SafeHome Security System

Ruchita Shah

How a project starts

- Scene – meeting room of a company that makes consumer software products for home & commercial use

- Players – Sr. Manager of product development, Marketing manager, Engineering manager,

How a project starts

- Conversation
  - Vp : Are you developing a generic universal wireless box?
  - Engineering M : It is about size of matchbox. Can attach to sensors of all kind, digital cameras & many other thing. It uses 802.11b protocol. Allow to acess the device's output without wires
  - Marketing M : we are planning a home management product. Its name is " SafeHome". It uses wireless i/f, provide people with a system that get controlled by their PC. It can control home security, home surveillance, appliances and device control like turn down an AC while on the move.

How a project starts

- Conversation
  - Engineering M : a feasibility study has been done. It is doable at low manufacturing cost. Most h/w are off the shelf. S/w is the issue
  - Sr. Manager : marketing have found that 60% of house have PC. If we price it right, it will be tremendously successful,

Selecting a process model

- Conversation
  - Engineering M : How will we build s/w part?
  - S/w M : this project is bigger & more complex than from past projects
  - Linear model is not applicable as we do not have all the requirements upfront
  - Rad model also do not fit as product may not be hoghly modularized
  - Prototype model seems good
  - Incremental approach is good for this project. We build an increment, deliver it, get feedback , replan & then deliver another increment. It fits with the nature of the product. We can have something on the market fast & then add functionality with each version

Considering Agile software development

- Conversation
  - S/w team M : many companies are adopting extreme programming. It lets you develop s/w really fast, uses pair programming to do real time quality checks
  - S/w M : I like the idea that stackholders should be part of team
  - S/w team M : But they will ask for frequent change
  - S/w M : But agile programming allow changes at any time in the project
  - S/w M : Also I would like you people to spend more time analyzing than on coding & recoding.

Communication mistake

- Conversation
  - S/w team M1: what have you heard about SafeHome project?
  - S/w team M2: meeting will be next week
  - S/w team M1 : I think this product may not do well
  - S/w team M2 : why?
  - S/w team M1 : Marketing people are asking about security & surveillance systems, marketing people are expecting us to act as consultant, we must learn everything about this product

Preliminary system engineering

- Conversation
  - S/w team M1: We had a look at overall system, we need to gether plenty of requirements for the s/w
  - S/w team M2: we have to communicated with our customers constantly
  - S/w team M3 : I have listed basic functionality
  - S/w team M2 : why?
  - S/w team M1 : Marketing people are asking about security & surveillance systems, marketing people are expecting us to act as consultant, we must learn everything about this product

Preliminary System Engineering

- Conversation
  - S/w team M1: what have you heard about SafeHome project?
  - S/w team M2: meeting will be next week
  - S/w team M1 : I think this product may not do well
- List of basic functionality
  - System will use one or more PC, various wall mounted &/or handheld control panels, various sensors & appliances & device controllers
  - Will communicate via wireless protocol & will be designed for new home construction & for application within existing homes
  - All the h/w except for our new wireless box will be off the shelf

Preliminary System Engineering

- SafeHome Software

1. Home security functions
   - Std window, door, motion sensor monitoring for unauthorized access
   - Monitoring for fire, smoke & CO level
   - Monitoring for water levels in basement
   - Monitoring for outside movement
   - Change security setting via Internet

Preliminary System Engineering

- SafeHome Software

2. Home surveillance functions
  - Connect to one or more video camera placed inside/outside the house
  - Control pan/ zoom for camera
  - Define camera monitoring zones
  - Display camera views on PC
  - Access camera views via internet
  - Selectively record camera o/p digitally
  - Replay Camera o/p

Preliminary System Engineering

- SafeHome Software

3. Home Management functions
  - Control lighting
  - Control appliance
  - Control HVAC
  - Control audio/video equipment's
  - Ability to set house for vacation mode with one button set
    - Set appliances/lighting/HVAC accordingly
    - Set Answering machine
    - Contact vendors to stop paper, mail etc.

