

# CoolPaint: Direct Interaction Painting



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## Problem

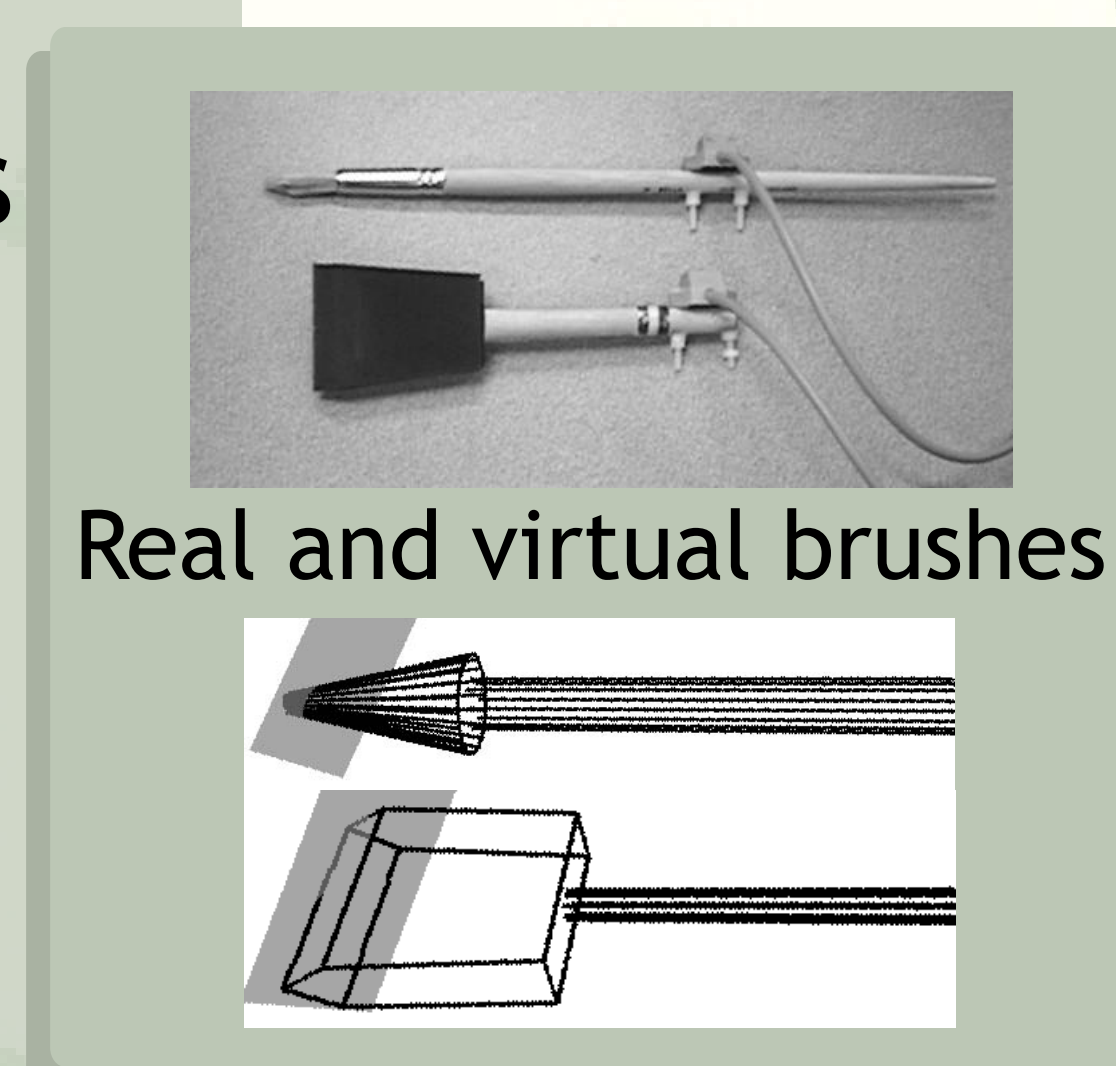
Computer drawing packages have several sources of indirection:

- One input device maps to several virtual tools, creating modes
- 2- or 3-degree-of-freedom input device controls a conceptually 6-dof virtual tool
- Spatial disconnect between input device and display

These add to the user's cognitive load.

