ETN

DES535
Ubiquitous Computing

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Department of Human-Centered Design

INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY **DELHI**

Google Classroom Code : pcwnf5t

Classroom Guidelines

- Electronic Device Use: Only if authorised by the instructor.
- Once assigned, project groups cannot be changed, unless necessary.
- **Late submissions will be penalized. Grace period : 24hrs (penalty of ~40%). Beyond 24hrs the marks will be 0.**
- You may choose instructor's or TA's Office Hours slot for course-related discussions.
- Maintain a respectful and cooperative atmosphere by avoiding arguments with TAs or classmates.
- Class Participation is highly encouraged as it will be recorded and/or evaluated.

Course Plan

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jan						Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr
						Introduction to Ubiquitous Computing		Introduction to Ubiquitous Computing					Aspects of Ubiquitous Computing		Aspects of Ubiquitous Computing					Ambient & Context-Aware Computing (Part 1)		Ambient & Context-Aware Computing (Part 1)					Ambient & Context-Aware Computing (Part 2)		Ambient & Context-Aware Computing (Part 2)		
						Project Discussion		Project Discussion					Project Discussion		Project Formulation (initial)					Assignment 1		Project Finalization					Experiment on Context-Aware Computing		Assignment 1 submission/ presentation		
Feb	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr			
			Location Sensing (Part 1)		Location Sensing (Part 1)					Location Sensing (Part 2)		Location Sensing (Part 2)					Activity & Motion Sensing (Part 1)		Activity & Motion Sensing (Part 1)			Mid Semester Examination									
			Assignment 2							Demonstration of systems using location sensing		Assignment 2 submission/ presentation					Assignment 3														
Mar	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo
	Mid Semester Examination		Activity & Motion Sensing (Part 2)		Activity & Motion Sensing (Part 2)					Mid Recess							Physiological Sensing (Part 1)		Physiological Sensing (Part 1)					Physiological Sensing (Part 2)		Physiological Sensing (Part 2)					Holiday
			Demonstration of systems on HAR/Motion sensing		Assignment 3 submission/ presentation												Assignment 4							Experiment on Physiological Sensing		Assignment 4 submission/ presentation					
Apr	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	
		TT Friday					Affective Computing		Affective Computing					Wearable Computing & Smart Systems		Wearable Computing & Smart Systems					Project Presentation		Project Presentation			End Semester examination					
									Experiment on human emotion classification							Experiment with smart devices																
May	Th	Fr	Sa	Su	Mo	Tu	We																								
	End Semester examination				Exam Copies Will be shown																										

Type of Evaluation	**% Contribution in Grade**
Assignment	20
Mid-sem Exam	15
End-sem	25
Project	30
Class Participation	10

Assignment : Groups of 2

Project : Groups of 3-4

People and Office Hours

Instructor

Office Hour: Tuesday 3 pm - 4 pm

A-411 (R&D Building)

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What is Ubiquity?

i.e. Blends in our lives

- *Ubiquity: “the fact of appearing everywhere or of being very common”*
- Do you pay attention to the following products of “literacy technology” or just glance at it to understand?

What is Ubiquitous Computing (UC)?

