Department of Computer Science and Engineering
The University of Texas at Arlington

Maverick Audio Visual Security Systems

(MAVS Systems)

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1. Product Services and Summary

1.1.   Purpose

The purpose of this project is to build an integrated security system that allows the user to maintain complete control over the security of their property without requiring a third party monitoring service.

1.2.   Document Overview

This document is to provide specific, mandatory requirements of the project.

Chapter 1 Product Services and Summary	Provides an overview of the project and this document
Chapter 2 Environments	Provides a description of each environment in which this product will be developed, used or maintained
Chapter 3 External Interface and Data Flows	Provides the definitions of all external data items and data flows. Does not contain internal data items or data flows
Chapter 4 Customer Requirements	Requirements originated by customers
Chapter 5 Localization Requirements	Requirements to adapt the product for a specific language and/or cultural usage
Chapter 6 Marketing and Sales Requirements	Requirements originated and/or in support of Marketing and Sales
Chapter 7 Administrative Requirements	Requirements imposed by the organization's administrative procedures
Chapter 8 Development Requirements	Requirements originated by the development team
Chapter 9 Quality Assurance Requirements	Requirements originated by and/or in support of Quality Assurance
Chapter 10 Safety Requirements	Requirements imposed by law, regulation or common sense whose primary purpose is the assurance of product safety
Chapter 11 Standards Compliance	A compendium of standards (ANSI, ISO, CCITT, etc.) and regulations to which the product must conform.

	Conformance shall be stated as a requirement
Chapter 12 Maintenance Requirements	Requirements aimed at increasing maintainability
Chapter 13 Support Requirements	Requirements necessary for the required level of support
Chapter 14 Performance Requirements	Requirements constraining reliability, speed, etc.; includes most constraints
Chapter 15 System Constraint Requirements	Constraints derived from limitations
Chapter 16 Exception Conditions and Handling	External exceptions and behavior
Chapter 17 Early Subsets and Implementation Priorities	Skeleton incremental development plan
Chapter 18 Foreseeable Modifications and Enhancements	Prognostications of the product
Chapter 19 Acceptance Criteria	Details of product acceptance criteria
Chapter 20 Design Guidelines	Ideas and general information about the design of the product
Chapter 21 Assumptions	Assumptions made for the product
Chapter 22 Sources of Information	Sources (oral and written) of information that applies to this product
Chapter 23 Use Cases	Use cases for all externals
Chapter 24 Glossary of Terms	An aggregation of each chapter's terms

1.3.   Scope

The MAVS System will allow the user to receive customizable alerts based on alert profiles.

The MAVS System will receive input from various sensors and determine activity on the property which will trigger an alert. The user will be able to customize the sensitivity of the motion sensor, times and days on which to trigger alert, as well as what the system's exact response to triggers shall be. By default, when a subject is detected, the MAVS System shall activate a camera, which will pan to the appropriate position and stream video and audio to a mobile device.
The user shall be able to control the camera and system settings from the mobile device, or from the central computer located on-site. The user will be able to manually arm, trigger, de-trigger, and disarm the system from both the mobile device and the central computer. The user shall also be able to dial their local emergency services with the touch of a single button from the mobile device. The user shall be notified in the event of a communication error, or other error that prevents the system from operating normally.

1.4.   Definitions, Acronyms, and Abbreviations

CSE – Computer Science and Engineering
IC - Integrated Circuit
IEEE – Institute of Electrical and Electronics Engineers.
MAVS System – Maverick Audio Visual Security System. Name of the product.
MAVS Team – Maverick Audio Visual Security Team. Name of the Team.
SC - Sensor Controller
SOG – Standard Operating Guidelines.
SOP – Standard Operating Procedure.
SRD – System Requirements Document.
User – Refers to the property owner, manager, or security personnel
UPS - Uninterruptible Power Supply
UTA – University of Texas at Arlington.
Subject -- Refers to an entity capable of triggering the alarm.
Mobile Device -- Refers to any mobile device or tablet running Android 2.0 or greater
POE -- Point of Entry. Refers to a structural feature on a property through which persons or animals enter and exit the property, such as doors or windows.

1.5.   References

- Senior Design Doc Library
  http://ranger.uta.edu/~odell/Senior_Design_Document_Library/Senior_Design_Document_Library.htm

- Microsoft's Design Guideline for class Library Developers
  http://msdn.microsoft.com/en-us/library/czefa0ke%28v=vs.71%29.aspx

1.6.   Overall Description

The MAVS System is a security system that gives the user total control and full capabilities concerning monitoring. The MAVS System is triggered primarily by sensors configured to the user's specifications. The user can access streaming video and audio from an on-site camera with their mobile device. The user can also access these features from a central computer located on-site. The user can control the camera, configure the system settings, or instantly alert police to an emergency situation through a graphical interface from the mobile device. The MAVS System can be installed in homes, businesses, or any personal property with a secure point of entry.
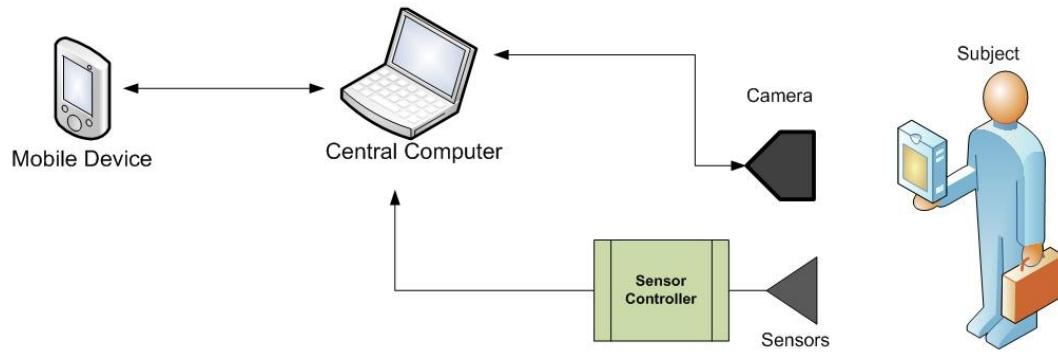
Figure 1 - Diagram of MAVS System

1.7. Product Perspectives

The MAVS System can be viewed from many different perspectives: Hardware, user interface (via mobile device or central computer), and subject interface.

1.7.1. Hardware Interfaces

The security system will contain a camera and several sensors, each of which will interface with the central computer. The central computer will be able to communicate with an Android mobile device. The following is a list of the various hardware interfaces:

- The network connecting the camera to the central computer
- The network connecting the central computer to the mobile device
- The network for connecting sensors to the integrated circuit (sensor controller)
- The integrated circuit for relaying sensor information from sensor controller to the central computer

1.7.2. User Interface

Users will interface with the security system through either the central computer or the mobile device. They will have the ability to control the entire security system from either the mobile device or the central computer. The Mobile Device user interface will be graphical and responsive to touch. The central Computer will also contain a graphical user interface and be responsive to keyboard and mouse input.