## Approach

1. Use real paint brushes for prop-style input
  - **Props:** passive physical objects that directly manipulate virtual objects
2. Model virtual tool to match physical paint brush
3. Interact directly on display surface



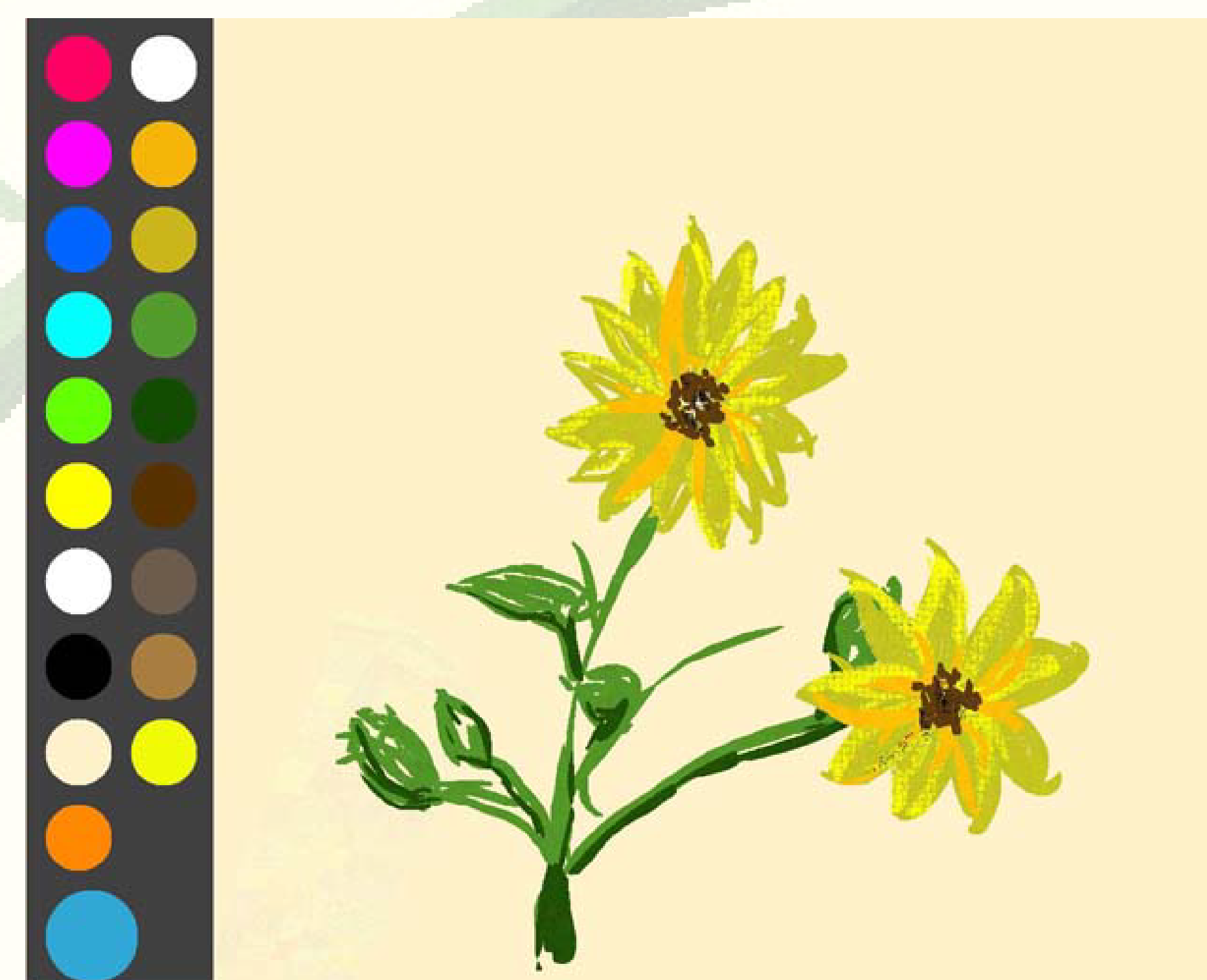
