

CS 349 Fall 2025

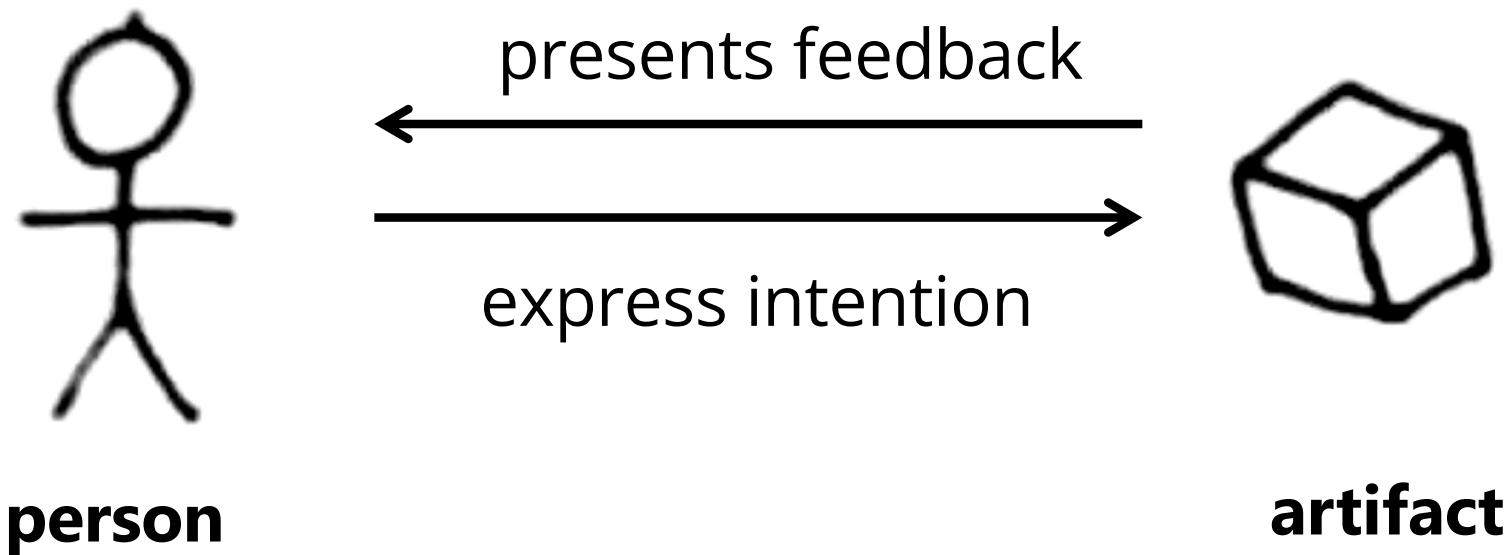
Prof. Daniel Vogel

<https://student.cs.uwaterloo.ca/~cs349/1259/>

