

Embodied Spatial Cognition in Tangible Computing

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CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI); Laboratory experiments;**

Additional Key Words and Phrases: Tangible user interfaces, tangible interaction, embodied cognition, spatial thinking, geospatial modeling

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1. INTRODUCTION

Theoretically tangible interaction should offload cognitive processes through bodily action, physical simulation, and digital computation.

Should improve spatial performance.

Research questions:

Can tangible interfaces improve spatial performance?

Which tangible analytics improve spatial performance the most?

Aim: Improve spatial performance

A comparative study of 3D spatial performance with hand modeling, digital modeling, and tangible interaction.

Two experiments.

2. METHODOLOGY

2.1. Tangible Landscape

Concept. A tangible user interface powered by open source GIS. Coupling a digital and physical model of a landscape so that you can intuitively feel and shape it with your hands. Near-real time interaction.

Evolution. An evolution of Illuminating Clay and the Tangible Geospatial Modeling System.

Design. Tangible Landscape couples a digital and a physical model through a continuous cycle of 3D scanning, geospatial modeling, and projection. Intuitive scientific

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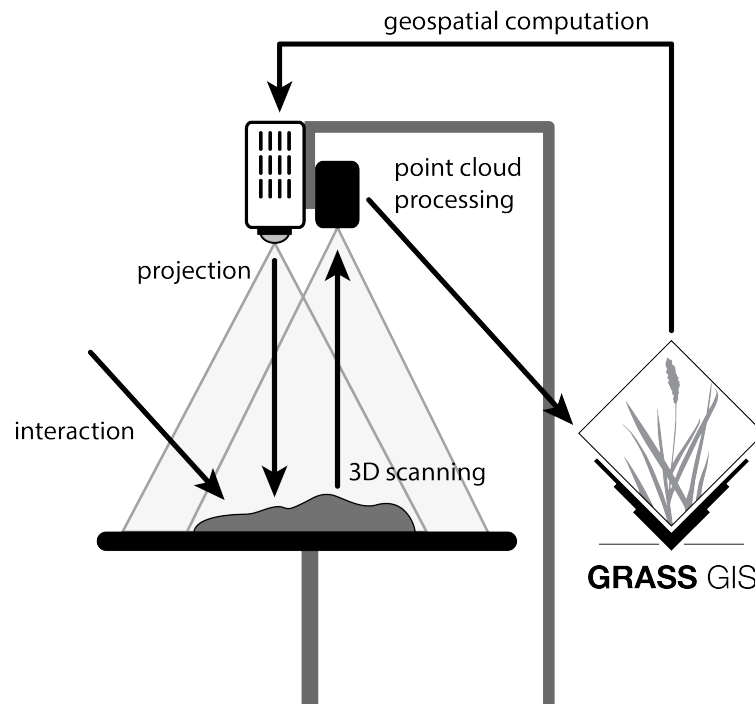


Fig. 1. Caption.

modeling with Tangible Landscape. Tangible Landscape is designed to make scientific data, models, and simulations exploratory, engaging, and fun.

Figure 1 ...

Modes of interaction.

Applications.

2.2. Coupling experiment

2.3. Analytics experiment

2.4. Case studies

Coffee & Viz. Scientific gaming: Structured problem solving with rules, challenging objectives, and scoring

3. RESULTS

4. DISCUSSION

5. FUTURE WORK

6. CONCLUSION

APPENDIX

In this appendix ...

ELECTRONIC APPENDIX

The electronic appendix for this article can be accessed in the ACM Digital Library.

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Online Appendix to: Embodied Spatial Cognition in Tangible Computing

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