1.7.3. Subject Interface

Subjects triggering the alert shall be notified with lights, sirens, and/or audible commands depending on the user's configuration of the system. The subject will be

able to see the camera, but will be unable to control it. The camera, along with the lights, speakers, and motion sensor shall be mounted securely and discretely around the point of entry to minimize the risk of physical damage.

2. Environments

2.1.   Environment

The software shall be developed on either the Senior Design Lab computer or the team members' personal computers.

The software development environment shall be Windows XP/Vista/7. The integrated development environment used for android development will be Eclipse, with the Android SDK plugin and virtual machine.

The hardware development environment shall be the senior design lab. Construction of test components (e.g. mock door/window) may take place outside of the senior design lab in a place with necessary equipment.

2.2.   Operations Environment

The MAVS System will be installed on a property with entry points. The camera shall be installed with a clear view of activity outside the door and close enough to the central computer to allow for connectivity. The sensors will be placed in a location that is close enough to allow connectivity to the IC. The IC shall be placed in an indoor, climate controlled environment close enough to allow connectivity to both the central computer and the sensors. The central computer will be in a climate controlled environment at a temperature between 40 and 90 degrees Fahrenheit. The central computer must be close enough to the IC and the sensors to allow connectivity. The mobile device will be in an area where the user can connect to the internet (2G, 3G, 4G, or Wi-Fi).

2.3.   Maintenance Environment

Hardware Maintenance shall be handled within the senior design lab.
Software Maintenance shall occur either within the Senior Design Lab or on team members' personal computers. If necessary, maintenance may occur within the operations environment on a system consistent with development system specifications.
The maintenance shall be handled by MAVS Team until December 2011.

3. External Interface and Data Flows

3.1. Hardware Interfaces

A hardware interface shall exist between the sensors and the central computer. This interface will notify the central computer when a specific sensor has been tripped. Another hardware interface shall exist between the central computer and the mobile device; this will allow the user to access the security system remotely Internet. The Internet networks used will be separate from the MAVS system.

3.1.1. General Requirements

The MAVS system sensors shall be able to detect the presence of an entity. The system's response shall be determined by the user. The mobile device and central computer shall have access to each other over the Internet.

3.1.2. User Displays and Outputs

N/A

3.1.3. User Input

N/A

3.1.4. Control Interface

N/A

3.2. Software Interfaces

The central computer shall host the back end that interacts with the smart phone device. The interface will allow the user to access key information on the system itself. The central computer and mobile GUI should allow the user to access the security system by arming/disarming the alarm system, viewing security status, viewing live camera feed, setting alert profiles, and managing other features of the system.

3.2.1. General Requirements

The user interface for the central computer and mobile device shall provide access to the security system.

3.2.2. User Displays and Outputs

There shall be a user interface to access the security system.

3.2.3. User Input

The user interface shall provide control of the arming and disarming of the security system within the property or remotely from the mobile device.

3.2.4. Control Interface

The control interface shall consist of a set of user controls, one to arm/disarm the security system, and one to allow the user to control the view of the security camera. In addition, there will be a set of buttons to control the camera as follows:

- Pan
- Tilt
- Zoom in
- Zoom out

3.3.   High-Level Data Flow Diagram
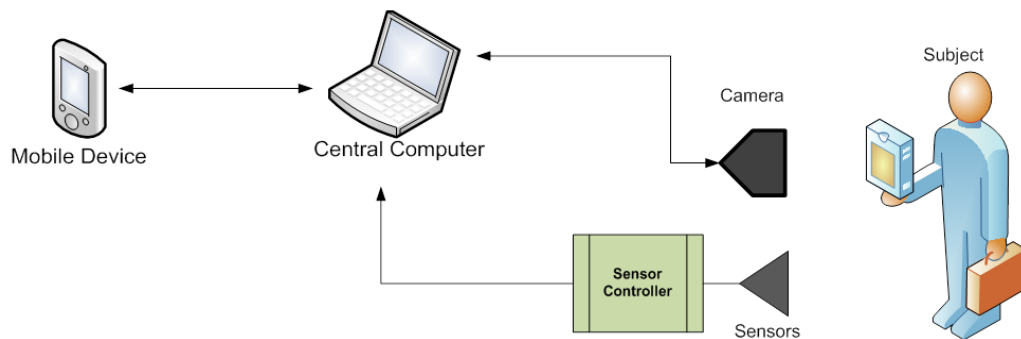
Figure 2 - Data Flow Diagram

3.4.   Logical Data Sources and Sinks

The main data sources will be derived from the sensors and the camera. The sensors' status will be regarded as data, as will images transmitted from the camera. With regard to the mobile device, the central computer can be considered a data source, since it will be the back end for the mobile device.

The main data sinks are the user interface on the central computer and the user interface within the mobile device. The central computer will have a system for storing data for the mobile device to access.

4. Customer Requirements

4.1.　General

Customer requirements are those that originate with the customer and/or his/her representative, usually marketing personnel. These requirements are the most visible and the most closely measured over the life of the product, even though they may not be the most critical. They deal with the appearance, usability, and primary functionality of the product.

4.2.　Requirements

4.2.1.　The MAVS System shall contain a camera to monitor areas of interest

4.2.1.1.　Description

The security system shall contain a camera which records and streams captured video

4.2.1.2.　Source

Sponsor

4.2.1.3.　Applicable Constraints

N/A

4.2.1.4.　Applicable Standards

N/A

4.2.2.　The camera shall be capable of panning

4.2.2.1.　Description

The camera shall be capable of panning, allowing for a wider field of view.

4.2.2.2.　Source

Sponsor

4.2.2.3.　Applicable Constraints

N/A

4.2.2.4.　Applicable Standards

N/A

4.2.3.   The camera shall be controllable from the user's mobile device

4.2.3.1.   Description

The camera's movement functions shall be controllable from the user's mobile device, allowing the user to change the camera's view point.

4.2.3.2.   Source

Sponsor

4.2.3.3.   Applicable Constraints

The user must be logged in to the system before they are allowed to control camera functions.

4.2.3.4.   Applicable Standards

N/A

4.2.4.   The camera's video feed shall be accessible from the user's mobile device

4.2.4.1.   Description

The camera's video feed shall be accessible from the user's mobile device.

4.2.4.2.   Source

Sponsor

4.2.4.3.   Applicable Constraints

Requirement assumes the user has a valid connection to the Internet from their mobile device and the user is logged in.

4.2.4.4.   Applicable Standards

N/A

4.2.5.   The camera's audio feed shall be accessible from the user's mobile device and the user shall be able to send audio back to the camera

4.2.5.1.   Description

The camera's audio feed shall be accessible from the user's mobile device, and the user shall be able to send an audio feed back to the camera.

4.2.5.2. Source

MAVS Team

4.2.5.3. Applicable Constraints

Requirement assumes that the camera used in the security system supports two-way audio. If it does not, this feature is not applicable.

4.2.5.4. Applicable Standards

N/A

4.2.6. The MAVS System shall have sensor(s) to detect motion on the property

4.2.6.1. Description

The security system shall have sensor(s) to detect when there is motion on the property.