Preliminary System Engineering

- SafeHome Software

4. Communication Management functions
  - Answering machine functions
    - List of callers via caller ID
    - Messaages with time
    - Message text via voice recognition system
  - E-mail functions
    - Std email display
    - Voice read of e-mail ia phone access
  - Personal phone book
  - Link to PDA

Preliminary System Engineering

- SafeHome Software

5. And many more

Requirement gathering meeting

- SafeHome Software
- Displaying primary functionality of s/w
- Remaining functionality : All SafeHome functionality accessible via internet , is added
- Constraints : technical constraints & legal
- 1. security – an outsider can not hack into the system, disarm it & rob
- But still need internet connectivity to stop outsider getting in
- All the functionalities are refined & expanded

Developing preliminary scenario

- Talking about security issues while providing access to SafeHome functionality via internet

- Developed a user scenario

- Asked marketing person to envision accessing the system

- Marketing person : I would like to access it through internet while I am away from home, I had to let someone into the house, a gardner or a repairman, they do not have security code
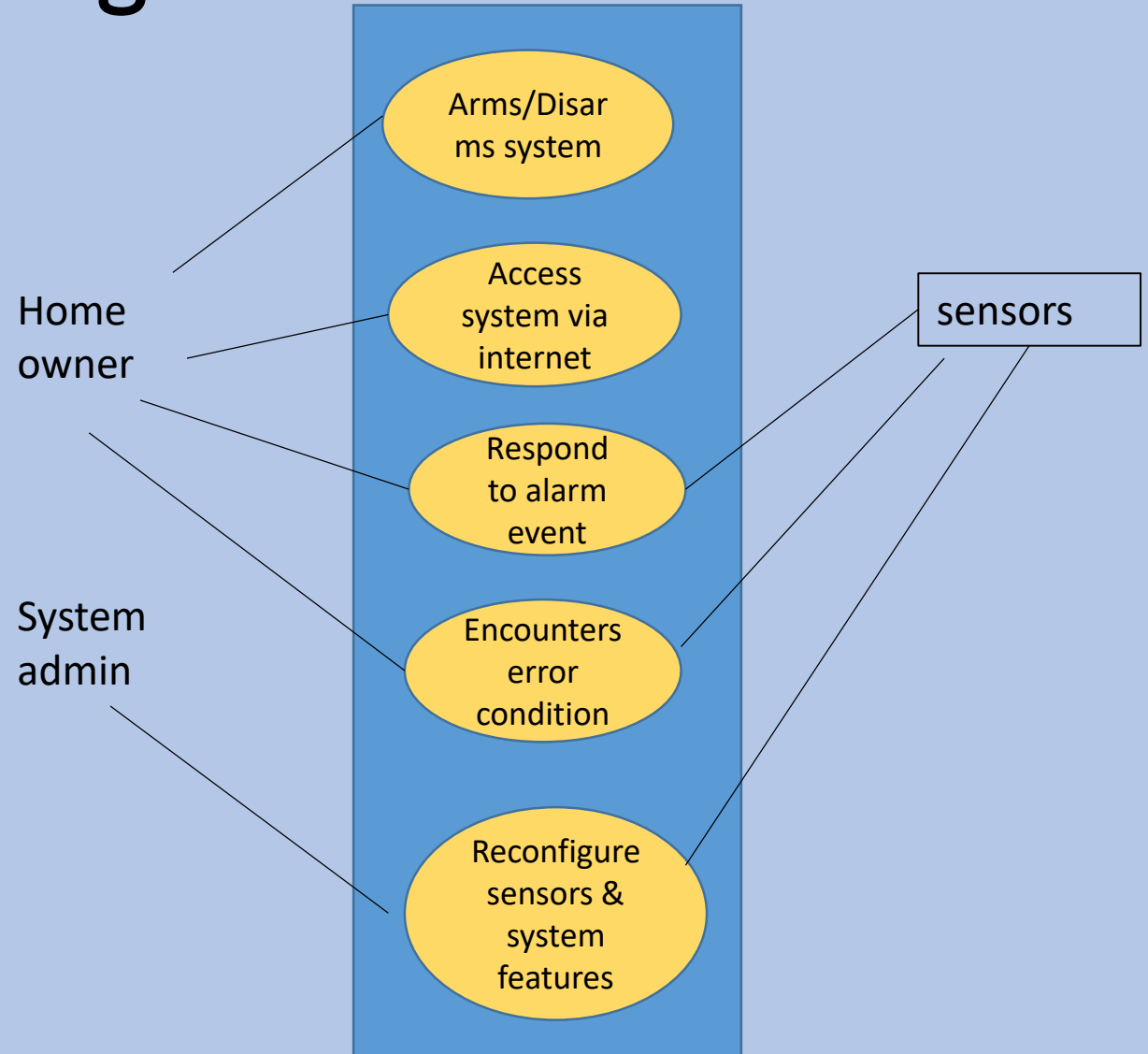
- How will you do it?