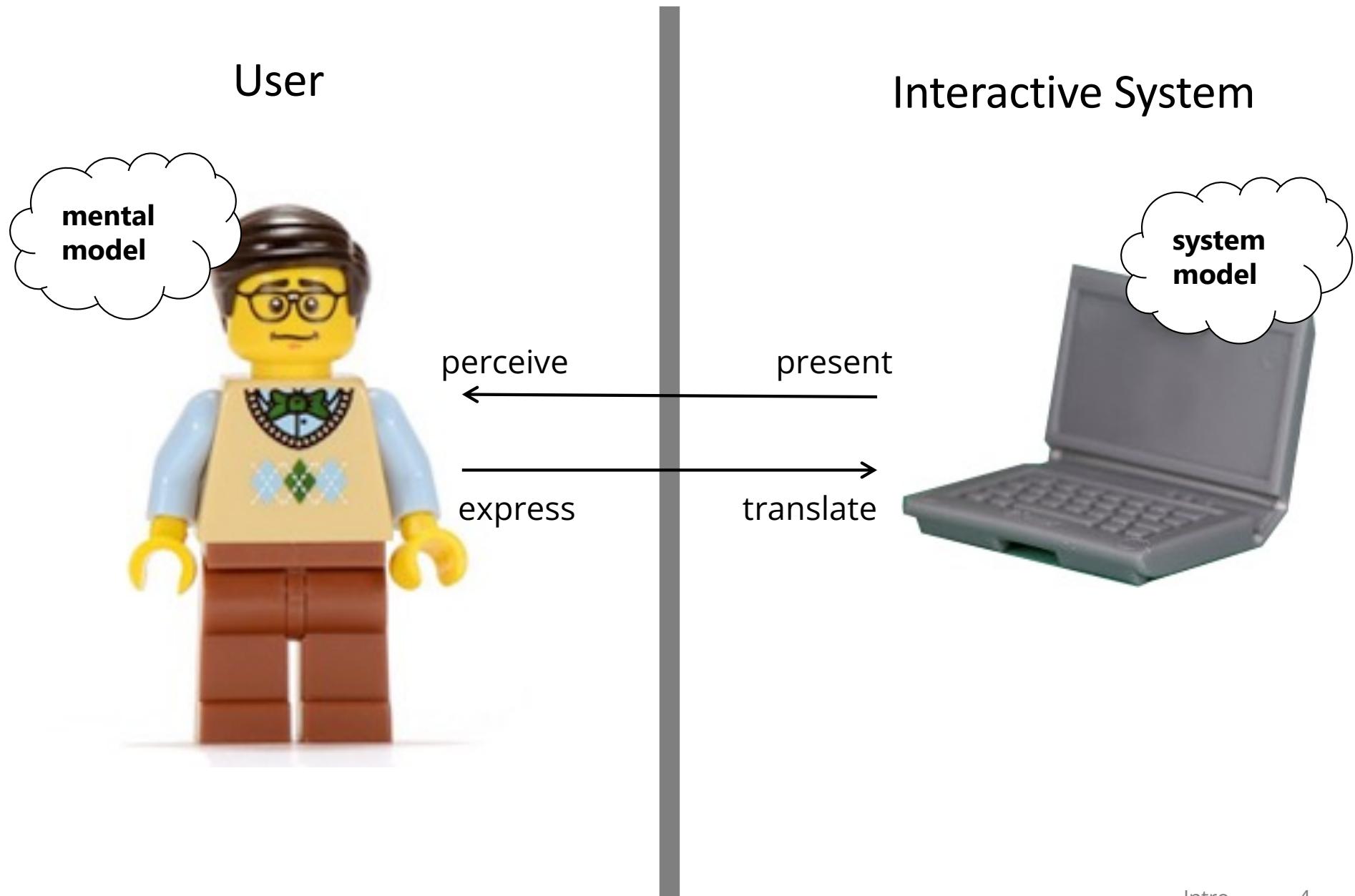
computer

User Interface

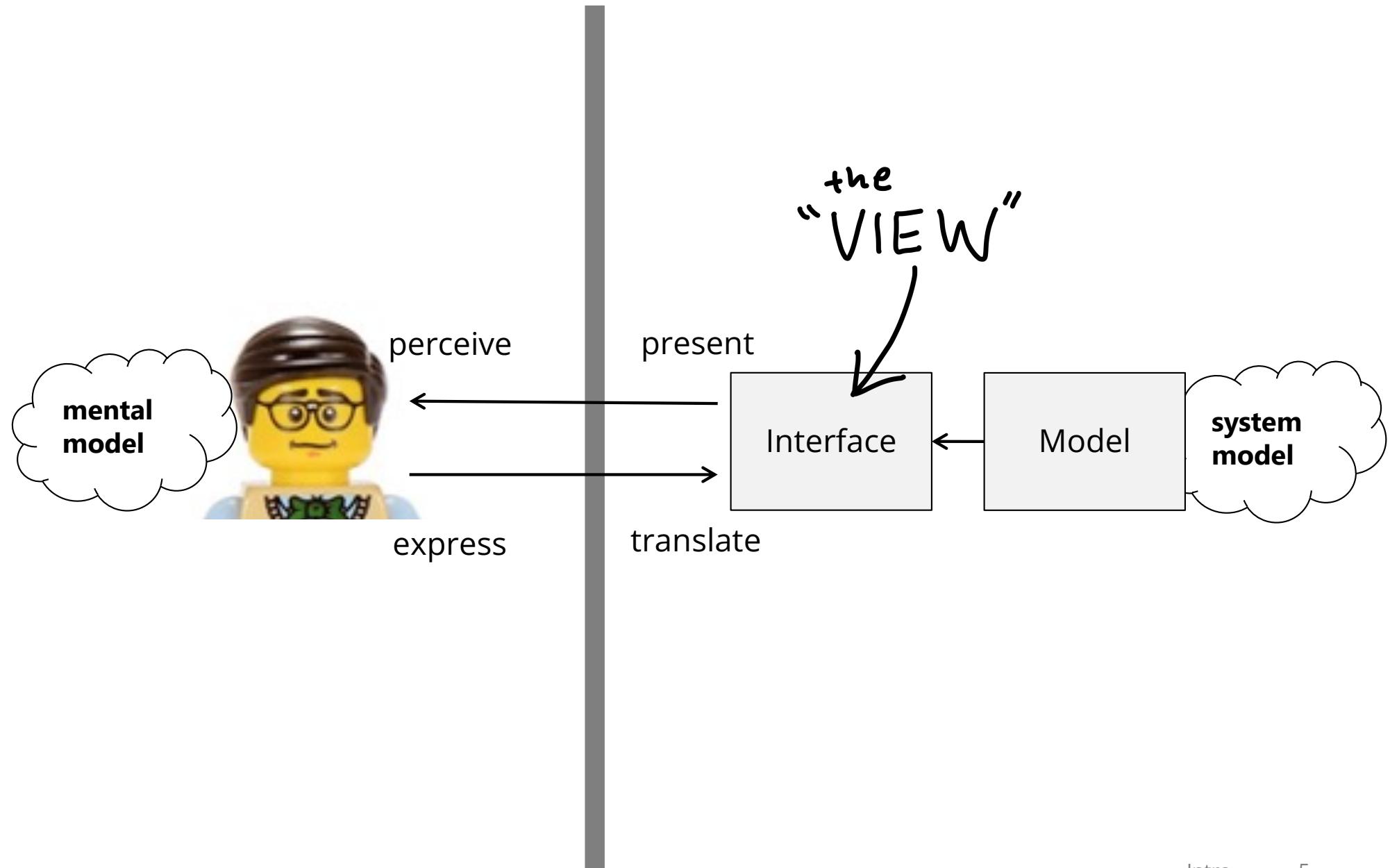
- The human's view of a computer
- *Formally:* The place where a person expresses intention to an artifact, and the artifact presents feedback to the person.



