### Getting Physical

- Lots of physical devices around us
- Many work very well
- Many do not!

### Affordance

- **Gibson**
  - Physical shape size suggest actions
    - E.g. size of cup affords holding
    - (Some) door handles afford pulling
- **Gaver, Norman**
  - Also cultural interpretations, learning
    - E.g. button affords pushing

### Physical-Logical Mapping

- Do external physical aspects reflect logical effect?
  - Logical state revealed in physical state?
    - E.g. on/off buttons
  - Inverse actions inverse effects?
    - E.g. arrow buttons, twist controls

### Inverse Actions

- Yes/no buttons
  - Well sort of
- 'Joystick'
- Also left side control

### Spring Back Controls

- One-shot buttons
- Joystick
- Some sliders

  Good – Large selection sets
  Bad – Hidden state

### A Minidisk Controller

- Twist for track movement
- Pull and twist for volume
- Spring back for options
  - Natural inverse for twist
- Series of spring-back controls
  - Each cycle through some options
  - Natural inverse back/forward
physical layout

controls:
  logical relationship
  ~ spatial grouping

compliant interaction

state evident in mechanical buttons
rotary knobs reveal internal state and can be controlled by both user and machine