Real and virtual brushes

## Brushes

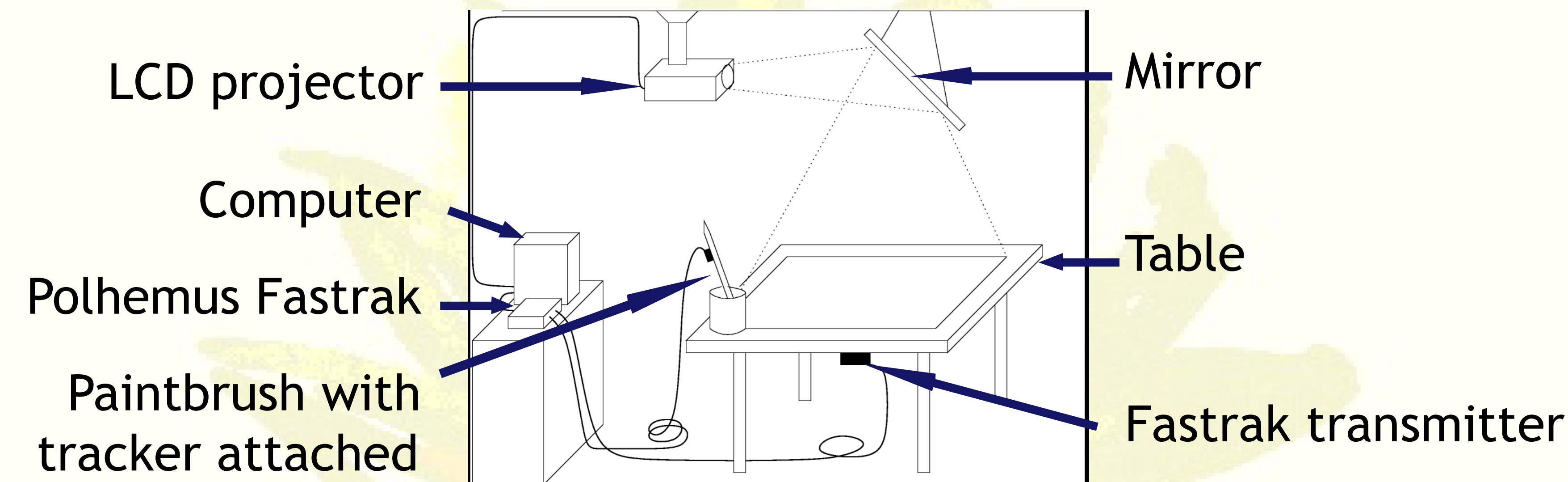
## Canvas

Primary colours

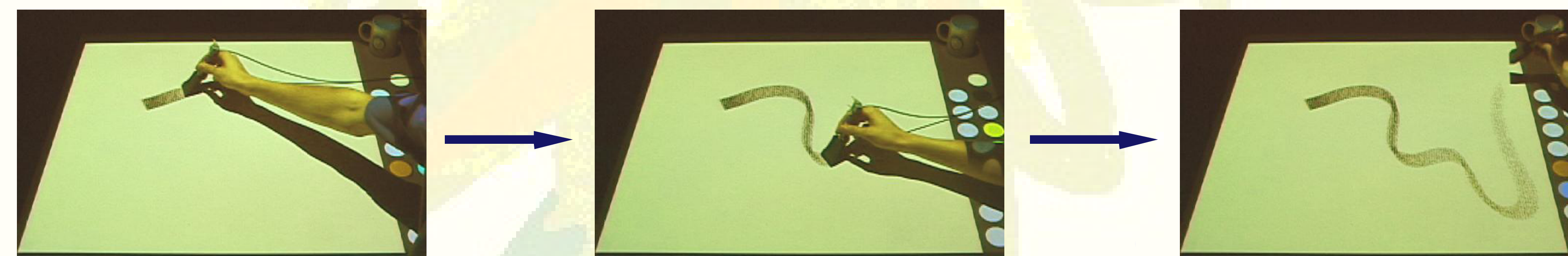
Custom colours: Color mixing is performed by picking up a color and dabbing the brush in a mixing circle