4.2.6.2. Source

Sponsor

4.2.6.3. Applicable Constraints

Requirement constrained by the sensors' operating temperatures.

4.2.6.4. Applicable Standards

N/A

4.2.7. The MAVS System shall be able to incorporate other sensors, regardless of their type

4.2.7.1. Description

The security system should allow users to install whatever types of sensors that they choose which can be used to provide custom notifications to the user.

4.2.7.2. Source

MAVS Team

4.2.7.3.   Applicable Constraints

Requirement assumes that the sensors used provide an external voltage measurable by the security system's microcontroller.

4.2.7.4.   Applicable Standards

N/A

4.2.8.   The MAVS System shall send a notification to the user when a sensor is triggered

4.2.8.1.   Description

The security system shall send an alert to the user on his/her mobile device indicating that a sensor was triggered.

4.2.8.2.   Source

Sponsor

4.2.8.3.   Applicable Constraints

Requirement assumes that the user has a valid connection to the Internet.

4.2.8.4.   Applicable Standards

N/A

4.2.9.   The MAVS System shall allow users to call 911 with the touch of one button

4.2.9.1.   Description

The security system's mobile application shall allow users to dial 911 with the touch of one button, should the user deem it necessary.

4.2.9.2.   Source

Sponsor

4.2.9.3.   Applicable Constraints

Requirement assumes that the user has a valid connection to the mobile network and an alert has been triggered.

4.2.9.4.   Applicable Standards

N/A

4.2.10. The MAVS System shall handle user unavailability

4.2.10.1. Description

The security system shall be able to handle user unavailability. If there is a high priority alert and the user does not reply within a user specified time, the system will begin to notify other trusted users that the user has specified in a "chain"-like fashion.

4.2.10.2. Source

MAVS Team

4.2.10.3. Applicable Constraints

Requirement constrained by user's pre-defined list of those on the chain. If the list contains no people and the user does not respond, the system will not be able to notify anyone about events.

4.2.10.4. Applicable Standards

N/A

4.2.11. The MAVS System mobile application shall notify the user when it loses connectivity to the central computer

4.2.11.1. Description

Users shall be informed when they lose connection to the central computer, indicating a possible power or Internet outage.

4.2.11.2. Source

MAVS Team

4.2.11.3. Applicable Constraints

Requirement assumes that the user has a valid connection to the mobile network.

4.2.11.4. Applicable Standards

N/A

4.2.12. The user shall be able to define "zones" that the camera can automatically pan to based on triggering of select sensors

4.2.12.1. Description

The user shall be able to define various "zones" that the camera will automatically pan to should a specified sensor be triggered. This allows for a better view of the objects that triggered the event.

4.2.12.2. Source

MAVS Team

4.2.12.3. Applicable Constraints

The specified zones must be reachable by the camera. For example, if the camera can rotate left 50 degrees, the user can not specify a zone pointing 100 degrees to the left.

4.2.12.4. Applicable Standards

N/A

4.2.13. The user shall be able to view archived video from the central computer

4.2.13.1. Description

The system shall save video feeds to the central computer and allow the user to view this footage at any time. The system will differentiate between footage that had sensors triggered, and further differentiate between the severity of the sensor that was triggered.

4.2.13.2. Source

MAVS Team

4.2.13.3. Applicable Constraints

N/A

4.2.13.4. Applicable Standards

N/A

4.2.14. The MAVS System shall save logs of triggered events on the central computer

4.2.14.1. Description

The security system shall save logs of triggered events on the central computer.

4.2.14.2. Source

MAVS Team

4.2.14.3.   Applicable Constraints

N/A

4.2.14.4.   Applicable Standards

N/A

4.2.15. The user shall be able to set up profiles that establish the severity of a certain triggered event

4.2.15.1.   Description

The user shall be able to set up profiles that establish the severity of a certain triggered event.

4.2.15.2.   Source

Sponsor

4.2.15.3.   Applicable Constraints

N/A

4.2.15.4.   Applicable Standards

N/A

4.2.16. The user shall be able to set up notification profiles on their mobile device that establish how to react to notifications concerning certain triggered events

4.2.16.1.   Description

The user shall be able to set up notification profiles on their mobile device that establish how the phone will react to notifications concerning certain triggered events. For example, the user may wish for the phone to play an alarm tone when a high priority sensor is triggered.

4.2.16.2.   Source

Sponsor

4.2.16.3.   Applicable Constraints

N/A

4.2.16.4. Applicable Standards

N/A

4.2.17. The MAVS System shall notify the user when the system has lost its main power source and has reverted to using UPS backup power

4.2.17.1. Description

The security system shall notify the user when the system has lost its main power supply had has reverted to the usage of UPS power.

4.2.17.2. Source

MAVS Team

4.2.17.3. Related Constraints

Requirement assumes that a UPS back up power source is being used.

4.2.17.4. Applicable Standards

N/A

4.2.18. The MAVS System shall require user authentication for accessing camera functions, such as audio/video

4.2.18.1. Description

The security system shall require user authentication for accessing camera function, such as audio/video.

4.2.18.2. Source

Sponsor

4.2.18.3. Related Constraints

N/A

4.2.18.4. Applicable Standards

The system shall store passwords in a secure fashion by not storing them in plain-text.

5. Localization Requirements

5.1.   General

This section will specify the requirements related to making the MAVS System work in multiple locations, including international locations. This section will include information related to language, date and time display, and other parameters that may influence functionality in a remote location.

5.2.   Requirements

5.2.1. All screens shall be in English

5.2.1.1.   Description

All input and output screens shall be in English.

5.2.1.2.   Source

MAVS Team

5.2.1.3.   Applicable Constraints

N/A

5.2.1.4.   Applicable Standards

N/A

5.2.2. All documentation shall be in English

5.2.2.1.   Description

All internal and external documentation shall be in English.

5.2.2.2.   Source

MAVS Team

5.2.2.3.   Applicable Constraints

N/A

5.2.2.4.   Applicable Standards

N/A

5.2.3. All measurements shall be in United States customary system units

5.2.3.1.   Description

United States customary system shall be used for all measurements.

5.2.3.2.   Source

MAVS Team

5.2.3.3.   Applicable Constraints

N/A

5.2.3.4.   Applicable Standards

N/A

5.2.4. All dates shall be displayed in the format Month/Day/Year

5.2.4.1.   Description

The format Month/Day/Year shall be used for all dates. The value for month and day shall be displayed as two-digit representations. Year shall be displayed in a 4-digit format.

5.2.4.2.   Source

MAVS Team

5.2.4.3.   Applicable Constraints

N/A

5.2.4.4.   Applicable Standards

N/A

5.2.5. All time shall be expressed as Hour: Minute

5.2.5.1.   Description

All times shall be in the form Hour: Minute.

