

# FlowField

A Framework for Whole-Hand Surface Interaction

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## goal

- To develop an interaction framework based on whole-hand interaction with surfaces

## motivation

- The human hand can perform many surface-interaction tasks:
  - stroke, rub, knead, squeeze, wipe, poke, scratch, pound, etc.
- These tasks are composed of multiple degree-of-freedom movements, and can have intrinsic emotional intent
- Intimacy and learning especially depend on the sense of touch

## related work

- Westerman and Elias: TouchStream, FingerWorks
- Rekimoto: Smartskin
- Schiphorst et al: gesture and caress semantics

## acknowledgments

- Thecla Schiphorst (SFU)
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## FlowField

- Visual application illustrating whole-hand surface interaction
- Metaphor: hands in running stream
- Participants can intuitively manipulate flow of particles by rubbing, wiping and stroking touchpad (fig. 2)
  - Two systems developed towards realizing a compelling interactive particle simulation:
    - System 1 uses raw data values
    - System 2 uses interpolation

## results from system 1

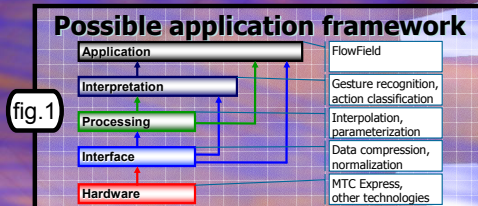
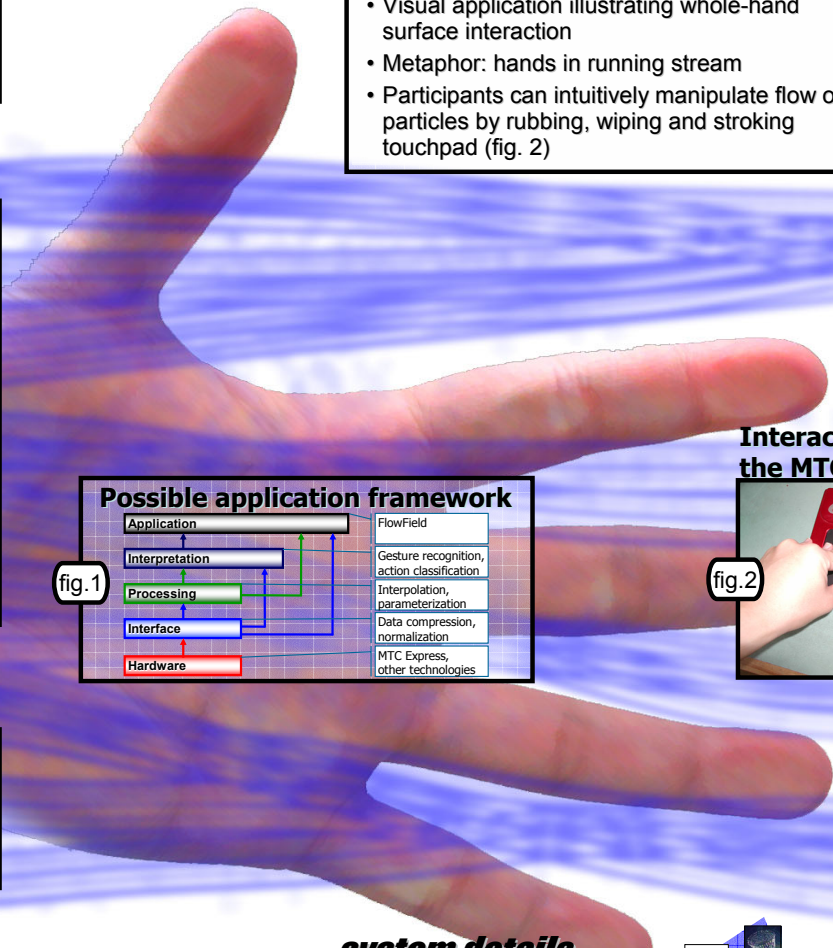
- Surface interaction well suited for manipulating particles
  - How would you do this with conventional input devices?
- Input too coarse and mapping is difficult
  - Interpolation needed

## work in progress

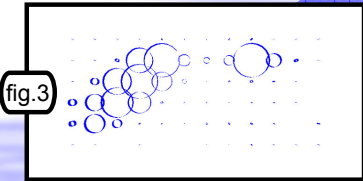
- Apply and refine application framework (fig. 1)
- Curve and surface parameterization (processing layer)
- Fingertip tracking and motion prediction (processing layer)
- Taxonomy of hand gestures (interpretation layer)
- Reconstruction of 3D hand configuration (application layer)

## contributions thus far

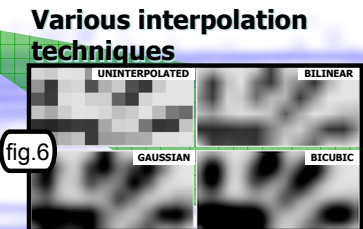
- Demonstration of whole-hand surface interaction
- Touch-interactive systems using multiple-point pressure input
- Real-time interpolation
- Linux driver, data processing library for MTC Express
- Better understanding of abilities of MTC Express



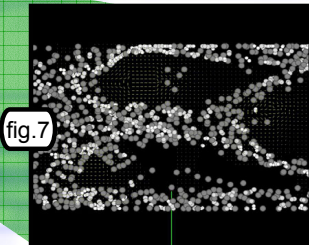
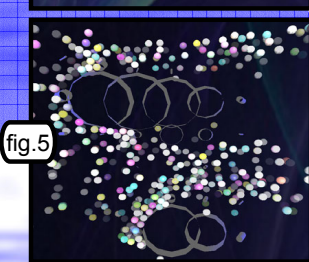
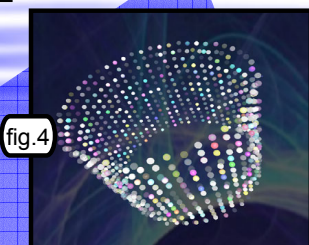
**Interaction with the MTC Express**



**Pressure-to-obstruction size mapping**



**Various interpolation techniques**



## system details

- System 1 (figs. 2-5)**
- 3D large immersive display (CAVE)
  - Particles swirl around participant (fig. 4)
  - Hand on MTC Express creates obstructions (figs. 3, 5)

- System 2 (figs. 2, 6-7)**
- Non-immersive display (higher complexity)
  - Use interpolated pressure data (fig. 6) mapped to force vectors
  - Vector field directs particle flow (fig. 7)