Developing preliminary scenario

- How will you do it?
- MP : will need a PC. Log into the website that company maintain for all users of SafeHome, I will provide username & password
- s/w E : web site must be secure, encrypted to guarantee the security
- But these are technical detail. Lets focus on how end user will use it

Developing preliminary scenario

- MP : a screen representing all SafeHome function will appear. I will select home security function. System must ask to verify myself. After verification it will display a picture of security system control panel along with a list of functions that I can perform – arm the system, disarm the system, disarm one or more sensors. It must also allow me to reconfigure security zones

- This form the basis for informal use case scenario

Developing use case diagram

- A usecase diagram is drawn that summarizes important scenarios that are part of function

Use case template for surveillance

- Use-case : Access camera surveillance – display camera views

- Primary actor : home owner

- Goal in context : to view output of camera places throughout the house from any remote location via internet

- Precondition: system must be fully configures; appropriate user ID & password must be obtained

- Trigger : the homeowner decides to take a look inside the house while away

Use case template for surveillance

- Scenario :
1. The home owner logs into the SafeHome products website
2. Home owner enters their user ID
3. Home owner enters two passwords
4. The system displays all major functions button
5. Home owner selects "surveillance" from it
6. Home owner selects "Pick a camera"
7. The system displays the floor plan of house

Use case template for surveillance

- Scenario :

8. The home owner selects a camera icon from floor plan

9. The owner selects the view button

10. The system displays a viewing window that is identified by the camera ID

11. The system displays video o/p within viewing window at one frame per second

Use case template for surveillance

- Exception :

1. Id or password are incorrect or not recognized – see use-case: "validate ID & password"

2. Surveillance function not configured for this system – system displays appropriate error message; see use-case:"configure surveillance function"

3. Homeowner selects "view thumbnail snapshots for all cameras" – see use-case:"view thumbnail snapshots for all cameras"