5.2.5.2.   Source

MAVS Team

5.2.5.3.   Applicable Constraints

N/A

5.2.5.4.   Applicable Standards

N/A

5.2.6. The MAVS System shall use 120 Volt alternating current electricity

5.2.6.1.   Description

The MAVS System shall use the standard US 120 Volt 60 Hz alternating current with type A or B plugs.

5.2.6.2.   Source

MAVS Team

5.2.6.3.   Applicable Constraints

Home electrical systems need to support the required power.

5.2.6.4.   Applicable Standards

N/A

5.2.7. The MAVS System shall communicate with mobile device via Internet

5.2.7.1.   Description

The MAVS System shall use the Internet to transmit data to the user on their mobile device.

5.2.7.2.   Source

MAVS Team

5.2.7.3.   Applicable Constraints

The mobile device operating system is Android 2.0 or higher.

The mobile device is able to access the Internet via some medium (e.g. 2G, 3G, 4G, Wi-Fi)

The central computer is connected to the Internet.

### 5.2.7.4.	Applicable Standards

N/A

6. Marketing and Sales Requirements

6.1.   General

Marketing and Sales requirements originate from and primarily benefit the marketing and sales of the product. The MAVS system is not intended to be sold on the open market. It may, however someday be transitioned into a legitimate commercial product. The MAVS system may be used to promote and market MAVS Systems and its members.

6.2.   Requirements

6.2.1. The security system hardware shall have a MAVS system logo affixed to it

6.2.1.1.   Description

A MAVS system logo shall appear on all physical components associated with the MAVS system. This includes, but is not limited to, the central computer, camera, sensors, and integrated circuit.

6.2.1.2.   Source

MAVS Team

6.2.1.3.   Applicable Constraints

N/A

6.2.1.4.   Applicable Standards

N/A

6.2.2. The MAVS system logo shall appear on all GUI interactions.

6.2.2.1.   Description

All GUI shall have a MAVS system logo.

6.2.2.2.   Source

MAVS Team

6.2.2.3.   Applicable Constraints

N/A

6.2.2.4.   Applicable Standards

N/A

7. Administrative Requirements

7.1.   General

Administrative requirements are those that facilitate the development process. These will include, but are not limited to, meeting conventions, tracking procedures, and documentation standards.

7.2.   Requirements

7.2.1. MAVS Team shall have team meetings at least twice a week

7.2.1.1.   Description

MAVS Team shall meet at least twice a week. At these meetings, team members will give status updates of their respective work. They will also be used as a medium for discussion of project related activities, delegation of workload, and review of deliverables. In some cases, these may be working meetings.

7.2.1.2.   Source

MAVS Team

7.2.1.3.   Related Constraints

Requirement constrained by the availability of team members.

7.2.1.4.   Applicable Standards

N/A

7.2.2. MAVS Team shall meet with the sponsor at least once a month

7.2.2.1.   Description

MAVS Team shall meet with the sponsor at least once a month. The purpose of this meeting will be to keep sponsor up to date on timeline and possible roadblocks to proposed implementation requirements as well as ensuring implementation plans fit sponsor's needs.

7.2.2.2.   Source

MAVS Team

7.2.2.3. Related Constraints

Requirement constrained by the availability of team members and the sponsor.

7.2.2.4. Applicable Standards

N/A

7.2.3. MAVS Team shall document all work in their Engineering Notebook

7.2.3.1. Description

MAVS Team shall maintain engineering notebooks that are complete and accurate. Team members will keep their notebooks up to date. The team leader will review the notebooks on a monthly basis.

7.2.3.2. Source

MAVS Team

7.2.3.3. Related Constraints

Requirement assumes team members have notebook in their possession and they have not been taken for review by another party.

7.2.3.4. Applicable Standards

N/A

7.2.4. MAVS Team shall keep the project plan up-to-date

7.2.4.1. Description

MAVS Team shall keep the project plan current and accurate. The project plan will be reviewed once a week by the team leader and updated as necessary.

7.2.4.2. Source

MAVS Team

7.2.4.3. Related Constraints

Requirement assumes availability of Microsoft Project

7.2.4.4. Applicable Standards

N/A

7.2.5. MAVS Team shall adhere to procedures as defined in the Team Charter

7.2.5.1. Description

MAVS Team shall follow the Team Charter with regards to communication, programming standards, documentation, risk management, and management of the project.

7.2.5.2. Source

MAVS Team

7.2.5.3. Related Constraints

Requirement constrained by the completion of the Team Charter.

7.2.5.4. Applicable Standards

N/A

7.2.6. MAVS Team shall keep the Team Charter current

7.2.6.1. Description

MAVS Team shall have a Team Charter outlining methods of communication, programming standards, documentation, risks management, and management of the project. The Team Charter shall be kept up-to-date.

7.2.6.2. Source

MAVS Team

7.2.6.3. Related Constraints

Requirement constrained by the completion of the Team Charter.

7.2.6.4. Applicable Standards

N/A

7.2.7. MAVS Team members shall maintain a time sheet

7.2.7.1. Description

MAVS Team members shall record time spent working on tasks and update a time sheet which will be used for project timeline estimations and tracking.

7.2.7.2. Source

MAVS Team

7.2.7.3. Related Constraints

N/A

7.2.7.4. Applicable Standards

N/A

7.2.8. MAVS Team shall implement risk management procedures for each stage of the design process

7.2.8.1. Description

MAVS Team shall perform risk management and mitigation techniques throughout the life cycle of the project. This will allow the team to identify potential roadblocks to timely completion of deliverables and adapt the plan accordingly.

7.2.8.2. Source

MAVS Team

7.2.8.3. Related Constraints

N/A

7.2.8.4. Applicable Standards

N/A

7.2.9. MAVS Team shall provide weekly status reports to the Project Manager

7.2.9.1. Description

MAVS Team will perform a biweekly group presentation updating the Project Manager of the status of the project. On weeks that group presentations are not required, team members will submit individual status reports.

7.2.9.2. Source

Course Syllabus

7.2.9.3. Related Constraints

Team presentations and individual reports will not be given during weeks that deliverables are due.

7.2.9.4. Applicable Standards

N/A

8. Development Requirements

8.1.　General

Development requirements benefit the development team itself. They often take the form of development standards, frequency of archives or other items not covered by SOP/SOGs and the Project Charter (project plan).

8.2.　Requirements

8.2.1. MAVS Team will use GitHub to maintain source control

8.2.1.1.　Description

MAVS Team shall use servers hosted by GitHub to maintain source control of programs, documentation, and deliverables. This will allow us to maintain the software and other documentation in a secure environment and prevent data loss.

8.2.1.2.　Source

MAVS Team

8.2.1.3.　Related Constraints

Requirement constrained by availability of GitHub.

8.2.1.4.　Applicable Standards

N/A

8.2.2. MAVS Team shall use a Hybrid Staged Delivery Model for development

8.2.2.1.　Description

MAVS Team shall use a Hybrid Staged Delivery Model for the entire project. The detailed design, implementation, and testing portion of the project shall follow the Staged Delivery Model, where user requirements are satisfied on a priority basis.

