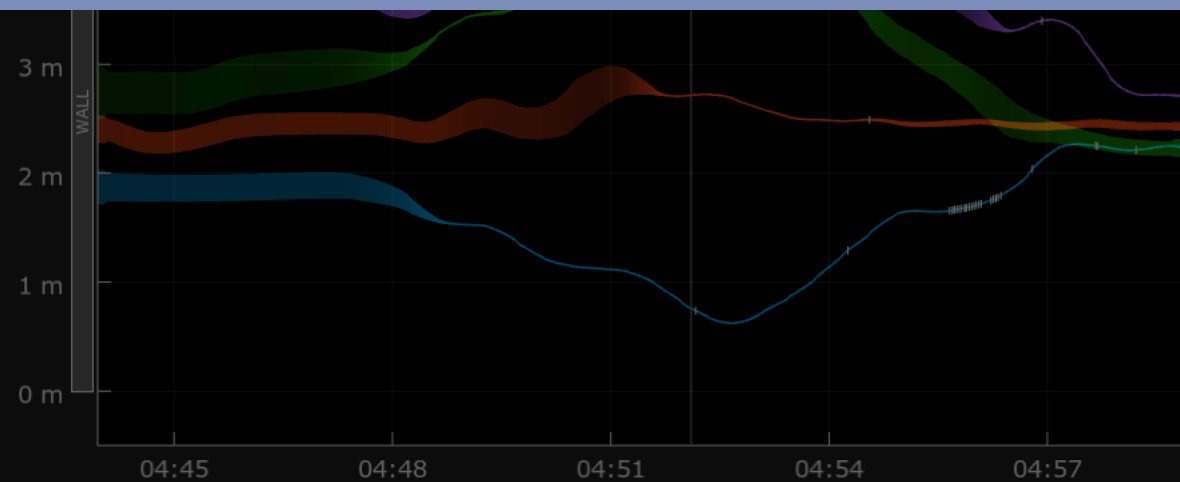
- Additive blending
- Regions with overlapping gaze are brighter

Visualizations: Floor View



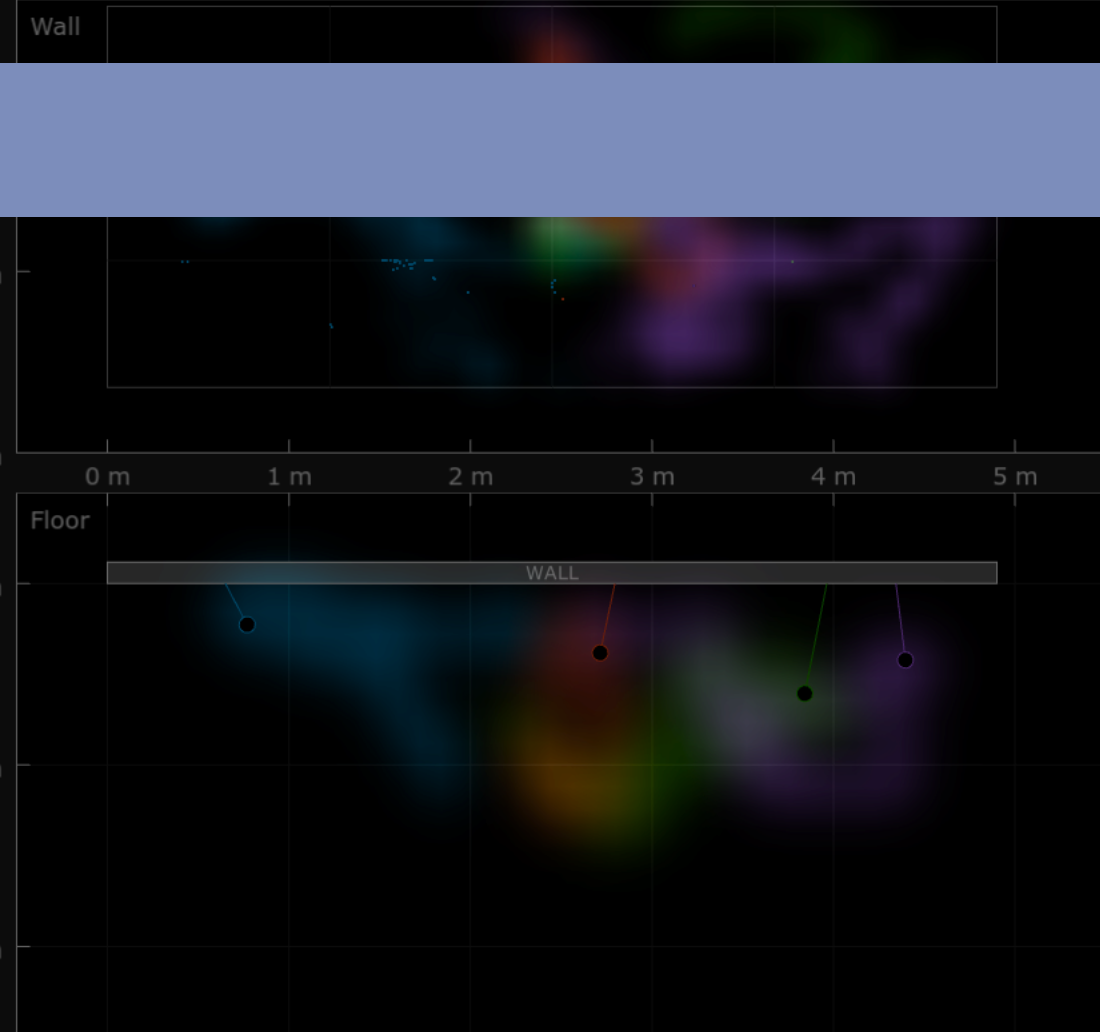
- Heat map of user positions
- Current positions as dots, viewpoints as lines