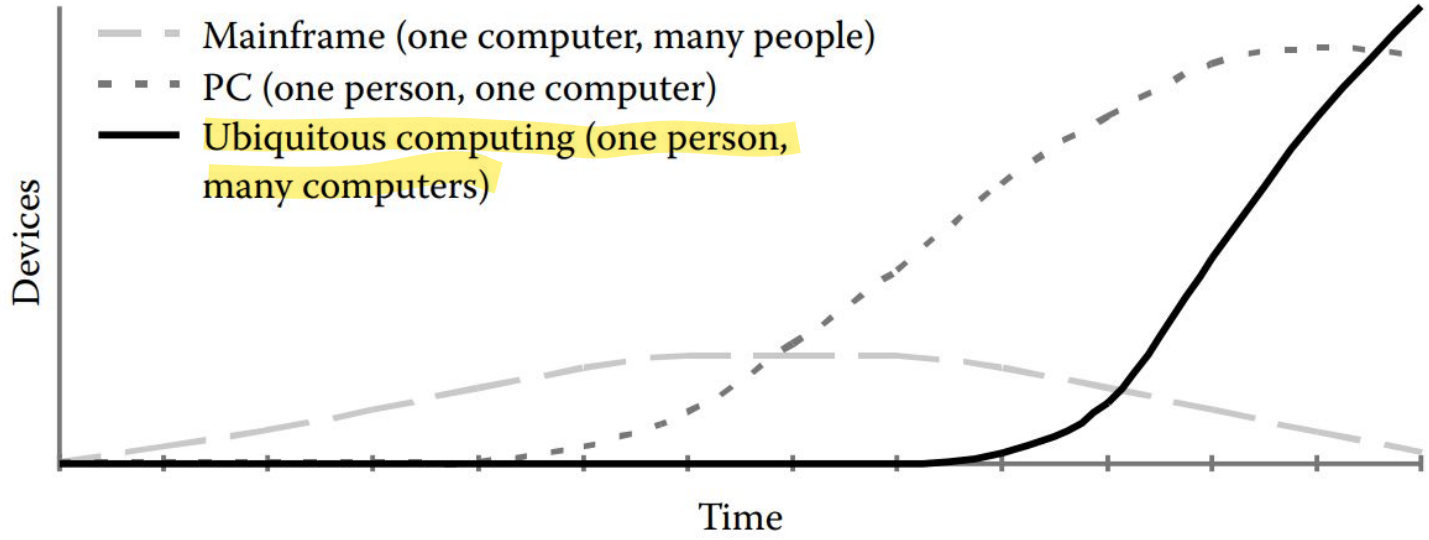
- The constant background presence of these products of “literacy technology” does not require active attention, but the information to be transmitted is ready for use at a glance.

- Whenever people learn something sufficiently well, they cease to be aware of it.

- “The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.” —Mark Weiser

https://www.cs.cmu.edu/~jasonh/courses/ubicomp-sp2007/papers/02-weiser-computer-21st-century.pdf

What is Ubiquitous Computing (UC)? *[contd.]*



Three eras of modern computing

https://www.cs.cmu.edu/~jasonh/courses/ubicomp-sp2007/papers/02-weiser-computer-21st-century.pdf

The vision of UC

- Make a list of 3 activities you perform in sequence during any time of the day.
- For each of these activities, mention the following
  - How you perform it presently
  - How you would like technology to enhance the experience of the same task

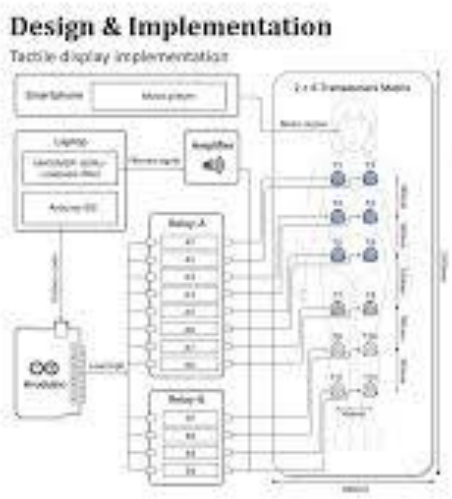
Activity
WAKING UP

What we do
Waking up to the sound of an alarm clock and go to kitchen to make a cup of coffee

What we want
Waking up by a gentle nudge of the mattress that can sense the wakeup pattern through the rolling motion of the body, predict the mood and ask if I want a cup of coffee.

