

**RUP Vision Document for the  
Home Appliance Control System:  
Defining Stakeholders, Goals, and COTS Components**

**Technical Report UTDCS-17-04**

**Lawrence Chung, Department of Computer Science UTD  
Kendra Cooper, Department of Computer Science UTD  
Sam Courtney, Rational software, IBM Software Group**

# Home Appliance Control System Vision

Version 1.3

## Revision History

| Date       | Version | Description  | Author      |
|------------|---------|--|-------------|
| 01/11/2003 | 1.0     | Preliminary version of the Home Appliance Control System   | K. Cooper   |
| 03/15/2004 | 1.1     | Updates  | S. Courtney |
| 05/05/2004 | 1.2     | Added Appendix A<br>(preliminary set of components)<br>Removed some of the empty (TBD)<br>sections | K. Cooper   |
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# 1. Introduction

## 1.1 Purpose

The purpose of this document is to collect, analyze, and define high-level needs and features of the Home Appliance Control System. It focuses on the capabilities needed by the stakeholders, and the target users, and why these needs exist. The details of how the Home Appliance Control System fulfills these needs are detailed in the use-case and supplementary specifications.

## 1.2 Scope

This Vision Document applies to the Home Appliance Control System (HACS), which will be developed by the UTD CARE Development team. The UTD CARE team will develop this client-server system to interface with existing alarm monitoring systems. The (HACS) monitors, controls, and coordinates a wide variety of home appliances such as the air conditioner, microwave oven, radios, televisions, CD players, indoor and outdoor lighting, water sprinkler, and home security and safety systems. The system supports local access through a keypad and remote access through land-line phones, cell phones or handheld computers (e.g., palm-top, personal digital assistant).

## 1.3 Definitions, Acronyms, and Abbreviations

HACS – Home Appliance Control System

## 1.4 References

TBD

# 2. Positioning

## 2.1 Business Opportunity

Simulating the presence of the homeowners is an important aspect of home security. This can involve adjusting indoor and outdoor lighting, and turning radios, CD players, and televisions on and off. In addition, a home security and safety system can have a rich variety of sensors to coordinate, monitor and control as well as emergency notification features. The primary user, a homeowner, can define sequences of lighting, radios, CD players, televisions, security, and safety events. This system will provide these functions and more to satisfy homeowners. This system is designed to be installed by alarm companies and licensed contractors and monitored using existing alarm monitoring networks.

## 2.2 Problem Statement

|                                |   |
|--------------------------------|---|
| The problem of                 | an increase in crime rates in large cities  |
| affects                        | middle income homeowners  |
| the impact of which is         | uncertainty in the safety and security of the home owners and their belongings  |
| a successful solution would be | a flexible, cost effective home safety and security system that can be easily configured by the homeowner. The product would support simulating the presence of the homeowners. This can involve adjusting indoor and outdoor lighting, and turning radios, CD players, and televisions on and off. In addition, a home security and safety system can have a rich variety of sensors to coordinate, monitor and control as well as emergency notification features. The user would be able to access the system either locally or remotely. It will be able to utilize existing alarm monitoring networks. |

## 2.3 Product Position Statement

|  |  |
|--|--|
| For                                      | Middle income homeowner  |
| Who                                      | Feel the need for a home safety and security system that provides more than a monitoring service to deter and detect break-ins.  |
| The Home Appliance Control System (HACS) | Is a software and hardware product   |
| That                                     | provides the ability to choreograph indoor lights, outdoor lights, and entertainment equipment such as CD players and TV's to deter potential burglars, provide monitoring for smoke and carbon monoxide detectors and for detecting break-ins   |
| Unlike                                   | current available monitoring systems that do not support the choreography of lights and entertainment equipment to simulate the homeowners moving about their homes and do not support the capability to remotely control or check the status of the system.   |
| Our product                              | monitors, controls, and coordinates a wide variety of home appliances such as the air conditioner, microwave oven, radios, televisions, CD players, indoor and outdoor lighting, water sprinkler, and home security and safety systems. The system supports local access through a keypad and remote access through landline phones, cell phones or handheld computers (e.g., palm-top, personal digital assistant). |

## 3. Stakeholder and User Descriptions

### 3.1 Market Demographics

The target market segment includes middle income homeowners living in medium and large cities. The users are anticipated to be consumers who already use cell phones on a regular basis for personal and/or business use. Most homes with alarms are above \$275,000 in market value. We are new in this area but we will align with one or more alarm hardware companies that will help us penetrate the market with this new technology.