Live Demo



Time range

0:00



User 1

User 2

User 3

User 4

Movement
(meters/min)

28.56

0.0

Avg. dist from wall
(meters)

1.89

0.0

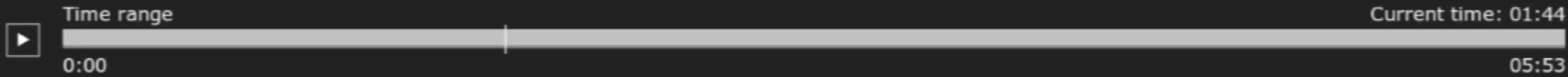
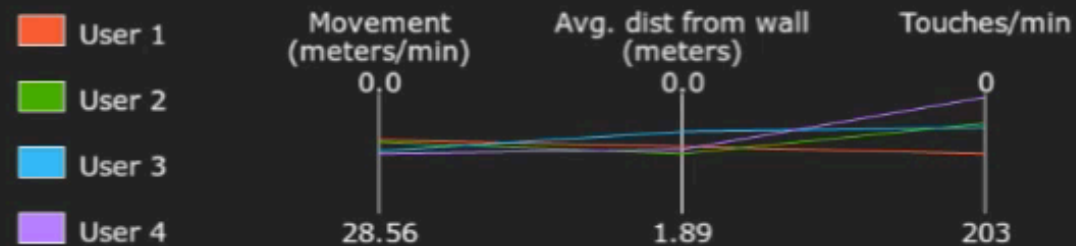
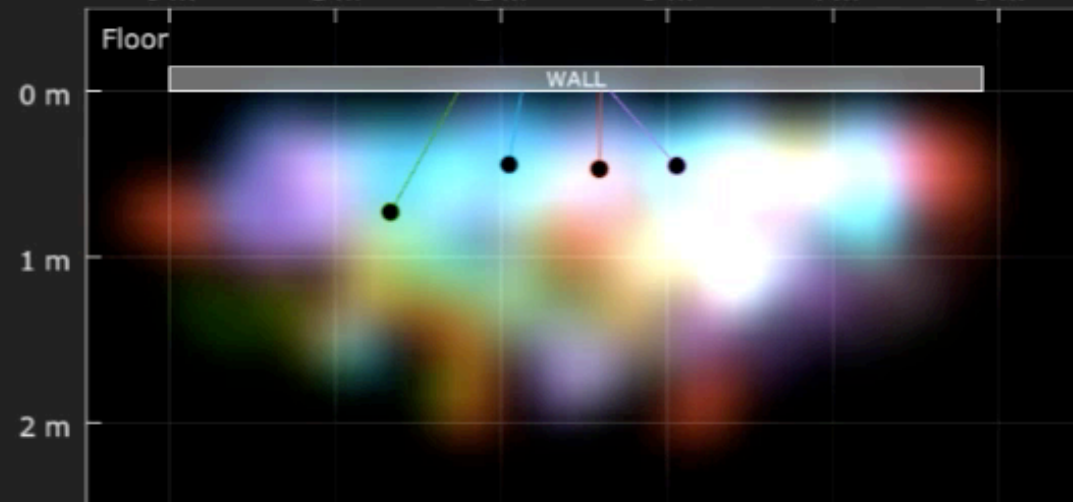
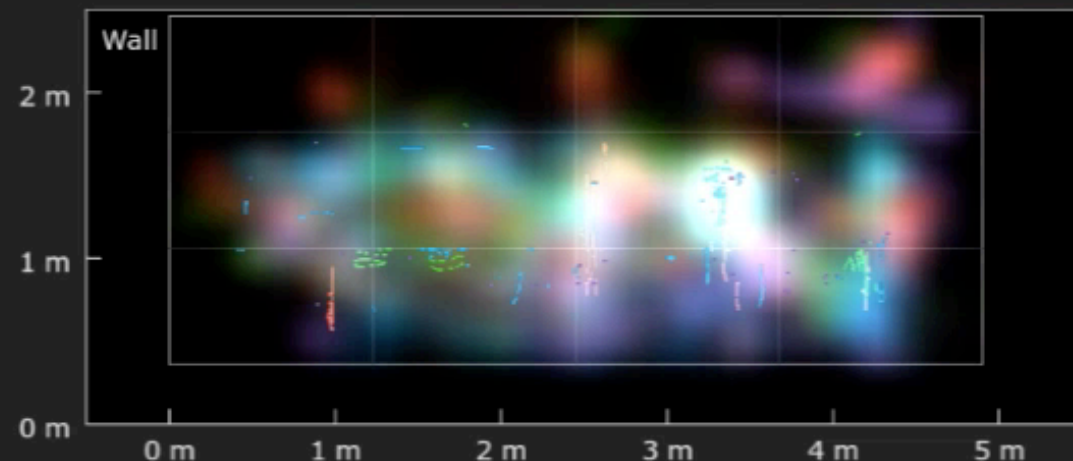
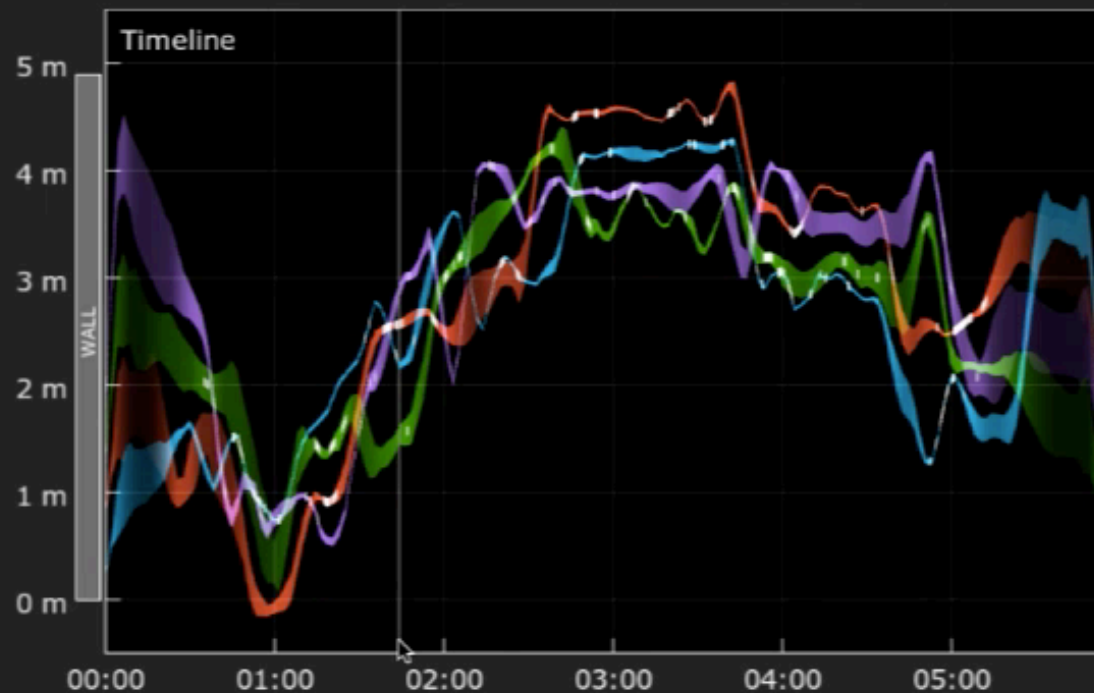
Touches/min