Interactive System Architecture

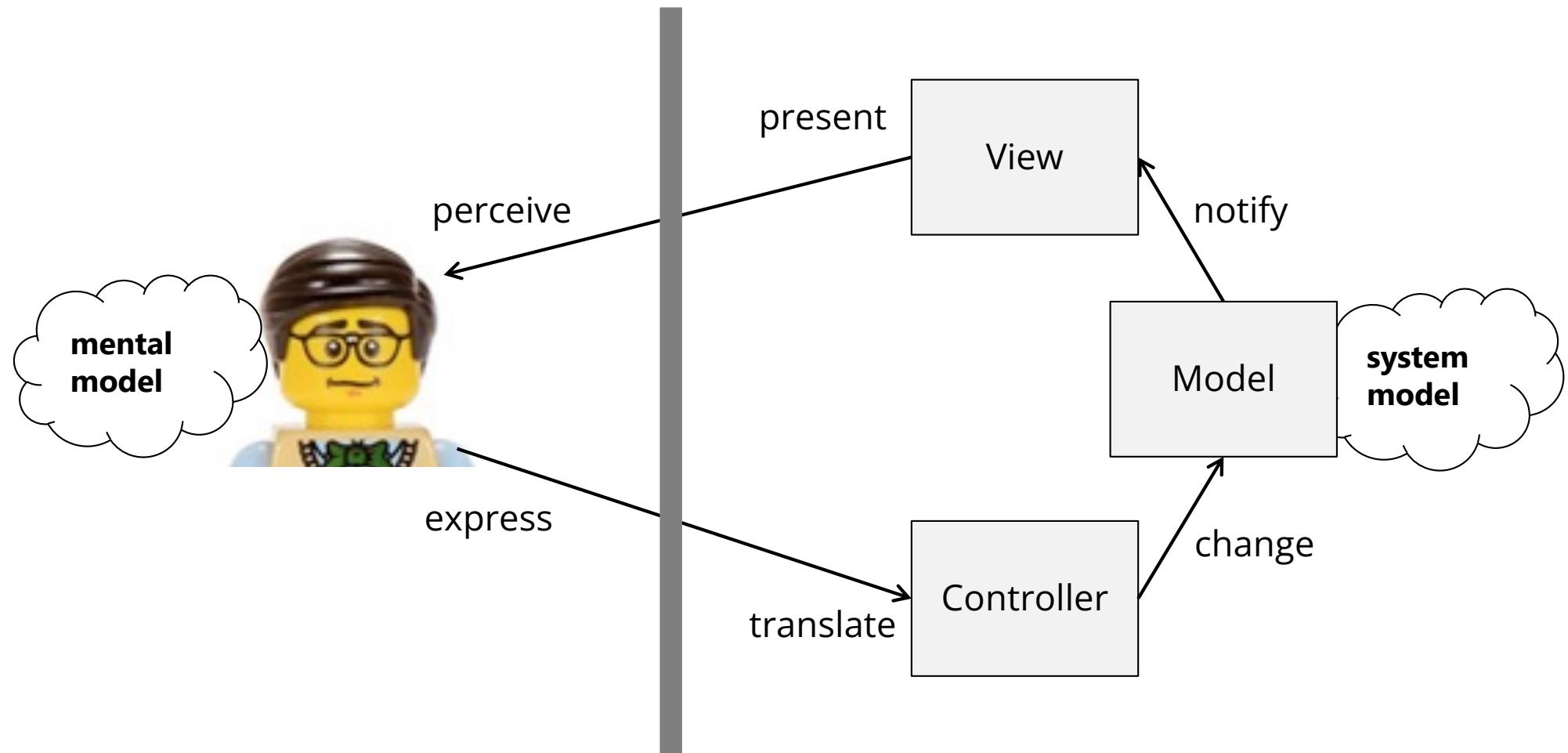


Interactive System Architecture

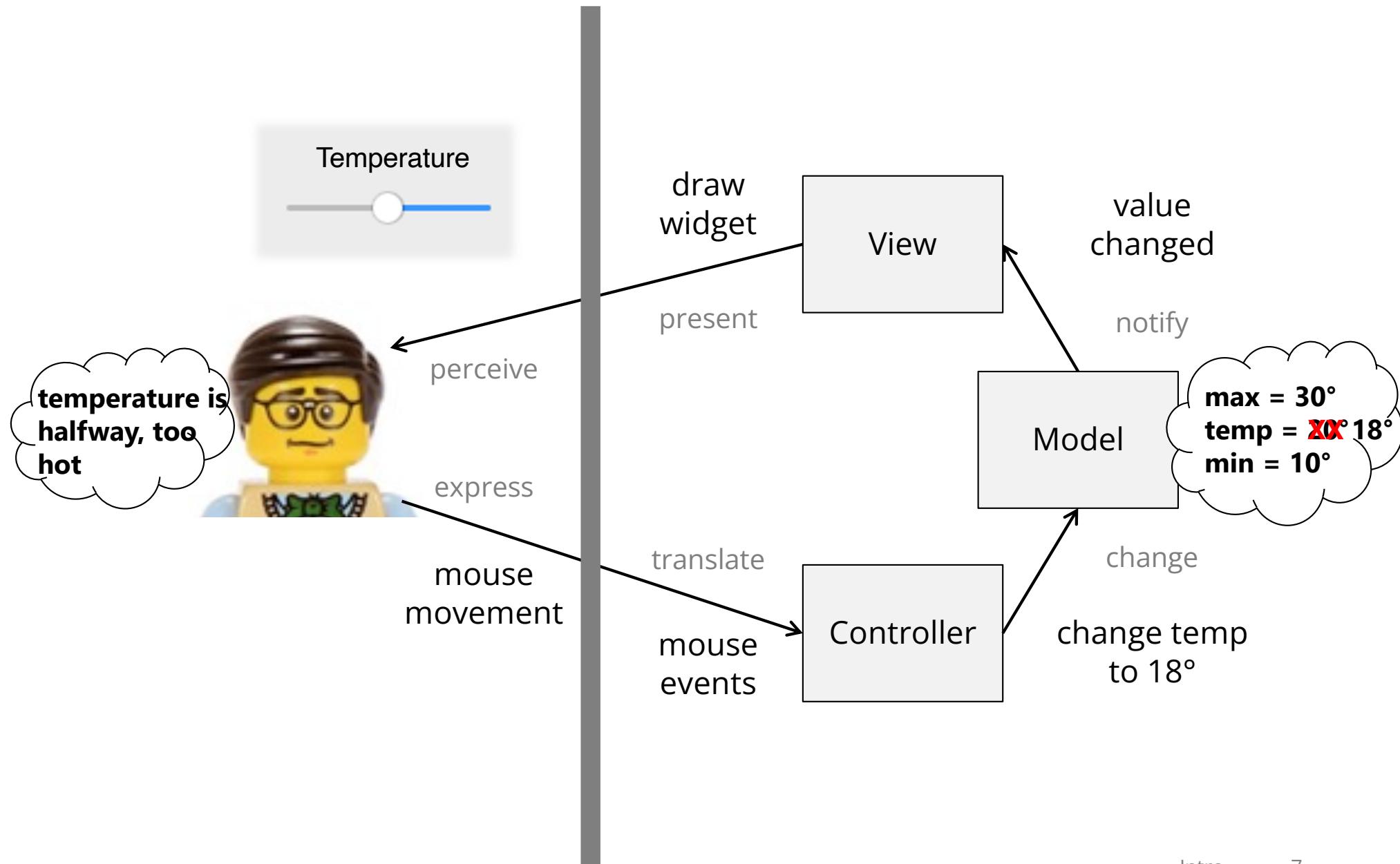


Model-View-Controller (MVC)

MVC was the first MV* interactive system architecture

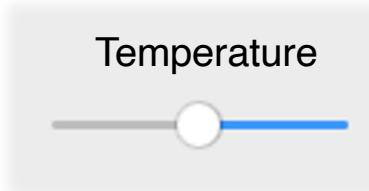


Graphical Temperature Control



User Interface vs. User Interaction

- **Interface** refers to the external presentation to the user
 - Controls (what user manipulates to communicate intent)
 - Feedback (what the program uses to communicate its response)
- **Interaction** refers to actions by user and system over time
 - interaction is a dialog with a cycle alternating between the user manipulating controls and the system responding with feedback



widget = control + feedback

Graphical User Interface (GUI)