Use case template for surveillance

- Exception :
4. A floor plan is not available or has not been configured- display appropriate error message & see use-case: " configure floor plan"
5. An alarm condition is encountered – see use-case : " alarm condition encountered"
- Priority : moderate priority, to be implemented after basic functions
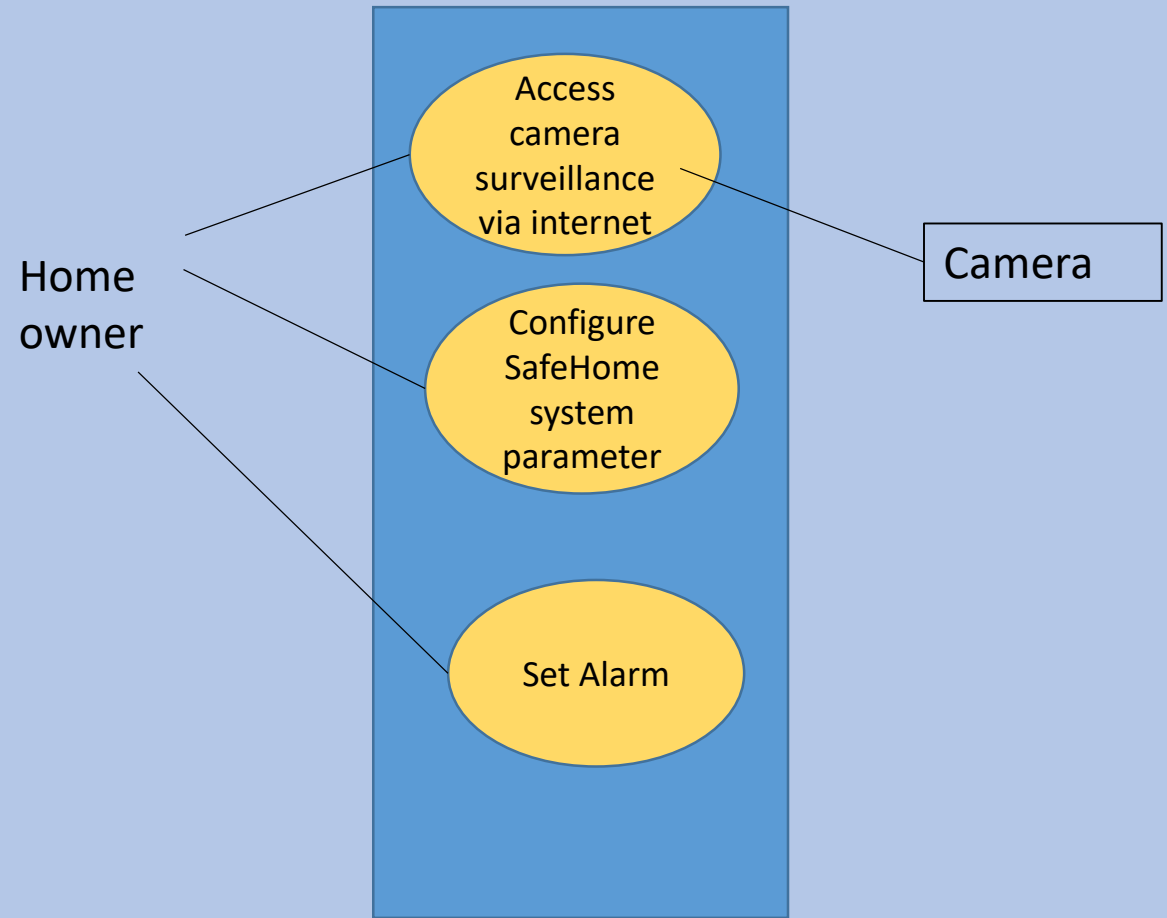- When available : 3rd increment
- Frequency of use : infrequent

Use case template for surveillance

- Channel to order : via PC based browser and internet connection to SafeHome web site

- Secondary actors : system admin, cameras

- Channels to secondary actors:
  - System admin : PC based system
  - Cameras : wireless connectivity

Use case template for surveillance

- Open issues :