8.2.2.2.　Source

MAVS Team

8.2.2.3.　Related Constraints

Requirement constrained by ranking of requirements by sponsor.

8.2.2.4.   Applicable Standards

N/A

8.2.3.   MAVS Team shall follow coding standards common in the computing industry

8.2.3.1.   Description

MAVS Team shall follow the coding standards outlined in the document IEEE 12207-95.

8.2.3.2.   Source

MAVS Team

8.2.3.3.   Related Constraints

Requirement constrained by availability of IEEE 12207-95.

8.2.3.4.   Applicable Standards

IEEE document 12207-95

8.2.4.   MAVS Team shall architect, design, and build hardware components on a modular basis

8.2.4.1.   Description

MAVS Team shall architect, design, and build the hardware components on a modular basis. Individual hardware components can be replaced with similar components without substantially changing the architecture and design of the MAVS System. Individual components can be replaced in the future to add additional functionality to the MAVS system. Hardware components can be tested individually.

8.2.4.2.   Source

MAVS Team

8.2.4.3.   Related Constraints

Requirement constrained by budget, time, availability of hardware, and feasibility.

8.2.4.4.   Applicable Standards

N/A

9. Quality Assurance Requirements

9.1. General

Quality assurance requirements are those that either set the quality levels to be met by the product or that demand specific features to facilitate quality testing.

9.2. Requirements

9.2.1. MAVS Team shall review all documents carefully and thoroughly before completion and submission

9.2.1.1. Description

MAVS Team shall review all documents internally before completion and submission. Each component of a document shall be thoroughly reviewed by each member of the group; the author and other teammates.

9.2.1.2. Source

MAVS Team

9.2.1.3. Related Constraints

Requirement constrained by availability of team members and the size of team.

9.2.1.4. Applicable Standards

N/A

9.2.2. MAVS Team shall review the product to ensure the acceptance criteria are met.

9.2.2.1. Description

MAVS Team shall review the final product to ensure all acceptance criteria are met.

9.2.2.2. Source

MAVS Team

9.2.2.3. Related Constraints

Requirement constrained by establishment of acceptance criteria.

9.2.2.4.   Applicable Standards

N/A

9.2.3.   MAVS Team shall perform unit testing on the individual components of the MAVS system.

9.2.3.1.   Description

The MAVS team shall be responsible for performing testing on individual components of the MAVS system. Individual components should be retested and documented after every modification of the components.

9.2.3.2.   Source

MAVS Team

9.2.3.3.   Related Constraints

N/A

9.2.3.4.   Applicable Standards

N/A

9.2.4.   MAVS Team shall perform integration testing on the entire system

9.2.4.1.   Description

MAVS Team shall test the complete system to ensure the MAVS system performs properly and safely. The MAVS system shall be retested and documented after every modification.

9.2.4.2.   Source

MAVS Team

9.2.4.3.   Related Constraints

N/A

9.2.4.4.   Applicable Standards

N/A

9.2.5. MAVS System deals with power outages.

9.2.5.1. Description

MAVS system must be able to handle random power outages that may affect the security system. The MAVS system must notify the user when power outages occur.

9.2.5.2. Source

MAVS Team

9.2.5.3. Related Constraints

The system must be connected to a UPS.

9.2.5.4. Applicable Standards

N/A

9.2.6. The MAVS System will notify the user of connection status.

9.2.6.1. Description

The MAVS System should notify the user of connection status as well as connection failures.

9.2.6.2. Source

MAVS Team

9.2.6.3. Related Constraints

N/A

9.2.6.4. Applicable Standards

N/A

10. Safety Requirements

10.1. General

Safety requirements are those that affect the user's (or the maintainer's) safety in any way. Often these consist of adherence to internal or external standards, but they may also be constraints on the system to keep its characteristics within safe limits. In some cases, they may require warning labels or active devices, such as visible or audible alarms.

10.2. Requirements

10.2.1. The MAVS System shall have applicable warning labels on the hardware

10.2.1.1. Description

The MAVS System shall have warning labels on the hardware for the protection of the owners.

10.2.1.2. Source

MAVS Team

10.2.1.3. Related Constraints

N/A

10.2.1.4. Applicable Standards

N/A

10.2.2. The MAVS System shall be designed to protect people from injury

10.2.2.1. Description

The MAVS System shall not injure people who come in contract with the product. Special emphasis shall be placed on protecting children from injury.

10.2.2.2. Source

MAVS Team

10.2.2.3. Related Constraints

N/A

10.2.2.4.   Applicable Standards

N/A

10.2.3. The MAVS System shall be designed to minimize exposed sharp edges

10.2.3.1.   Description

The MAVS System shall be designed such that sharp edges shall not be exposed or exposed sharp edges shall be made as safe as possible. Special attention shall be paid for sharp edges accessible by children.

10.2.3.2.   Source

MAVS Team

10.2.3.3.   Related Constraints

Requirement assumes modifications to MAVS System are done by MAVS Team, certified installer, certified maintenance personnel, or certified support personnel.

10.2.3.4.   Applicable Standards

N/A

10.2.4. The MAVS System shall not have exposed wiring

10.2.4.1.   Description

The MAVS System shall not have any metal that carries electrical current exposed to people. All external wiring on the MAVS System shall have electrical insulation.

10.2.4.2.   Source

MAVS Team

10.2.4.3.   Related Constraints

Requirement constrained by access to exposed wiring. Requirement assumes modifications to MAVS System are done by MAVS Team, certified installer, certified maintenance personnel, or certified support personnel.

10.2.4.4.   Applicable Standards

N/A

10.2.5. The MAVS System shall be designed to remain safe through normal wear

10.2.5.1.   Description

The MAVS System shall be designed such that normal wear and tear will not result in any violation of any other safety requirement.

10.2.5.2.   Source

MAVS Team

10.2.5.3.   Related Constraints

Requirement assumes normal wear and tear. The MAVS System shall not be abused or modified by the user. The MAVS System shall be installed by a certified installer and maintained and supported by MAVS Team.

10.2.5.4.   Applicable Standards

N/A

11. Standards Compliance

11.1. General

This section contains a summary of all standards with which the product must comply. Each standard is listed as a specific requirement.

11.2. Standards

11.2.1. The product shall comply with the Senior Design Project Standard

11.2.1.1. Description

The MAVS System shall meet or exceed all standards required by Senior Design. The Senior Design standard specifies the development budget not to exceed $800.

11.2.1.2. Source

Dr. Manfred Huber.

11.2.1.3. Related Constraints

N/A

11.2.1.4. Related Standards

N/A

11.2.2. The product shall comply with the rules and regulations defined by UTA CSE

11.2.2.1. Description

The MAVS System shall meet all rules and regulation defined by UTA CSE. The MAVS System shall not alter, manipulate, modify, change, or defeat the security systems or parts thereof at UTA.

11.2.2.2. Source

Dr. Manfred Huber.