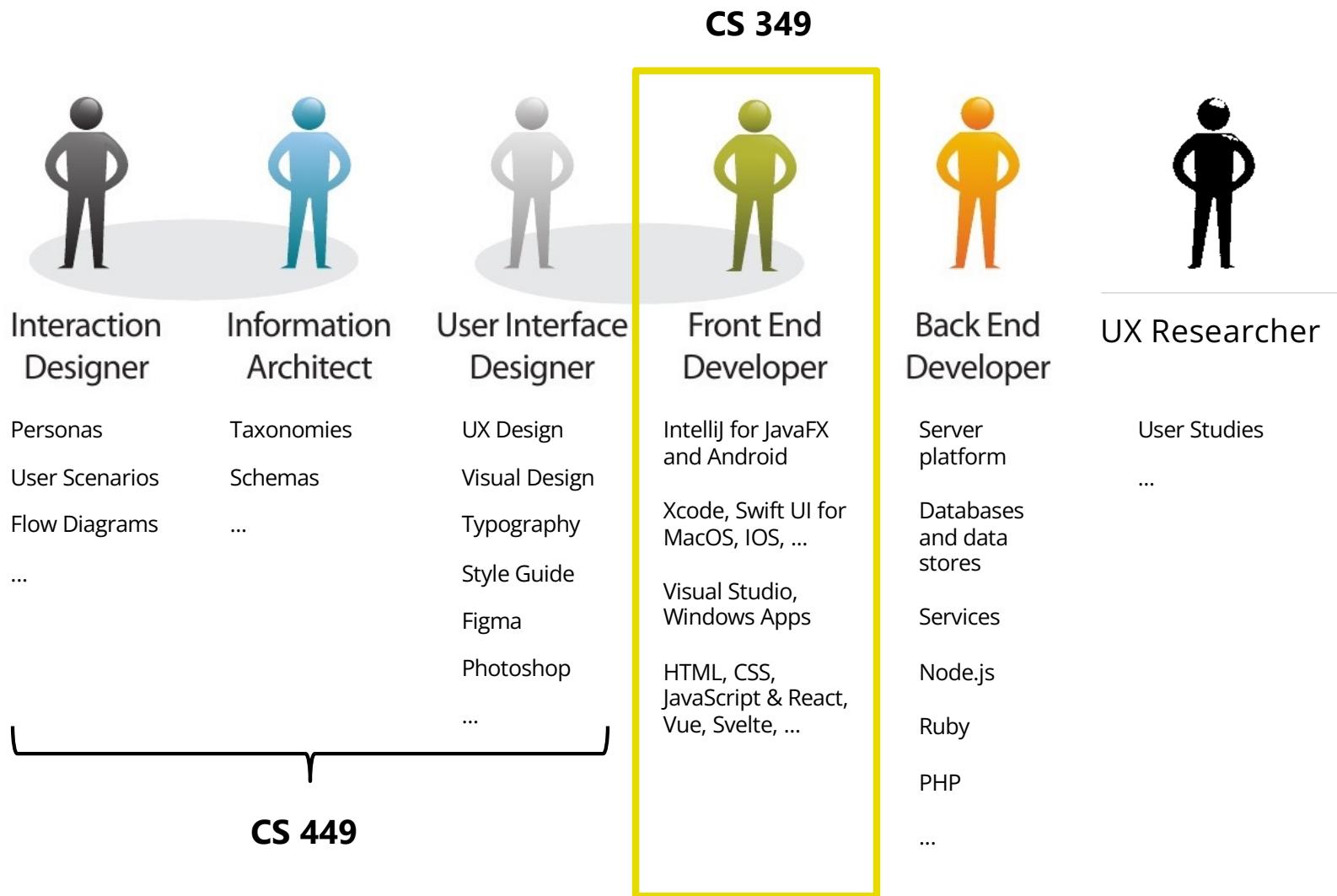
- We can assume:
 - a **pointing device** (e.g. mouse)
 - a **text entry device** (e.g. keyboard)
 - a **high-resolution display**
- The display contains interactive elements (e.g. widgets)
- Users interact primarily by pointing and clicking
 - pointing at an object of interest (e.g. widget, image, text)
 - clicking to select, drag to move, etc.



Course Information

- Focus
- Technology
- Syllabus

UI Development in Industry



What will you learn?

The focus is *how user interfaces work* and *how to build user interfaces*,
using web technologies and the TypeScript language 

Learning Outcomes

- Explain architectural and algorithmic details underlying user interfaces and user interface toolkits
- Describe key aspects of user interfaces, such as user input, event-driven architecture, events, etc.
- Implement user interfaces using different approaches

