HUMAN-COMPUTER INTERACTION THIRD EDITION

DIX FINLAY ABOWD BEALE

chapter 18

modelling rich interaction

extract for MSc/MRes AISD

low intention and sensor-based interaction

HUMAN-COMPUTER INTERACTION

low intention and sensor-based interaction

HUMAN-COMPUTER INTERACTION

car courtesy lights

- turn on
  - when doors unlocked/open
- turned off
  - after time period
  - when engine turned on

driver's *purpose* is to get into the car

incidentally the lights come on

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Pepys

- Xerox Cambridge (RIP)
- active badges
- automatic diaries

Allan's *purpose* to visit Paul's office

incidentally diary entry created

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MediaCup

- cup has sensors
  - heat, movement, pressure
- broadcasts state (IR)
- used for awareness
  - user is moving, drinking, …

Han's *purpose* to drink coffee

incidentally colleagues are aware

HUMAN-COMPUTER INTERACTION

shopping cart

- goods in shopping cart analysed
  - e.g. Amazon books
- used to build knowledge about books
  - people who like X also like Y
- used to give you suggestions
  - "you might like to look at …", "special offer …"

my *purpose* to buy a book

incidentally shown related titles

onCue

- 'intelligent' toolbar
  - appropriate intelligence
    - make it good when it works
    - don't make it hard of it doesn't
- analyses clipboard contents
- suggests things to do with it

user's *purpose* to copy text elsewhere

incidentally alternative things to do

the intentional spectrum

intentional — press light switch

expected — walk into room expecting lights to switch on

incidental — walk into room … unbeknown to you
… air conditioning increases

fluidity

intentional

expected

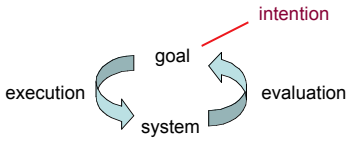
incidental

co-option
users explicitly use behaviour
e.g. open door for lights

comprehension
users notice, form model
then rely on behaviour

interaction models

- intentional cycle
  - Norman execution/evaluation loop
- some exceptions
  - multiple goals, displays, opportunistic
- guidelines
  - feedback, transparency



cognition

- physical things (inanimate)
  - directness of effect
  - locality of effect
  - visibility of state
- computational things (also animate)
  - complex effects
  - non locality of effect
    distance – networks; time – delays, memory
  - large hidden state

cognition

- understanding
  - innate intelligences
    - physical, natural/animal, social, physiological
  - rational thought
  - imagination
- interfaces
  - GUI, VR, AR, tangible
    - recruit physical/tangible intelligence
  - ubicomp, ambient, incidental
    - ? ? ?
      homunculi, haunted houses

designing incidental interaction

- need richer representations
  - of the world, of devices, of artefacts
  - wider ecological concerns
- two tasks
  - purposeful task – for interpretation
  - supported task – for actions

issues and process

- no accepted methods but … general pattern
- uncertainty
  - traditional system due to errors
  - sensor-based intrinsic to design
    - uncertain readings, uncertain inference
    - usually control non-critical aspects of environment
- process … identify
  - input – what is going to be sensed
  - output – what is going to be controlled
  - scenarios – desired output and available input

designing a car courtesy light

- available input
  - –door open, car engine
- desired output
  - –light!
- identify scenario
- label steps
  - 0 don't care
  - +, ++, … want light
  - –, ––, … don't want it
- legal requirements
  - light off whilst driving
- safety
  - approaching car??

1.	deactivate alarm	0
2.	walk up to car	+
3.	key in door	–
4.	open door & take key	+
5.	get in	++
6.	close door	0
7.	adjust seat	+
8.	find road map	++
9.	look up route	+++
10.	find right key	+
11.	key in ignition	–
12.	start car	0
13.	seat belt light flashes	0
14.	fasten seat belt	+
15.	drive off	–––––

safe? light advertises presence

illegal to drive with interior light on

implementation

- sensors not used for original purpose
  - open architectures, self-discovering, self-configuring
- privacy
  - internet–enables kettle broadcasts to the world!
- context
  - inferring activity from sensor readings – status not event
- data filtering and fusion
  - using several sensors to build context
- inference
  - hand-coded or machine-learning
- must be used
  - control something (lights) or modify user actions (TV on)

architectures for sensor-based systems?