### 3.2 Stakeholder Summary

#### Non-User Stakeholders

| Name                   | Description   | Responsibilities  |
|------------------------|---|---|
| System Analyst         | This is a stakeholder that works with the stakeholders to gather their needs.   | Leads and coordinates requirements elicitation and use-case modeling by outlining the system's functionality and delimiting the system; for example, identifying what actors exist and what use cases they will require when interacting with the system. |
| Requirements Specifier | This is a stakeholder that works with the Analysts to correctly translate requests/needs into requirements to be used for design. | Specifies the details of one or more parts of the system's functionality by describing one or the aspects of the requirements, this will include functional and non-functional.   |
| Technical Reviewer     | This is a stakeholder that must be involved regularly to maintain the development cycle.  | Responsible for contributing feedback to the review process. This role is involved in the category of review that deals with the technical review of  |

|                    |  |  |
|--------------------|--|--|
| Software Architect | This is a stakeholder that is primary for leading the system development.                  | project artifacts. This role is responsible for providing timely, appropriate feedback on the project artifacts being reviewed.<br>Responsible for the software architecture, which includes the key technical decisions that constrain the overall design and implementation for the project.<br>Ensures that the system is going to be maintainable and the architectural solution supports the functional and non-requirements. |
| Project Manager    | This is a stakeholder that is primary for leading the system development.                  | Plans, manages and allocates resources, shapes priorities, coordinates interactions with customers and users, and keeps the project team focused. Also establishes a set of practices that ensure the integrity and quality of project artifacts.  |
| Market Analyst     | This is a stakeholder that will assist our abilities to position our product successfully. | Ensures that there is going to be a market demand for the product's features and for the new service.  |

### 3.3 User Summary

| Name           | Description                    | Responsibilities   | Stakeholder |
|----------------|--------------------------------|--|-------------|
| Homeowner      | Primary end user of the system | choreograph indoor lights, outdoor lights, CD player, TV, monitor status of the system, start a choreographed sequence, stop a choreographed sequence, receives notification when a 911 emergency call is made | Self        |
| Business Owner | End user of the system         | choreograph indoor lights, outdoor lights, CD player, TV, monitor status of the system, start a choreographed sequence, stop a choreographed sequence, receives notification when a 911 emergency call is made | Self        |
| Customer Care  | End user of the system         | monitor the status of the system and can send a 911 emergency call, assist Homeowners with system operation.   | Self        |

### 3.4 User Environment

The users access the HACS remotely and locally. Remote access is wireless (cell phone, personal data assistant) or using a landline (dial-up modem). The following operating systems for the mobile devices are supported: Tynex (from PalmPalm Technologies Inc.), Smartphone 2003 (from Microsoft), Palm OS (from Palm Inc.) and the Pocket PC (from Microsoft).

The HACS interfaces to the following security monitoring companies: Brinks, ADT.

### 3.5 Stakeholder Profiles

#### 3.5.1 Homeowner

|                         |  |
|-------------------------|--|
| <b>Representative</b>   |  |
| <b>Description</b>      | A private individual that will use the system for protecting their home.       |
| <b>Type</b>             | This is a casual user, possibly with previous use of alarm monitoring systems. |
| <b>Responsibilities</b> | Ensure that the necessary comforts and security are provided to satisfy the    |



|                          |   |
|--------------------------|---|
|                          | typical Homeowner.  |
| <b>Success Criteria</b>  | The success is completely defined by the customers continuing business with using our system.                     |
| <b>Involvement</b>       | We will have sample customers to help evaluate our design and market research results will also guide our vision. |
| <b>Deliverables</b>      |   |
| <b>Comments / Issues</b> |   |