This course is not a tutorial for a programming language or UI toolkit

This course is technical using code to explain/learn concepts

Course Website

- <https://student.cs.uwaterloo.ca/~cs349/1259/>

The screenshot shows a web browser window displaying a course website. The address bar at the top contains the URL `student.cs.uwaterloo.ca`. The main content area features a blue header with the text "349 F25". To the left, a sidebar lists navigation links: "About", "Schedule", "Assignments", "Policies", and "Support". The main content area has a large title "CS349 Fall 2025 User Interfaces" in bold black font. Below the title, a descriptive paragraph reads: "An introduction to contemporary user interface implementation concepts, including event abstraction, graphical components, layout, feedback, testing, accessibility, and architectures to develop user interfaces. One or more types of interface toolkit paradigms are considered." A link "(full description in course calendar)" is provided. At the bottom, a section titled "Learning Outcomes" lists two bullet points:

- Explain architectural and algorithmic details underlying current user interfaces and user interface toolkits.
- Describe key aspects of user interfaces, such as user input, event-

Website Highlights

- <https://student.cs.uwaterloo.ca/~cs349/1259/>
- About
 - Course Staff: ISC, IA, TAs
 - Course Communication: Piazza (hours), Office Hours
 - Assessment: 5 assignments, midterm, final
- Schedule
- Assignments
 - Develop on your computer, submit using git
 - Late submissions

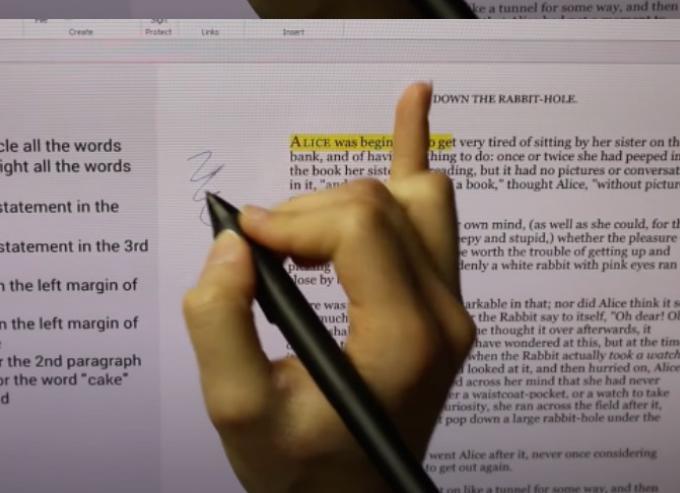
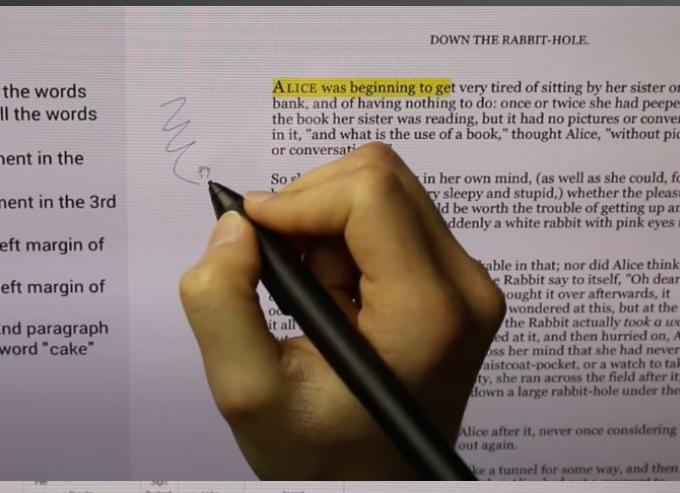
A0 will setup your dev environment
- Policies
 - **Contact Caroline Kierstead (ISC) if sick**
 - Short-term absence: **must also complete course form**
 - Academic integrity and external sources (incl. AI systems)



Midterm and Final Exam

- Structure
 - terms and definitions
 - UI toolkit algorithms, architectures, and usage
 - reading and writing short code
 - multiple choice, short answer, longer questions
- How to do well:
 - attend lectures
 - pay attention and take notes
 - do the assignments

About Me



Wearable Computing



VR and AR

Input Devices



Spatial Augmented Reality and Projection Mapping

CS 383 / FINE 383

Computational Digital Art Studio

An upper-level studio course to create computational projects that function as art works and aesthetic experiences. Students will work in an interdisciplinary environment to combine computer science principles with fine art technical and conceptual skills.

