Embodied Spatial Cognition in Tangible Computing

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1. APPENDIX

Table I. Tangible interfaces for geospatial modeling

System	Typology	Interaction	GIS	User studies	Publications
Urp	Augmented architectural models	Object detection		Case studies	[Underkoffler and Ishii 1999]
					[Ishii et al. 2002]
Illuminating Clay	Augmented clay	Sculpting		Case studies	[Piper et al. 2002a]
					[Piper et al. 2002b]
					[Fielding-piper 2002]
					[Ishii et al. 2004]
					[Ratti et al. 2004]
SandScape	Augmented sandbox	Sculpting			[Ishii et al. 2004]
					[Ratti et al. 2004]
XenoVision Mark III Dynamic Sand Table	Actuated pin table	Sculpting			
Northrop Grumman Terrain Table	Actuated pin table	Sculpting			
Tangible Geospatial Modeling System	Augmented clay	Sculpting	✓	Case studies	[Mitasova et al. 2006]
					[Tateosian et al. 2010]
Relief	Actuated pin table	Sculpting			[Leithinger and Ishii 2010]
					[Leithinger et al. 2009]
Recompose	Actuated pin table	Sculpting			[Leithinger et al. 2011]
		Gesture			[Blackshaw et al. 2011]
Collaborative Design Platform	Augmented architectural models	Object detection			[Schubert et al. 2012]
		Touch			[Schubert et al. 2011a]
		Sketching			[Schubert et al. 2014]
					[Schubert et al. 2015]
Tangible CityScape	Actuated pin table	Gesture			
Inform	Actuated pin table	Sculpting			[Follmer et al. 2013]
		Gesture			
		Object detection			
SandyStation	Augmented sandbox	Sculpting			

Table II. Tangible interfaces for geospatial modeling

System	Typology	Interaction	GIS	User studies	Publications
Augmented Reality Sandbox	Augmented sandbox	Sculpting			[Reed et al. 2014]
		Gesture			
Tangible Landscape	Augmented sandbox	Sculpting	✓	Case studies	[Petrasova et al. 2014]
		Object detection		User experiments	[Petrasova et al. 2015]
		Sketching			[Harmon et al. 2016b]
					[Harmon et al. 2016a]
The Augmented REality Sandtable (ARES)	Augmented sandbox	Sculpting			[Amburn et al. 2015]
		Gesture			

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