### 3.5.2 Business Owner

|                          |   |
|--------------------------|---|
| <b>Representative</b>    |   |
| <b>Description</b>       | A commercial individual that will use the system for protecting their business.                                   |
| <b>Type</b>              | This is a casual user, possibly with previous use of alarm monitoring systems.                                    |
| <b>Responsibilities</b>  | Ensure that the necessary comforts and security are provided to satisfy the typical Business Owner.               |
| <b>Success Criteria</b>  | The success is completely defined by the customers continuing business with using our system.                     |
| <b>Involvement</b>       | We will have sample customers to help evaluate our design and market research results will also guide our vision. |
| <b>Deliverables</b>      |   |
| <b>Comments / Issues</b> |   |

### 3.5.3 Customer Care

|                          |  |
|--------------------------|--|
| <b>Representative</b>    |  |
| <b>Description</b>       | An individual that will assist homeowners and business owners with using the system for protecting their home and businesses.  |
| <b>Type</b>              | This is an advanced user with experience in supporting similar alarm monitoring systems.   |
| <b>Responsibilities</b>  | Ensure that the system can provide the necessary comforts and security to satisfy the typical Homeowner and Business Owner and that they can rapidly respond in assisting them in an emergency or normal business operation. |
| <b>Success Criteria</b>  | The success is completely defined by the ability for the Customer Care group to eliminate negative customer complaints about getting support while using our system.   |
| <b>Involvement</b>       | We will have internal Customer Care members on our project team to help evaluate our design and guide our vision.  |
| <b>Deliverables</b>      | End user support manuals, Technical reference manuals.   |
| <b>Comments / Issues</b> |  |

### 3.6 User Profiles

See previous section.

### 3.7 Key Stakeholder or User Needs

| Need                    | Priority         | Concerns   | Current Solution | Proposed Solutions  |
|-------------------------|------------------|--|------------------|---|
| Secured access          | High             | Management of private user information                                       | None             | Manage user access with PIN numbers and encryption  |
| Scalable                | Moderate         | None   | None             | Allow ample number of access channels for end users, managed with high volume server hardware.                        |
| Easy to use             | High             | Ability to provide intuitive navigation for all wireless devices             | None             | Provide user friendly, highly intuitive, help guided navigation in application regardless of wireless device in use.  |
| Responsive              | Moderate to High | Ability to rely on third party communication links for prompt response times | None             | Create business partnerships with third party providers to ensure prompt response times.                              |
| Flexible (configurable) | High             | Ability to provide a truly customized user experience                        | None             | Provide a simple, yet robust, ability for the end user to customize the application to enhance their user experience. |

### 3.8 Alternatives and Competition

#### 3.8.1 House Sitter

#### 3.8.2 Home Security System and Monitoring Company

## 4. Product Overview

### 4.1 Product Perspective

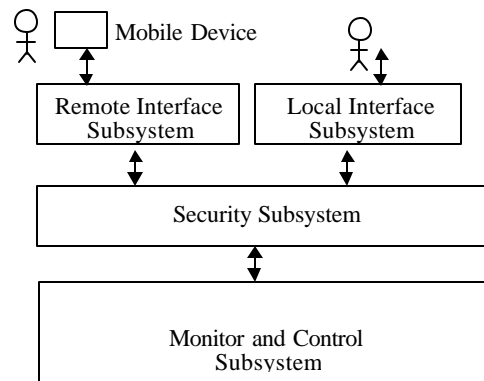


Figure 1 Overview of the HACS Architecture

### 4.2 Summary of Capabilities

Table 4-1 Customer Support System

| Customer Benefit                                      | Supporting Features   |
|---|---|
| Convenient, flexible access to the system             | Remote (wireless) and local access  |
| Secured access to the system                          | authentication, access control to the system  |
| System responds quickly                               |   |
| Simulate the presence of homeowners to deter burglars | <b>Choreograph Indoor Lighting</b><br>The HACS provides capabilities to turn on and off one or more selected indoor lights, all indoor lights, and allows the primary user to choreograph sequences of lights going on and off at different times to simulate the homeowners moving about their home. The primary user may define up to twenty different sequences for the indoor lights. The sequences can be scheduled to play out either in a specific order or in a random order. The sequences are categorized as weekday or weekend sequences.<br><br>The HACS can support monitoring and controlling up to fifty indoor lights. The indoor lights can be in the main home or in an attached or separate garage.<br><br>The HACS can automatically adjust the schedule for daylight savings time changes. |