11.2.2.3. Related Constraints

N/A

11.2.2.4.   Related Standards

N/A

11.2.3. The MAVS System SRD shall comply with the System Requirements Specification standards set forth in 1233-1998 under System requirements specification – Properties

11.2.3.1.   Description

The requirements in the SRD shall have the following properties:

- Unique set - Each requirement should be stated only once.
- Normalized - Requirements should not overlap (i.e., they shall not refer to other requirements or the capabilities of other requirements).
- Linked set - Explicit relationships should be defined among individual requirements to show how the requirements are related to form a complete system.
- Complete - A SRD should include all the requirements identified by the customer, as well as those needed for the definition of the system.
- Consistent - SRD content should be consistent and non-contradictory in the level of detail, style of requirement statements, and in the presentation of material.
- Bounded - The boundaries, scope, and context for the set of requirements should be identified.
- Modifiable - The SRD should be modifiable. Clarity and non-overlapping requirements contribute to this.
- Configurable - Versions should be maintained across time and across instances of the SRD.
- Granular - This should be the level of abstraction for the system being defined.

11.2.3.2.   Source

IEEE Standard 1233-1998 IEEE Guide for Developing System Requirements Specifications section 4.2.

11.2.3.3.   Related Constraints

N/A
11.2.3.4.   Related Standards

N/A

11.2.4. The MAVS System SRD shall comply with the System Requirements Specification standards set forth in 1233-1998 under System requirements specification – Organizing requirements

11.2.4.1. Description

The requirements in the SRD shall communicate in a structured manner to ensure that the customer and technical community are able to do the following:

- Identify requirements that are derived from other requirements;
- Organize requirements of different levels of detail into their appropriate levels;
- Verify the completeness of the set of requirements;
- Identify inconsistencies among requirements;
- Clearly identify the capabilities, conditions, and constraints for each requirement;
- Develop a common understanding with the customer of the purpose and objectives of the set of requirements;
- Identify requirements that will complete the SRD.

11.2.4.2. Source

IEEE Standard 1233-1998 IEEE Guide for Developing System Requirements Specifications section 4.3.1.

11.2.4.3. Related Constraints

N/A

11.2.4.4. Related Standards

N/A

11.2.5. The MAVS System SRD shall comply with the System Requirements Specification standards set forth in 1233-1998 under System requirements specification – Benefits

11.2.5.1. Description

The requirements in the SRD shall document the complete set of system capabilities and provides the following benefits:

- Assurance to the customer that the technical community understands the customer needs and is responsive to them;
- An early opportunity for bidirectional feedback between the customer and the technical community;
- A method for the customer and the technical community to identify problems and misunderstandings while relatively inexpensive to correct;
- A basis for system qualification to establish that the system meets the customer needs;

- Protection for the technical community, providing a baseline for system capabilities and a basis of determining when the construction of the system is complete;
- Support for the developer's program planning, design, and development efforts;
- Aid in assessing the effects of the inevitable requirement changes;
- Increased protection against customer and technical community misunderstandings as development progresses.

11.2.5.2. Source

IEEE Standard 1233-1998 IEEE Guide for Developing System Requirements Specifications section 4.5.

11.2.5.3. Related Constraints

N/A

11.2.5.4. Related Standards

N/A

11.2.6. The MAVS System shall comply with the Consumer Product Safety Act

11.2.6.1. Description

The MAVS System shall comply with the Consumer Product Safety Act as defined for a consumer product.

11.2.6.2. Source

Codified at 15 U.S.C. §§ 2051–2089

11.2.6.3. Related Constraints

The MAVS System complies with Consumer Product Safety Act as defined in July 2011.

11.2.6.4. Related Standards

N/A

11.2.7. MAVS Team shall comply with the reporting requirements in the Consumer Product Safety Act

11.2.7.1. Description

MAVS System shall comply with the reporting requirement in the Consumer Product Safety Act as defined for a consumer product. MAVS Team shall monitor the safety of the MAVS System and report to the Consumer Product Safety Commission if the MAVS System becomes a potentially hazardous consumer product.

11.2.7.2.   Source

Codified at 15 U.S.C. §§ 2051–2089

16 C.F.R. parts 1115 and 1116

11.2.7.3.   Related Constraints

The MAVS System complies with Consumer Product Safety Act as defined in July 2011.

11.2.7.4.   Related Standards

N/A

12. Maintenance Requirements

12.1. General

Maintenance requirements are those that facilitate maintenance of the product. These may be in the form of test points (even in software), resident debug code, etc. Maintenance also includes later upgrading of the product

12.2. Requirements

12.2.1. MAVS Team shall perform all maintenance until December 2011

12.2.1.1. Description

The MAVS Team will perform maintenance until December 2011, after which time, the responsibility will fall on the owner of the MAVS System.

12.2.1.2. Source

MAVS Team

12.2.1.3. Related Constraints

Requirement constrained by budget.

12.2.1.4. Applicable Standards

N/A

12.2.2. MAVS System shall provide architecture documentation and a user manual

12.2.2.1. Description

MAVS System will provide a detailed user manual that will allow users to perform basic troubleshooting.

12.2.2.2. Source

MAVS Team

12.2.2.3. Related Constraints

User has the ability to understand written English.

12.2.2.4.   Applicable Standards

N/A

12.2.3. Software will be maintained in a safe location

12.2.3.1.   Description

MAVS System software will be stored in a secure repository, such that modifications and maintenance can be done without altering working versions. Should software need to be modified on a field unit, MAVS Team will perform maintenance remotely.

12.2.3.2.   Source

MAVS Team

12.2.3.3.   Related Constraints

Maintainer requires access to software repository.

12.2.3.4.   Applicable Standards

N/A

12.2.4. MAVS System will have a modular design

12.2.4.1.   Description

MAVS Team will design the system to allow for future enhancements and additions of sensors and cameras if necessary. The design will also make replacing parts simple and easy for the user or maintainer.

12.2.4.2.   Source

MAVS Team

12.2.4.3.   Related Constraints

N/A

12.2.4.4.   Applicable Standards

N/A

13. Support Requirements

13.1.   General

This section contains requirements that enable the Support department to do their job. Some of these requirements may also be maintenance requirements. Those are listed in only one place.

13.2.   Requirements

13.2.1. The MAVS System shall be replaced in case of damages until December 2011

13.2.1.1.   Description

The MAVS System shall be replaced in case of possible mechanical problem that might be encountered until December 2011.

13.2.1.2.   Source

MAVS Team

13.2.1.3.   Applicable Constraints

Requirement constrained by project budget. Requirement assumes modifications to the MAVS System are done by MAVS Team, certified installer, certified maintenance personnel, or certified support personnel.

13.2.1.4.   Applicable Standards

N/A

13.2.2. Hardware support shall be done in the field

13.2.2.1.   Description

Hardware support shall be done in the field. If the MAVS System has not been installed, MAVS Team reserves the right to bring in the MAVS System to the factory and perform hardware support.

13.2.2.2.   Source

MAVS Team

13.2.2.3.   Related Constraints

Support requires physical access to installed MAVS System.