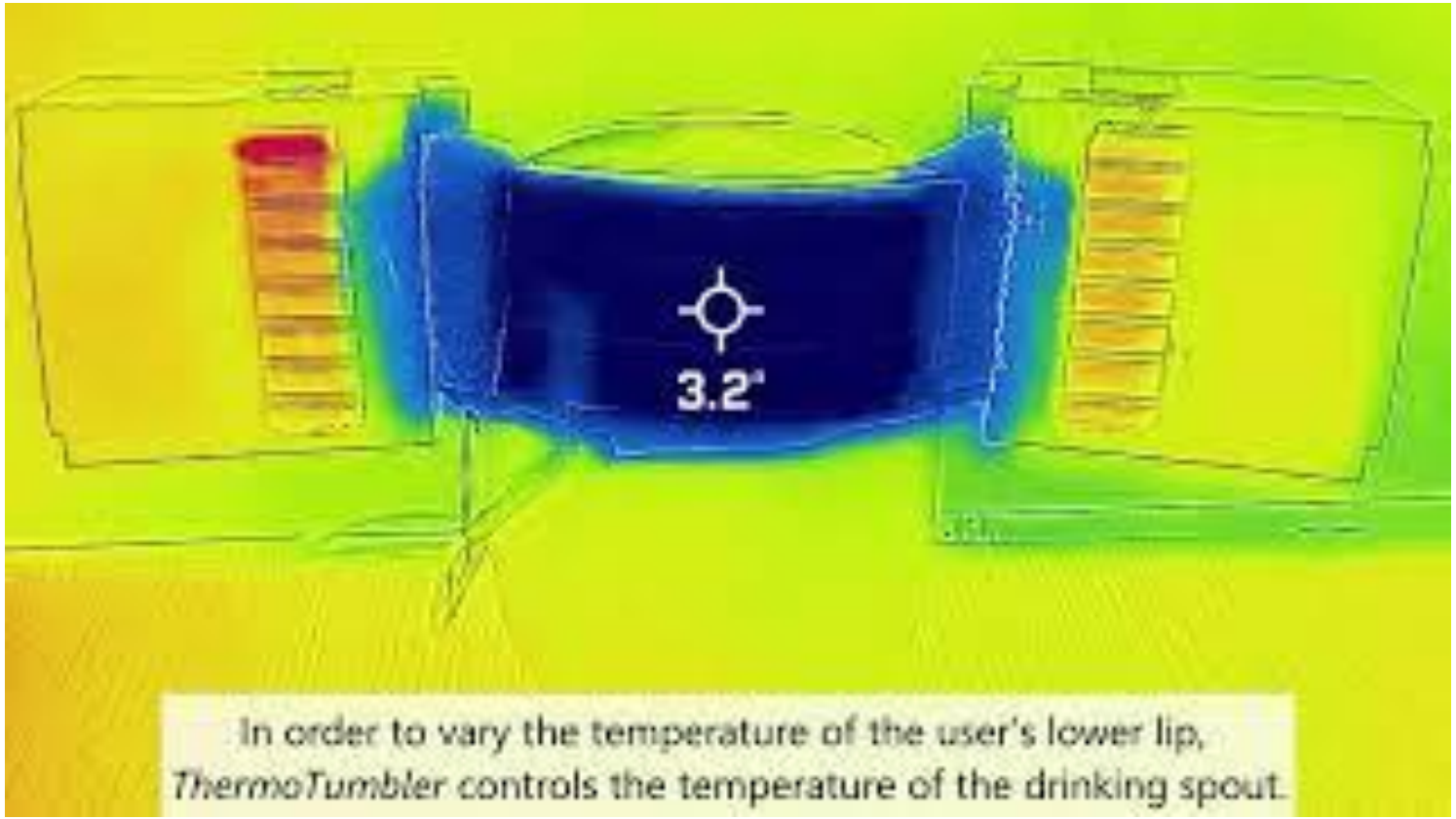
The Current State of UC

What we have
Smart Mattresses