**Choreograph Outdoor Lighting**

The HACS provides capabilities to turn on and off one or more selected outdoor lights, all outdoor lights, and allows the primary user to choreograph sequences of lights going on and off at different times to deter burglars from going onto the property. The primary user may define up to twenty different sequences for the indoor lights. The sequences can be scheduled to play out either in a specific order or in a random order. The sequences are categorized as weekday or weekend sequences.

The HACS can support monitoring and controlling up to fifty outdoor lights.

The HACS can automatically adjust the schedule for daylight savings time changes.

**Choreograph Entertainment Equipment**

The HACS provides capabilities to turn on and off one or more selected radios, cd players, and televisions, and allows the primary user to choreograph sequences of radios, cd players, and televisions going on and off at different times to simulate the homeowners' presence. The primary user may define up to twenty different sequences for the radios, cd players, and televisions. The sequences can be scheduled to play out either in a specific order or in a random order. The sequences are categorized as weekday or weekend sequences.

The HACS can support monitoring and controlling up to ten radios, cd players, or televisions.

The HACS can automatically adjust the schedule for daylight savings time changes.

|   |  |
|---|--|
| <b>Monitor and Control Safety and Security features</b> | <p>The HACS provides capabilities to co-ordinate, monitor, and control security and safety related equipment. The primary user can choreograph sequences of sensor and notification features going on and off at different times to simulate the homeowners' presence. The primary user may define up to twenty different sequences for the sensors, security cameras, security VCRs, and notification features.</p> <p>The sensors include door sensors, window sensors, motion sensors inside the home or garage, motion sensors outside the home or garage, infrared sensors inside the home or garage, infrared sensors outside the home or garage.</p> <p>The notification features include monitoring smoke and carbon monoxide detectors inside the home or garage, automatic 911 notification of fire, break-in, and medical alert 911 emergency request for ambulance.</p> <p>The sequences can be scheduled to play out in a specific order. The sequences are categorized as weekday or weekend sequences. The HACS can support monitoring and controlling up to 50 sensors.</p> <p>The HACS can automatically adjust the schedule for daylight savings time changes.</p> |
| <b>Scalable</b>   | Supports the monitoring and controlling of a large number of lights, entertainment equipment, and sensors.   |

### 4.3 Assumptions and Dependencies

The HACS is developed using a component based software engineering approach. A preliminary collection of components identified is in Appendix A.

### 4.4 Cost and Pricing

TBD

### 4.5 Licensing and Installation

The product requires professional installation. It must be installed by licensed personnel only.

## 5. Product Features

### 5.1 Start system

The Homeowner and Business Owner need to be able to start up and initialize the system either locally or remotely.

### 5.2 Shutdown system

The Homeowner and Business Owner need to be able to shutdown the system gracefully either locally or remotely.

### 5.3 View status of system

The Homeowner and Business Owner need to be able to view the status of the system gracefully either locally or remotely.

**The following features relate to choreographing a group of sequences, such as the lighting and music sequences for a four day business trip.**

- 5.4 Add a new group of sequences**
- 5.5 Modify an existing group of sequences**
- 5.6 Delete an existing group of sequences**
- 5.7 Categorize a group**
- 5.8 Schedule a group**
- 5.9 Start a group**
- 5.10 Stop a group**

**The following features relate to viewing the status of the system**

- 5.11 View the status of whole system**
- 5.12 View the status of indoor lights**
- 5.13 View the status of outdoor lights**
- 5.14 View the status of entertainment equipment (radios, cd players, televisions)**
- 5.15 View the status of the safety system**
- 5.16 View the status of the security system**