## Setup



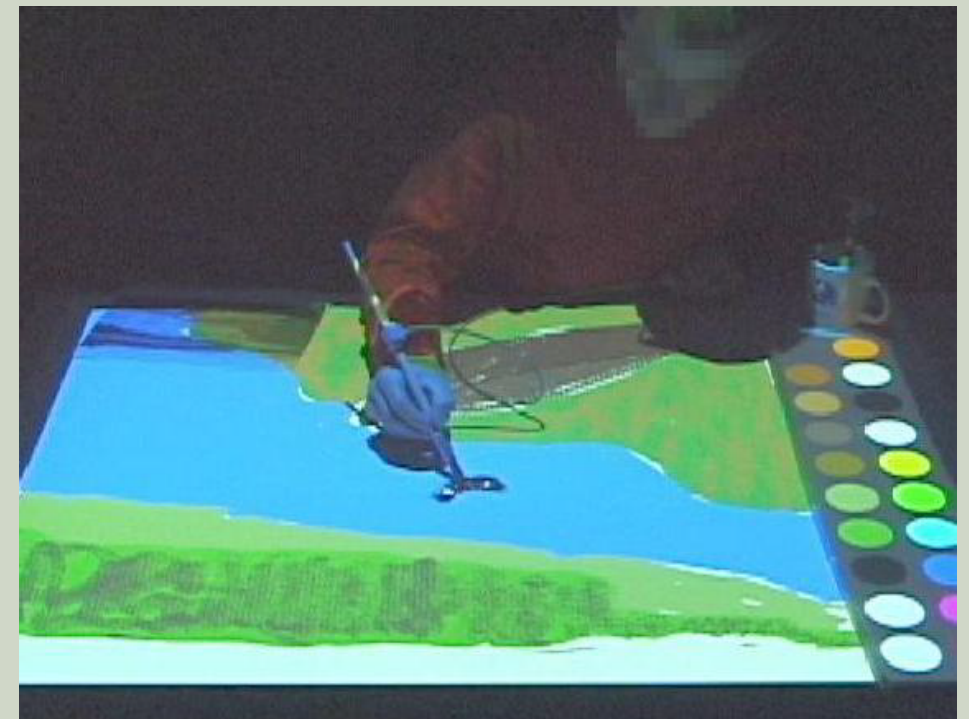
## Interaction



Physical paint brushes (with 6-degree-of-freedom trackers) control 3D models - the painter gets exactly the brush stroke she expects

## User Evaluation

- Informal evaluations with 6 users
- CoolPaint vs. Adobe Photoshop + tablet
- ✓ **Easy to use**
- ✓ **Collaborative:** No hesitation in picking up a spare brush and joining in
- ✓ **Expressive:** full six-degree-of-freedom movement
- ✓ **Fun:** encourages creativity, and all users wanted to use *CoolPaint* further



## Future Work

- User evaluations with amateur and professional artists
- Incorporate better brush and paint models, and digital tools (e.g. copy/paste)
- Provide a wider range of physical tools

## Conclusions

- Painter can focus on the task, rather than on the mechanics of interaction, because computer is 'hidden'
- Keeping high fidelity between physical input devices and virtual tools allows skill transfer from the real world, intuitive interaction, and expressiveness

## Related Work

Some examples:

- • DAB - 3D haptic painting on virtual canvas (Baxter, 2001)
- CavePainting - 3D painting in immersive CAVE environment (Keefe, 2001)

## Acknowledgements

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