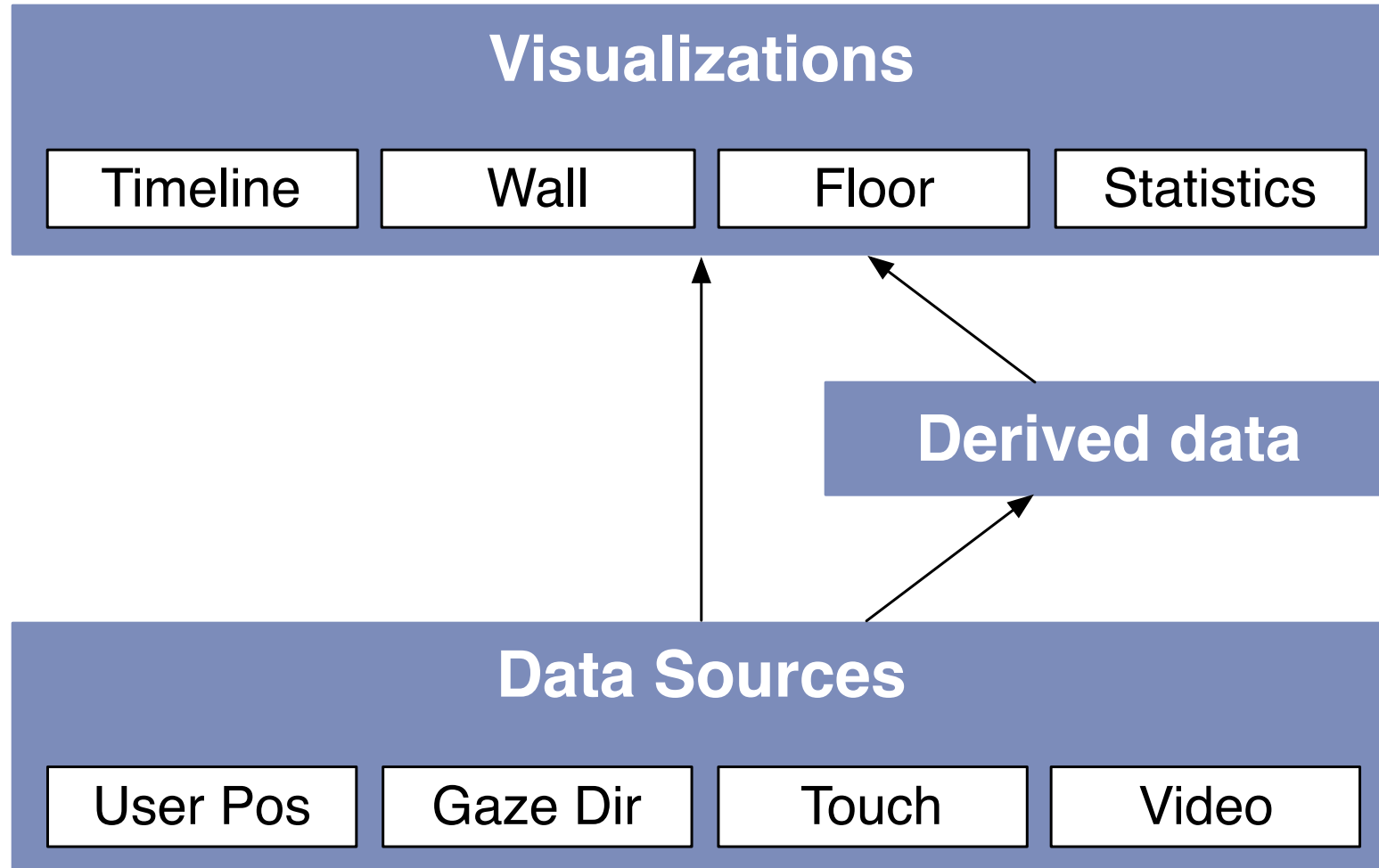
203

0

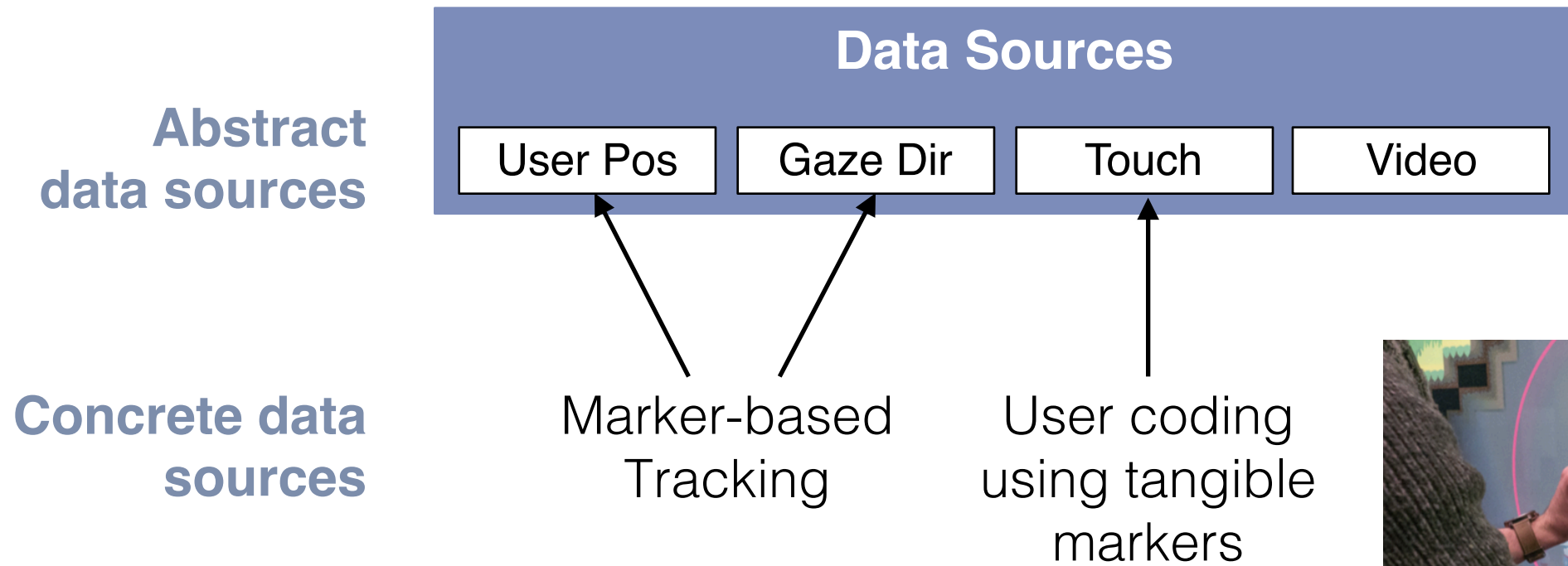
Current time: 04:52

05:53





GIAnT System Design



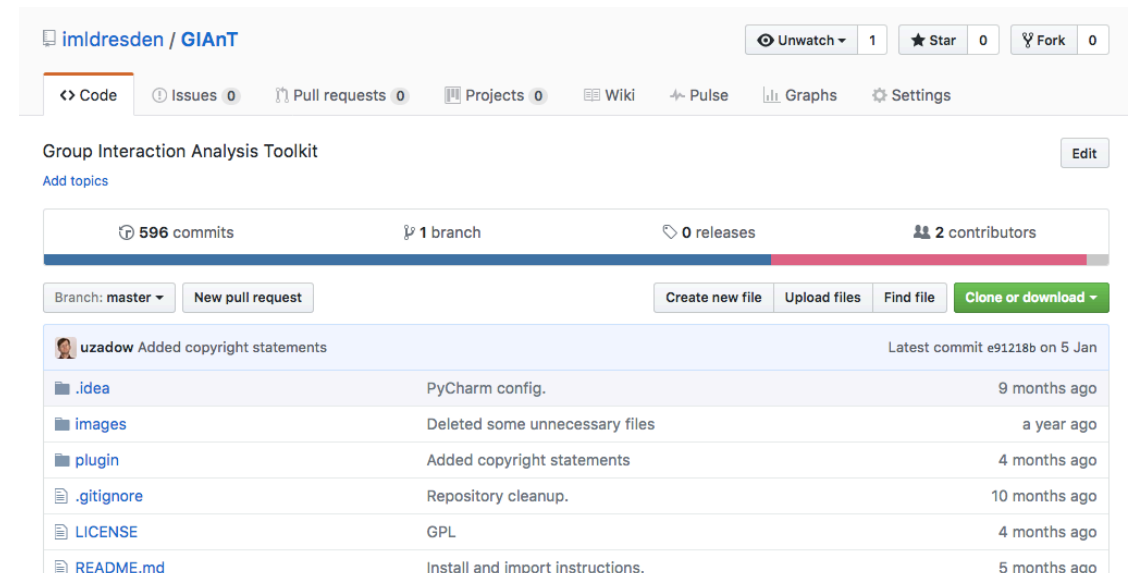
GIAnT System Design

Technologies

- Python/libavg
- SQLite database
- C++ visualizations for speed
- Preprocessor script

Open Source

- <https://github.com/imldresden/GIAnT>
- GPL license
- Any issues? Contact us!



imldresden / GIAnT