**The following features relate to choreographing a sequence of indoor lights.**

- 5.17 Make a new sequence**
- 5.18 Modify an existing sequence**
- 5.19 Delete an existing sequence**
- 5.20 Schedule a sequence**
- 5.21 Start a sequence**
- 5.22 Stop a sequence turn on indoor lights (all)**
- 5.23 Turn off indoor lights (all)**
- 5.24 Turn on selected indoor lights**
- 5.25 Turn off selected indoor lights**

**The following features relate to choreographing a sequence of outdoor lights.**

- 5.26 Make a new sequence**
- 5.27 Modify an existing sequence**
- 5.28 Delete an existing sequence**
- 5.29 Schedule a sequence**
- 5.30 Start a sequence**
- 5.31 Stop a sequence turn on outdoor lights (all)**
- 5.32 Turn off outdoor lights (all)**
- 5.33 Turn on selected outdoor lights**
- 5.34 Turn off selected outdoor lights**

**The following features relate to choreographing a sequence of entertainment equipment.**

- 5.35 Make a new sequence**
- 5.36 Modify an existing sequence**
- 5.37 Delete an existing sequence**
- 5.38 Schedule a sequence**
- 5.39 Start a sequence**
- 5.40 Stop a sequence**
- 5.41 Turn on radios, cd players, televisions (all)**
- 5.42 Turn off radio, cd player, television (all)**
- 5.43 Turn on selected radio, cd player, television**
- 5.44 Turn off selected radio, cd player, television**

**The following features relate to the safety and security features in the system.**

**5.45 Automatic notification of emergency**

**5.46 Make a new sequence**

**5.47 Modify an existing sequence**

**5.48 Delete an existing sequence**

**5.49 Schedule a sequence**

**5.50 Start a sequence**

**5.51 Stop a sequence**

**5.52 Turn on security system (all features)**

**5.53 Turn off security system (all features)**

**5.54 Turn on safety system (all features)**

**5.55 Turn off safety system (all features)**

**5.56 Turn on selected features of security system**

door sensors, window sensors, motion sensors inside the home or garage, motion sensors outside the home or garage, infrared sensors inside the home or garage, infrared sensors outside the home or garage, security cameras, security VCRs

**5.57 Turn off selected features of security system**

door sensors, window sensors, inside the home or garage, motion sensors outside the home or garage, infrared sensors inside the home or garage, infrared sensors outside the home or garage

**5.58 Turn on selected features of safety system**

smoke detectors inside the home or garage, automatic 911 notification of fire, break-in, medical alert 911 emergency request for ambulance

**5.59 Turn off selected features of safety system**

smoke detectors inside the home or garage, automatic 911 notification of fire, break-in, medical alert 911 emergency request for ambulance

## **6. Constraints**

### **6.1 Security**

Security for the HACS includes authentication, access control, data integrity, and data privacy.

Authentication of the user is by identifier and password.

Homeowners and Business Owners can monitor and change the state of the system.

Customer Care users can only monitor the system and manually place a medical alert 911 emergency request for an ambulance.

Transmissions should be encrypted for privacy.



## **6.2 Usability**

Easy to use (especially safety related features)

Request for an ambulance, police or fire truck needs to be at the push of a button or voice activated

## **6.3 Responsiveness**

System responds quickly to user requests or changes in the environment.

System responds within 2 seconds on average to local user requests and changes in the environment.

System responds within 4 seconds on average to remote user requests and changes in the environment.

## **6.4 Capacity**

Maximum number of sequences for indoor lights is twenty (20)

Maximum number of indoor lights that can be controlled is fifty (50)

Maximum number of sequences for outdoor lights is twenty (20)

Maximum number of outdoor lights that can be controlled is fifty (50)

Maximum number of sequences for radios, CD players, televisions is twenty (20)

Maximum number of radios, CD players, televisions that can be controlled is ten (10)

Maximum number of sequences for safety and security equipment is twenty (20)

Maximum number of sensors, security cameras, security VCRs, emergency notifications, that can be controlled is fifty (50)

## **Appendix A. COTS Components**

A preliminary collection of components that may be possible matches for use are summarized in this section. A rich set of standard compliant COTS components is expected to be available for this system to provide security, communication, multimedia, compression, etc. capabilities.