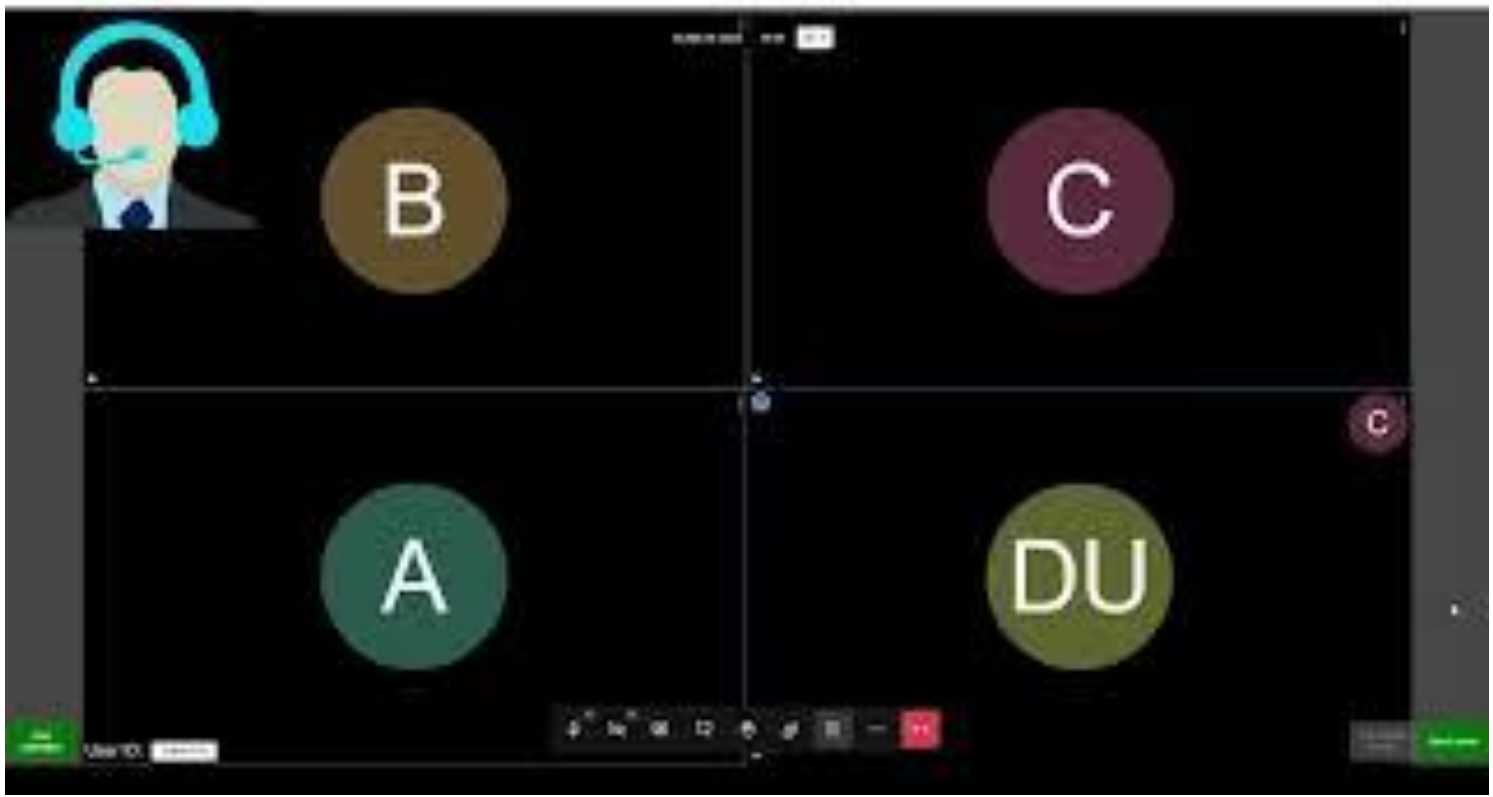


Home activity: Find the current development in UC with respect to the tasks you mentioned