13.2.2.4.   Applicable Standards

N/A

13.2.3. Software support shall be done remotely

13.2.3.1.   Description

Software support shall be done remotely, however MAVS Team reserves the right to perform software maintenance in the field. If the MAVS System has not been installed or inaccessible remotely, MAVS Team reserves the right to bring in the MAVS System to the factory and perform software support.

13.2.3.2.   Source

MAVS Team

13.2.3.3.   Related Constraints

Support requires network access to MAVS System software.

13.2.3.4.   Applicable Standards

N/A

13.2.4. MAVS Team shall provide a user manual for the MAVS System

13.2.4.1.   Description

The team shall furnish a user manual for the MAVS System to help owners use, maintain, and upgrade the MAVS System.

13.2.4.2.   Source

MAVS Team

13.2.4.3.   Related Constraints

N/A

13.2.4.4.   Applicable Standards

N/A

13.2.5. The camera shall be replaced if defective

13.2.5.1.   Description

The defective camera shall be replaced with a new camera if the camera stops working until December of 2011.

13.2.5.2.   Source

MAVS Team

13.2.5.3.   Applicable Constraints

Requirement constrained by project budget. Requirement assumes modifications to MAVS System are done by MAVS Team, certified installer, certified maintenance personnel, or certified support personnel.

13.2.5.4.   Applicable Standards

N/A

13.2.6. Defective sensors shall be replaced

13.2.6.1.   Description

In case of defect, the sensors shall be replaced until December 2011.

13.2.6.2.   Source

MAVS Team

13.2.6.3.   Applicable Constraints

Requirement constrained by project budget. Requirement assumes modifications to MAVS System are done by MAVS Team or certified install, maintenance, or support personnel.

13.2.6.4.   Applicable Standards

N/A

14. Performance Requirements

14.1.   General

Most products have performance requirements that must be explicitly stated, and for this product, they are listed below. Performance requirements relate to customer and quality assurance requirements.

14.2.   Requirements

14.2.1. The response time of the notification system in response to triggered events shall be minimal

14.2.1.1.   Description

The response time of the notification system in response to triggered events shall be minimal.

14.2.1.2.   Source

MAVS Team

14.2.1.3.   Applicable Constraints

Requirement assumes that the user has a valid network connection through their mobile device and can access the Internet. Additionally, network conditions such as bandwidth may alter the response time of the notifications.

14.2.1.4.   Applicable Standards

N/A

14.2.2. The frames per second (FPS) of the camera's video stream to the user's mobile device shall be maximal

14.2.2.1.   Description

The frames per second of the camera's video stream to the user's mobile device shall be maximal.

14.2.2.2.   Source

MAVS Team

14.2.2.3. Applicable Constraints

Requirement assumes that the user has a valid network connection through their phone and can access the Internet. Additionally, network conditions such as bandwidth may dynamically alter the amount of FPS of the stream that is transferred to the user.

14.2.2.4. Applicable Standards

N/A

14.2.3. The response time of the camera in response to movement commands shall be minimal

14.2.3.1. Description

When the user issues commands to the camera, the response time of the camera should be minimal.

14.2.3.2. Source

MAVS Team

14.2.3.3. Applicable Constraints

Requirement assumes that the user has a valid network connection through their phone and can access the Internet. Additionally, network conditions such as bandwidth may dynamically alter the response time of the camera.

14.2.3.4. Applicable Standards

N/A

14.2.4. The camera shall be able to operate effectively in normal Texas weather conditions at both day and night

14.2.4.1. Description

The camera shall be able to operate effectively in normal Texas weather conditions at both day and night.

14.2.4.2. Source

Sponsor

14.2.4.3. Applicable Constraints

Requirement constrained by budget and availability of hardware.

14.2.4.4.   Applicable Standards

N/A

14.2.5. The mobile application shall be as responsive as possible

14.2.5.1.   Description

The mobile application shall be as responsive as possible.

14.2.5.2.   Source

MAVS Team

14.2.5.3.   Applicable Constraints

N/A

14.2.5.4.   Applicable Standards

N/A

14.2.6. The mobile application shall utilize a minimum amount of mobile device resources

14.2.6.1.   Description

The mobile application shall utilize a minimum amount of phone resources.

14.2.6.2.   Source

MAVS Team

14.2.6.3.   Applicable Constraints

N/A

14.2.6.4.   Applicable Standards

N/A

15. System Constraint Requirements

15.1.   General

There are several constraints that have been derived due to a number of limitations, some of which are described as follows.

15.2.   Requirements

15.2.1. The camera shall not operate in the rain

15.2.1.1.   Description

The camera shall not operate in the rain.

15.2.1.2.   Source

MAVS Team

15.2.1.3.   Related Constraints

The requirement is derived from the availability of limited resources and budget limitations.

15.2.1.4.   Applicable Standards

N/A

15.2.2. The MAVS System shall operate on AC power

15.2.2.1.   Description

The security system shall operate on AC power. The home shall be able to provide enough AC power to run the security system. If the power is low or out, it is recommended that a back-up UPS be provided to continue operation until the user has returned home.

15.2.2.2.   Source

MAVS Team

15.2.2.3.   Related Constraints

N/A

15.2.2.4.   Applicable Standards

N/A

15.2.3. Access to the camera feeds and options shall only be accessible when the user has a connection to the Internet

15.2.3.1.   Description

Access to the camera feeds and options shall only be accessible when the user has a connection to the Internet. There will be no other means of accessing central options from the user's phone.

15.2.3.2.   Source

MAVS Team

15.2.3.3.   Related Constraints

Requirement assumes the user has Internet access through their cellular network provider.

15.2.3.4.   Applicable Standards

N/A

15.2.4. The MAVS System shall save video to the central computer only as long as there is enough disk space to hold it

15.2.4.1.   Description

The MAVS System shall save video to the central computer only as long as there is enough disk space to hold it.

15.2.4.2.   Source

MAVS Team

15.2.4.3.   Related Constraints

N/A

15.2.4.4.   Applicable Standards

N/A

16. Exception Conditions and Handling

16.1. General

All known external exceptions are detailed here.

16.2. Exceptions

16.2.1. The MAVS System fails to provide audio or video to the mobile device

16.2.1.1. Description

The MAVS System may not provide audio or video to the mobile device in some cases.

16.2.1.2. Handling

If the security system does not provide audio or video to the mobile device, reset all power and Internet connections, and make sure the settings on the central computer are correctly specified.

16.2.2. The MAVS System fails to notify the user of triggered events

16.2.2.1. Description

The MAVS System incorrectly fails to notify the user of triggered events.

16.2.2.2. Handling

The MAVS System will continue to not inform the user of triggered events. In this case, the user can view triggered events from the events log at a later time. If the notifications are not sent to the user, the MAVS System should be reset and the settings checked for correctness.

16.2.3. The MAVS System falsely allows camera access to an unauthorized user

16.2.3.1. Description

The MAVS System falsely allows camera access to an unauthorized user.

16.2.3.2. Handling

The MAVS System will allow the unauthorized user access to the camera.

