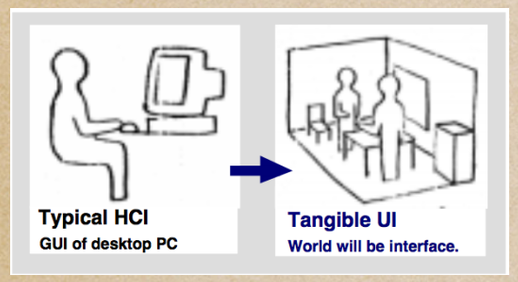
TANGIBLE USER INTERFACE

- **Definition**: a user interface in which a person interacts with digital information through the physical environment.

- **Purpose**: To empower collaboration, learning, and design by giving physical forms to digital information, thus taking advantage of the human ability to grasp and manipulate physical objects and materials.



key researches:

1. "TANGIBLE BITS: TOWARDS SEAMLESS INTERFACES BETWEEN PEOPLE, BITS AND ATOMS" BY H ISHII, B ULLMER.

This paper presents our vision of Human Computer Interaction (HCI):" Tangible Bits." Tangible Bits allows users to" grasp & manipulate" bits in the center of users' attention by coupling the bits with everyday physical objects and architectural surfaces. Tangible Bits also enables users to be aware of background bits at the periphery of human perception using ambient display media such as light, sound, airflow, and water movement in an augmented space. The goal of Tangible Bits is to bridge the gaps between both cyberspace and the physical environment, as well as the foreground and background of human activities.

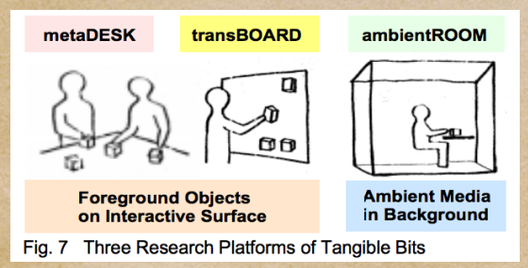
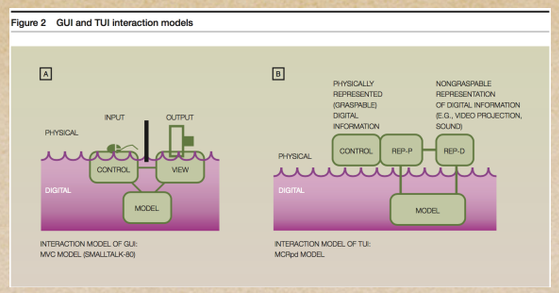
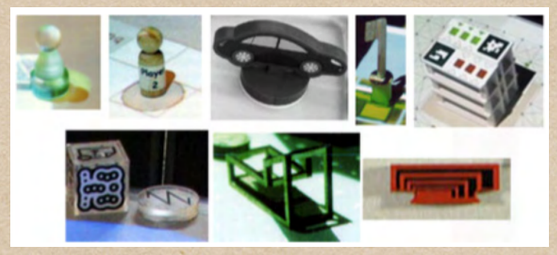


Fig. 7 Three Research Platforms of Tangible Bits



2."EMERGING FRAMEWORKS FOR TANGIBLE USER INTERFACES" - BY B ULLMER, H ISHII

-We present steps toward a conceptual framework for tangible user interfaces. We introduce the MCRpd interaction model for tangible interfaces, which relates the role of physical and digital representations, physical control, and underlying digital models. This model serves as a foundation for identifying and discussing several key characteristics of tangible user interfaces. We identify a number of systems exhibiting these characteristics, and situate these within 12 application domains. Finally, we discuss tangible interfaces in the context of related research themes, both within and outside of the human-computer interaction domain.



Top row: figurines representing people made of different materials (glass, wood), a car resembles a toy (LinguaBytes), a bus stop, a storage tower(Tinkersheets).
Lower row: more abstract music manipulatives(ReacTable), an outline of a building (an early version of Urp), and a token that represents a graphic transition between video clips (Tangible Video Editor).

3."TANGIBLE USER INTERFACES: PAST, PRESENT, AND FUTURE DIRECTIONS" BY O SHAER, E HORNECKER.

In the last two decades, Tangible User Interfaces (TUIs) have emerged as a new interface type that interlinks the digital and physical worlds. Drawing upon users' knowledge and skills of interaction with the real non-digital world, TUIs show a potential to enhance the way in which people interact with and leverage digital information. However, TUI research is still in its infancy and extensive research is required in order to fully understand the implications of tangible user interfaces, to develop technologies that further bridge the digital and the physical, and to guide TUI design with empirical knowledge.

key researchers:

Hiroshi Ishii:

- Jerome B. Wiesner Professor and Associate Director of Media Arts and Sciences, at the MIT Media Lab.
- His research focuses on the design of seamless interfaces between humans, digital information, and the physical environment.

Brygg Ullmer:

- Professor and Division Chair at Clemson University
- A researcher with interests in bridging the physical and digital worlds through "tangible interfaces." Special interest in designing "tangible visualizations," which serve as physical descriptions of complex systems.

Orit Shaer:

- Associate Professor of Computer Science and Media Arts and Sciences at Wellesley College.
- Researcher in Human-Computer Interaction (HCI), focuses on developing next-generation interaction techniques and software tools.

open ideas:

1. A design of touch-screen mouse.
-Key Technology needed: be able to detect how hard the user press on the mouse/screen.
- The mouse is covered by touch-screen.The screen can be personalized and users can add features and hot keys to it.
-Controlled experiment: touch-screen mouse vs. normal mouse.
eg: Let experimenters play an online shooting game.

.2. A design to use the tangible user interface to train table tennis.
-Key Technology needed: Slow-motion camera, or force sensor on the pad.
- A table tennis pad that can calculate and identify the spin direction when the ball contacts with it, and it will make different sounds. Then the players will be able to make adjustment accordingly.