Product name: Windows Mobile Developer Resource Kit

Additional information available at:

<http://msdn.microsoft.com/mobility/prodtechinfo/platforms/windowsmobile/resourcekit/default.aspx>

Vendor: Microsoft Inc.

Overview: The Windows Mobile Developer Resource Kit contains all the new SDKs for Windows Mobile 2003, emulator images and content for developing Windows Mobile 2003 Second Edition applications. The Resource Kit DVD includes eMbedded Visual C++ 4.0, Pocket PC 2003 SDK, Smartphone 2003 SDK

Product name: Java specification request (JSR) 000177 Security and Trust Services API for J2ME™

Additional information available at: <http://jcp.org/aboutJava/communityprocess/first/jsr177/index.html>

Vendor: Sun Microsystems Inc.

Overview: The JSR defines a collection of APIs that provide security services to J2ME enabled devices. These services rely on the interaction with a Security Element in the device for secure storage and execution to secure storage to protect sensitive data (e.g., private keys, public key (root) certificates, service credentials, personal information, etc. ), secure execution (e.g., cryptographic operations to support payment protocols, data integrity, and data confidentiality), and custom and enabling security features that J2ME applications can rely on to handle many

valued-added services (e.g., such as user identification and authentication, banking, payment, ticketing, loyalty applications, digital media play, etc.)

Note: proposed final draft available, version 1.0

Product name: Java Authentication and Authorization Service

Additional information available at: <http://java.sun.com/products/jaas/>

Vendor: Sun Microsystems Inc.

Overview: The Java Authentication and Authorization Service (JAAS) is a set of APIs that enable services to authenticate and enforce access controls upon users. JAAS supports the reliable and secure determination of who is currently executing Java code, regardless of whether the code is running as an application, an applet, a bean, or a servlet. It implements a Java technology version of the standard Pluggable Authentication Module (PAM) framework, and supports user-based authorization.

Product name: PDASecure

Additional information available at: <http://www.pcguardiantechnologies.com/PDASecure/index.html>

Vendor: PC Guardian Technologies, Inc.

Overview: PDASecure™ encrypts data on PDA devices, requires users to authenticate themselves to devices before data can be decrypted, and offers centralized policy management of protected devices. Six different selectable encryption algorithms are supported including the Advanced Encryption Standard (AES, based on the "Rijndael" algorithm, with a 128-bit encryption key). In addition, PDASecure uses the MD5 hash algorithm to protect passwords. This product supports Pocket PC/Pocket PC 2002 devices, Palm OS 3.0 and higher, smart phones, and BlackBerry, Symbian operating systems.

Product name: PDA Protect

Additional information available at:

[http://whitepapers.informationweek.com/detail/PROD/1072086990\\_744.html&src=iw](http://whitepapers.informationweek.com/detail/PROD/1072086990_744.html&src=iw)

Vendor: Transaction Security, Inc.'s

Overview: PDA-Protect has been developed for Pocket PC 2002 device access control. It is used to control the release of the password to enable the device at power-up or whenever a password is required. This means that the Password will not have to be remembered or entered each time it is used and a record of it may be stored in a secure location for access.

Product name: Bluefire Mobile Firewall (Plus)

Additional information available at: [http://www.bluefiresecurity.com/mobile\\_firewall\\_plus.php](http://www.bluefiresecurity.com/mobile_firewall_plus.php)

Vendor: Bluefire Security Inc.

Overview: Bluefire Mobile Firewall Plus is a security solution for mobile and wireless applications, providing firewall protection, intrusion prevention, integrity management, enforced authentication, FIPS 140-2 validated encryption and enterprise security management features. It provides a fast, compact firewall that is portable across a range of PDAs and, is optimized to run on small, low-power devices (via patent-pending compression technology). The solution operates over multiple communication protocols including 802.11, CDMA and GPRS to provide always-on, device-level security.