1. When mechanisms protect unauthorized use of this capability by employees of the company?

2. Is security sufficient? Hacking into this feature would represent a major invasion of privacy?

3. Will system response via the internet be acceptable given the bandwidth required for camera views?

4. Will we develop a capability to provide video at a higher frames-per-second rate when high bandwidth connections are available?
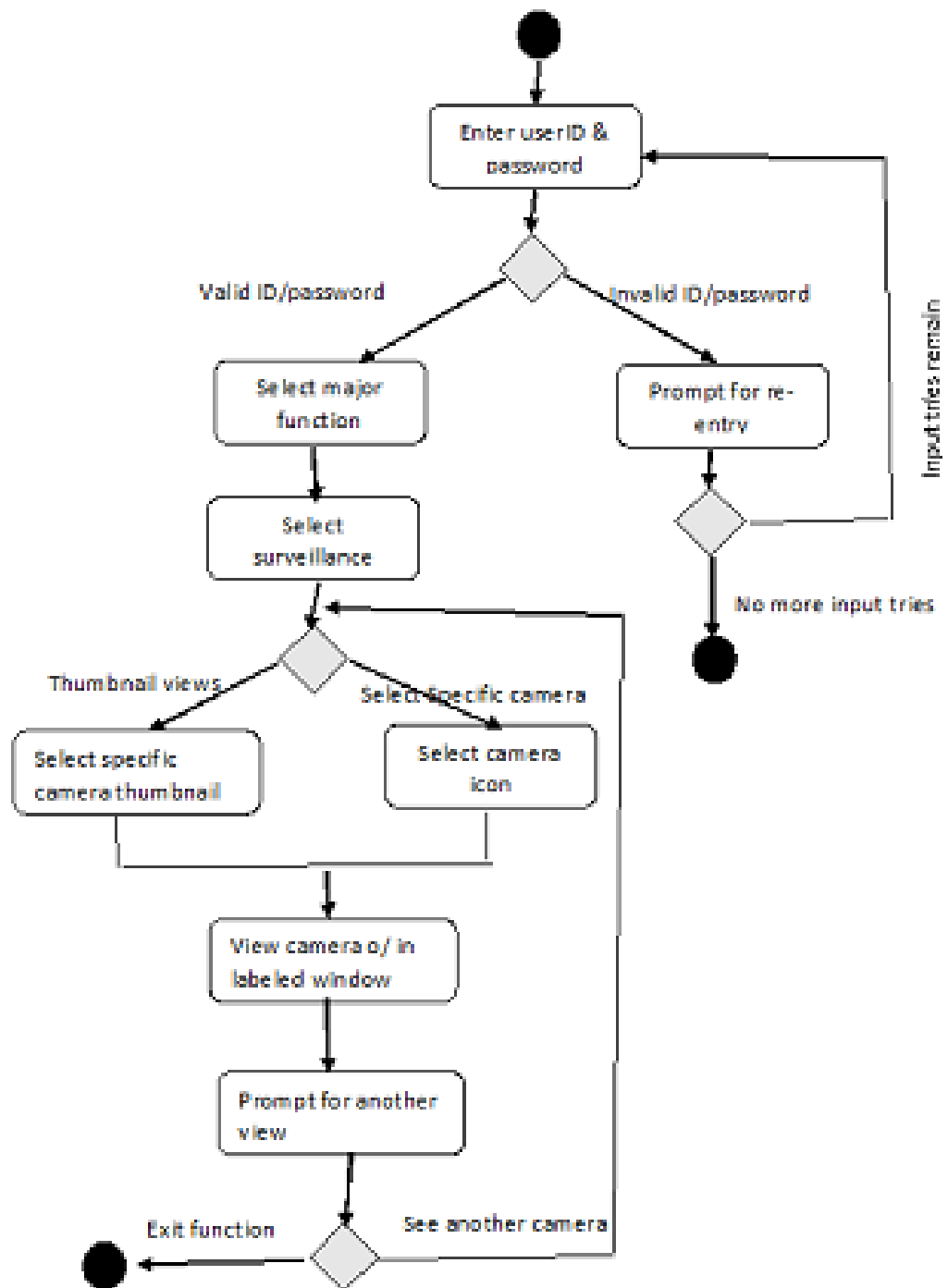
Use case diagram

Developing activity diagram

- A graphical representation of flow of interaction within specific scenario, similar to flow chart

- Rectangle - [ ] - represents specific system function

- Arrows - → flow

- Decision diamonds - ◇ - branching decision

- Solid horizontal line - —— parallel activities

Developing activity diagram

- Activity diagram for access camera surveillance -

Swim lane diagram

- A useful variation of activity diagram
- Allows to represent flow of activities decribed by the use-case
- Also indicates which actor or analysis class has responsibility for the action
- All actors/responsibilities are represented as parallel segment
- Diagram is divided vertically like lanes in a swimming pool
- In this example 3 analysis classes

Swim lane diagram

- A useful variation of activity diagram
- Allows to represent flow of activities decribed by the use-case
- Also indicates which actor or analysis class has responsibility for the action
- All actors/responsibilities are represented as parallel segment
- Diagram is divided vertically like lanes in a swimming pool
- In this example 3 analysis classes