Applications of UC : Altering temperature of lower lip changes taste

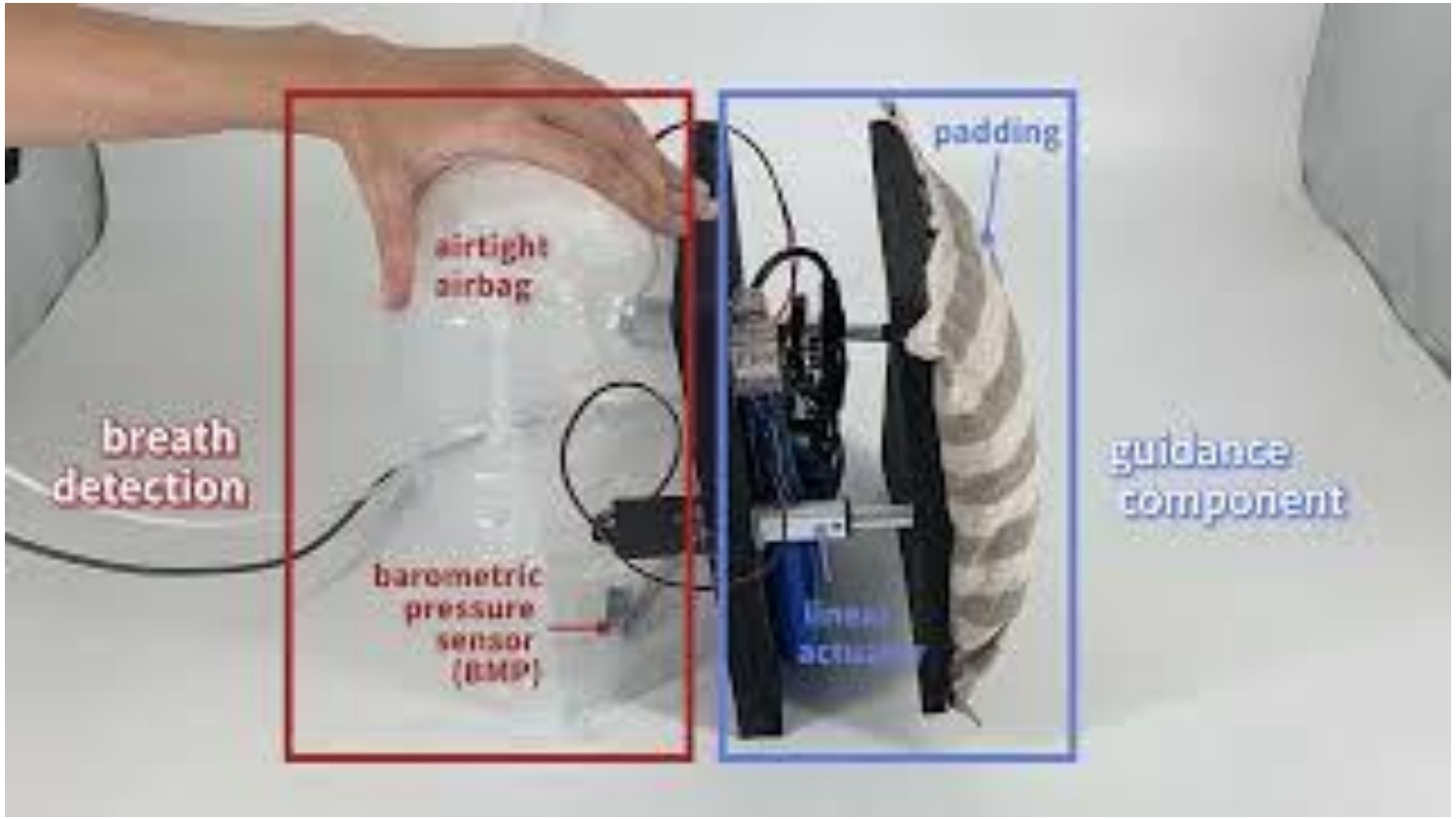


Applications of UC : Gaze elevates engagement in online meetings



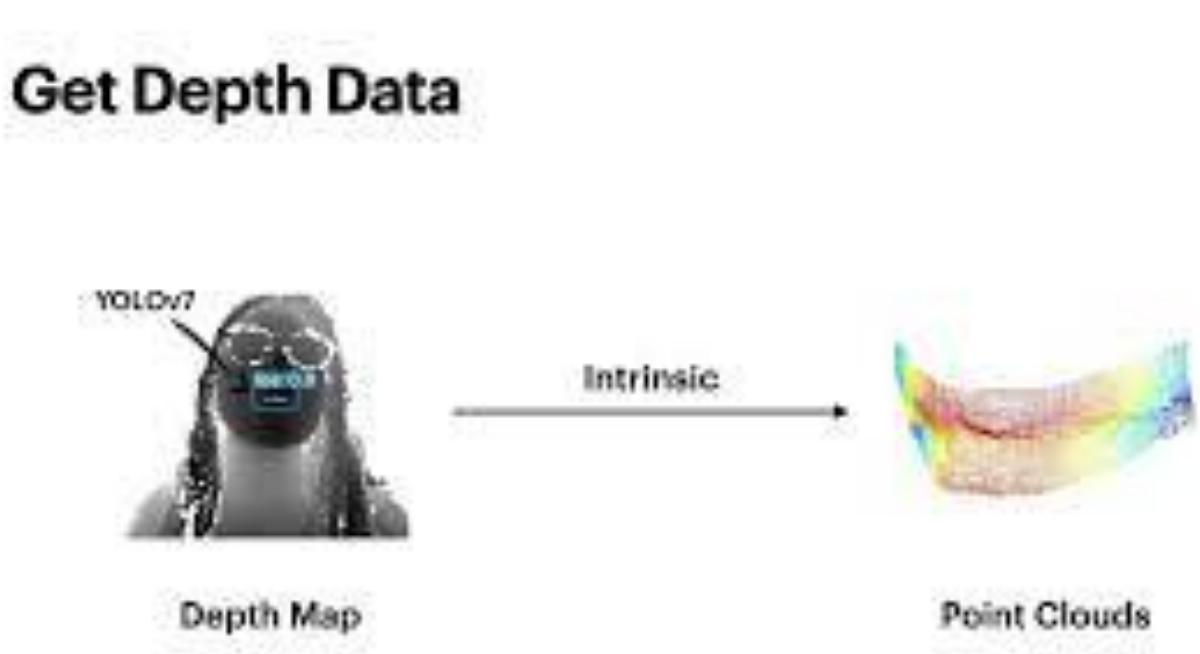
Applications of UC : A sewing analyzer

Applications of UC : A smart cushion for relaxation



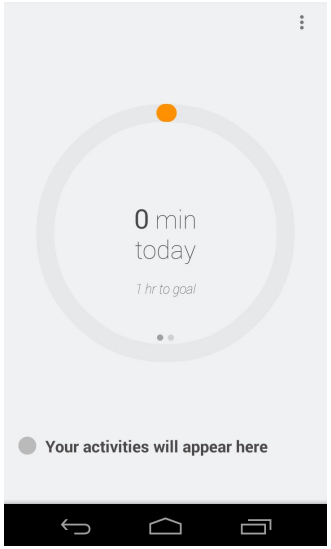
Applications of UC : Radio frequency ring for multiple purposes