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Group Interaction Analysis Toolkit Edit

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596 commits 1 branch 0 releases 2 contributors

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uzadow Added copyright statements		Latest commit e91218b on 5 Jan
.idea	PyCharm config.	9 months ago
images	Deleted some unnecessary files	a year ago
plugin	Added copyright statements	4 months ago
.gitignore	Repository cleanup.	10 months ago
LICENSE	GPL	4 months ago
README.md	Install and import instructions.	5 months ago

Set of Visualizations for Wall Interaction Analysis

- Shows user interaction over configurable **time periods**
- Intelligent **dimensional mapping**
- Supports relevant **research topics**

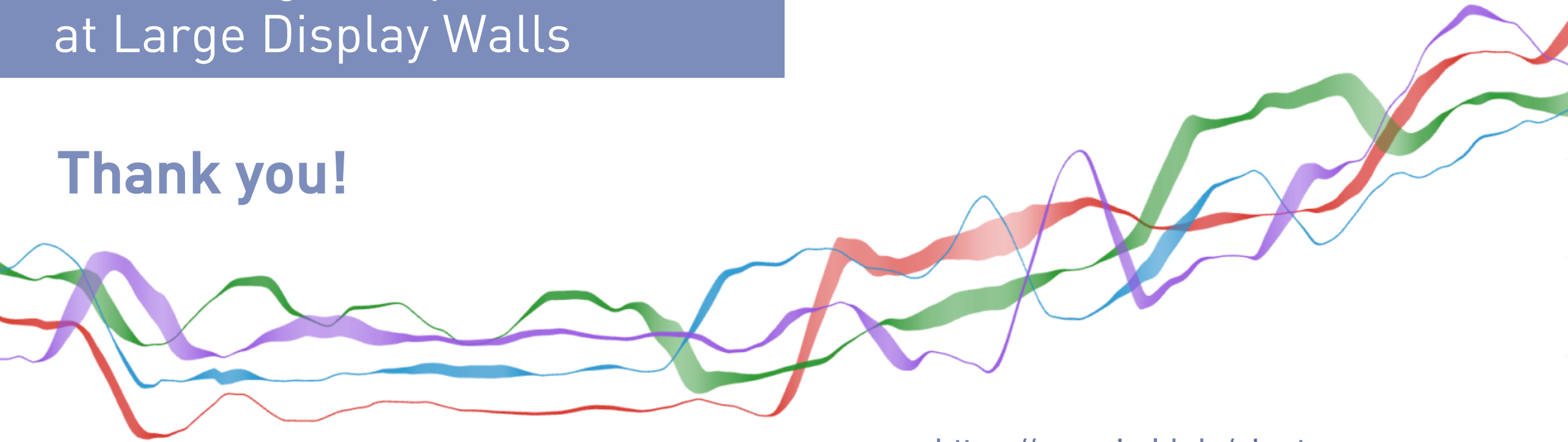
Group Interaction Analysis Toolkit GIAnT