Applications of UC : Silent speech reading

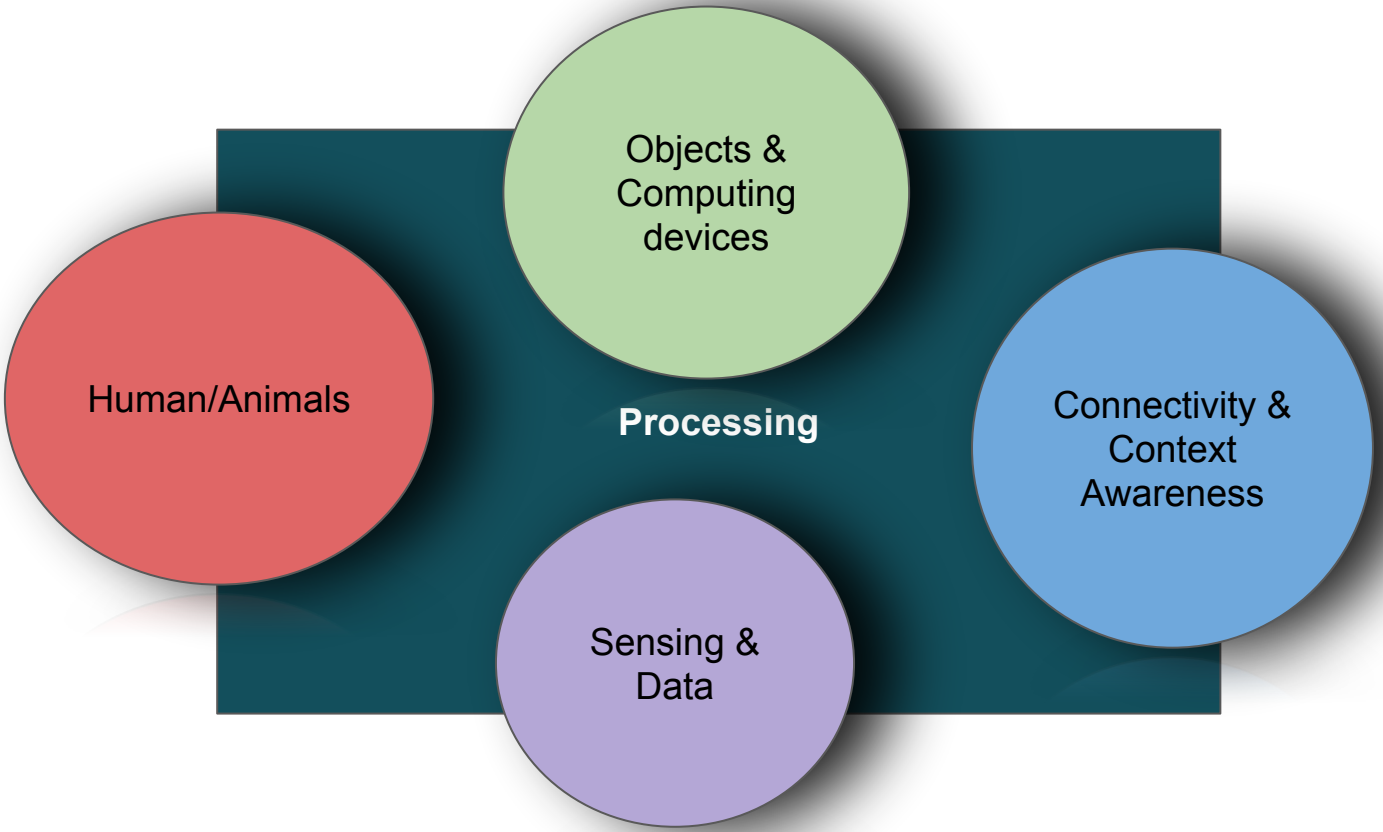


UC in Industry

- Google Nest
- Apple Homekit
- Google Fit
- Empatica Smartwatch



Components of UC



Activity

1. **Develop a simple fall-detection smartphone application.**

- Accelerometer - X, Y, Z axis
- IF

    absolute(currentX value - previousX value) is more than t **AND** absolute(currentY value - previousY value) is more than t **AND** absolute(currentZ value - previousZ value) is more than t

    THEN

    Falling

    ELSE

    Not falling

Activity

2. UC Components

3. Innovations