- **Open Source**
- **Expandable** to new visualizations, data sources, derived data

GIAnT:

Visualizing Group Interaction
at Large Display Walls

Thank you!



<https://www.imld.de/giant>
<https://github.com/imldresden/GIAnT>

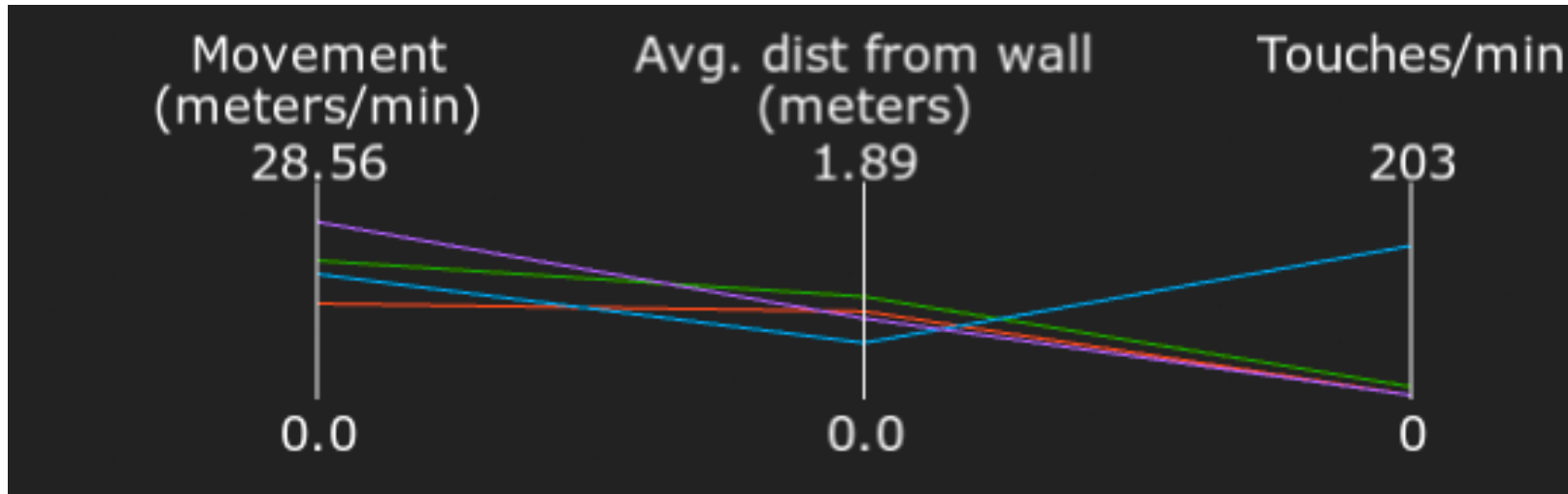
Contact: Ulrich von Zadow
ulrich.zadow@tu-dresden.de



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References

Visualizations: Statistics View



- Shows derived data
- Parallel coordinates emphasize correlations
- Candidate for expansion

...

Extrafolien:

- Research topics
- ...

Visualizations: Colors

- Colors determined in L^*C^*h space.
- Users differentiated by hue, equal perceptual brightness and distance.
- Lightness available to visualize other variables.
- Additive blending results in clearly visible overlaps (e.g. heatmaps)