16.2.4. An authorized user is denied access to the camera

16.2.4.1.   Description

The MAVS System does not allow an authorized user access to the camera.

16.2.4.2.   Handling

The MAVS System shall prevent the user from accessing the camera.

16.2.5. The user does not respond to a critical triggered event notification

16.2.5.1.   Description

The user does not respond to a critical triggered event notification.

16.2.5.2.   Handling

The MAVS System will begin notifying other authorized users, one at a time, until one of them responds to the notification. If no users respond to the notification within a user specified time, the system will again begin notifying users one at a time until the notification is responded to.

17. Early Subsets and Implementation Priorities

17.1. General

This section details the order of implementation of external requirements. The requirements are arranged into groups based upon the sponsor and other stakeholders' input.

17.2. Subsets

- Priorities are divided into three sections – High Priority, Medium Priority, and Low Priority.
- High priority requirements – Defined as critical. High priority requirements are required in order for the project to be accepted.
- Medium priority requirement – Defined as nice to have. The MAVS System should meet as many medium priority requirements as possible.
- Low priority requirements – Defined as ancillary. If time permits, the MAVS System should meet some of the low priority requirements.

17.2.1. High Priority

17.2.1.1. *The MAVS system shall contain a camera to monitor areas of interest (requirement 4.2.1)*

17.2.1.2. *The camera shall be capable of panning (requirement 4.2.2)*

17.2.1.3. *The camera shall be controllable from the user's mobile device (requirement 4.2.3)*

17.2.1.4. *The camera's video feed shall be accessible from the user's mobile device (requirement 4.2.4)*

17.2.1.5. *The MAVS System shall have sensor(s) to detect motion on the property (requirement 4.2.6)*

17.2.1.6. *The MAVS System shall send a notification to the user when a sensor is triggered (requirement 4.2.8)*

17.2.1.7. *The MAVS System shall allow users to call 911 with the touch of one button (requirement 4.2.9)*

17.2.1.8. *The user shall be able to define "zones" that the camera can automatically pan to based on triggering of select sensors (requirement 4.2.12)*

17.2.1.9. *The MAVS System shall save logs of triggered events on the central computer (requirement 4.2.14)*

17.2.1.10. *The user shall be able to set up profiles that establish the severity of a certain triggered event (requirement 4.2.15)*

17.2.1.11.   The user shall be able to set up notification profiles on their mobile device that establish how to react to notifications concerning certain triggered events (requirement 4.2.16)

17.2.1.12.   The MAVS System shall require user authentication for accessing camera functions, such as audio/video (requirement 4.2.18)

17.2.2. Medium Priority

17.2.2.1.   The camera's audio feed shall be accessible from the user's mobile device, and the user shall be able to send audio back to the camera (requirement 4.2.5)

17.2.2.2.   The MAVS System shall be able to incorporate other sensors, regardless of their type (requirement 4.2.7)

17.2.2.3.   The MAVS System shall handle user unavailability (requirement 4.2.10)

17.2.2.4.   The MAVS System mobile application shall notify the user when it loses connectivity to the central computer (requirement 4.2.11)

17.2.2.5.   The user shall be able to view archived video from the central computer (requirement 4.2.13)

17.2.3. Low Priority

17.2.3.1.   The MAVS System shall notify the user when the system has lost its main power source and has reverted to using UPS backup power (requirement 4.2.17)

18. Foreseeable Modifications and Enhancements

18.1.   General

Although there are several additional features MAVS Team would like to implement, the senior design timeline is restrictive enough that we may not get to everything. Rather than discard these requirements completely, we will list them in in this section and implement them if time allows.

18.2.   Enhancements

18.2.1. MAVS System will recognize users and allow/deny access

18.2.1.1.   Description

MAVS System will use facial recognition technology to allow access to authorized users based on their facial features. People who are not recognized will be logged. This will also be extensible to linking with databases of known criminals.

18.2.1.2.   Source

Sponsor

18.2.1.3.   Applicable Constraints

This is constrained by availability of facial recognition libraries and availability of databases with facial recognition features.

18.2.1.4.   Applicable Standards

N/A

18.2.2. MAVS System will use computer vision to track visitors instead of sensors

18.2.2.1.   Description

The incorporation of computer vision would provide many advantages when it comes to tracking and prioritizing camera position automatically.

18.2.2.2.   Source

Sponsor

18.2.2.3.   Applicable Constraints

N/A

18.2.2.4.   Applicable Standards

N/A

18.2.3. MAVS System will include dropbox integration

18.2.3.1.   Description

MAVS System central computer will automatically save images and events logs to dropbox. This will allow users to have a backup source of data should something happen to the central computer.

18.2.3.2.   Source

Sponsor

18.2.3.3.   Applicable Constraints

N/A

18.2.3.4.   Applicable Standards

N/A

18.2.4. The central computer will be a low profile self-contained computer

18.2.4.1.   Description

Instead of a PC, the central computer will become a low profile self-contained computer that is accessible from PC's within the network or from the mobile device.

18.2.4.2.   Source

Sponsor

18.2.4.3.   Applicable Constraints

N/A

18.2.4.4.   Applicable Standards

N/A

18.2.5. MAVS System will include a web interface and/or web backup

18.2.5.1.   Description

A user will be able to log into the MAVS System website and view live feeds of their home, with audio. MAVS System will also archive events to the website. An intuitive web interface will allow users to maintain complete control even if they don't have their mobile device with them.

18.2.5.2.   Source
MAVS Team

18.2.5.3.   Applicable Constraints
N/A

18.2.5.4.   Applicable Standards
N/A

18.2.6. MAVS System be able to distinguish between people and other entities

18.2.6.1.   Description
MAVS System will, through the use computer vision, be able to determine the type of entity and the alert system will take this into consideration.

18.2.6.2.   Source
MAVS Team

18.2.6.3.   Applicable Constraints
N/A

18.2.6.4.   Applicable Standards
N/A

18.2.7. MAVS System will incorporate biometrics and voice recognition

18.2.7.1.   Description
Enabling, disabling, or modifying the alarm can be done via biometrics or voice recognition.

18.2.7.2. Source

MAVS Team

18.2.7.3. Applicable Constraints

N/A

18.2.7.4. Applicable Standards

N/A

18.2.8. MAVS System will allow control of more than just the security system

18.2.8.1. Description

MAVS System will allow user to turn on perimeter lights, adjust air conditioner settings, or other household appliances and electronics from the mobile device.

18.2.8.2. Source

Sponsor

18.2.8.3. Applicable Constraints

The other devices must be either connected to the integrated circuit or have the capability to connect directly to the central computer.

18.2.8.4. Applicable Standards

N/A

19. Acceptance Criteria

19.1.   General

The final MAVS System prototype shall be deemed acceptable when all specifications, high priority requirements, and safety tests are passed. The MAVS System shall be accepted when the following criteria are met and accepted by all stakeholders.

19.2.   Criteria

19.2.1. The MAVS System shall contain a camera

19.2.1.1.   Description
The MAVS System shall contain a camera.

19.2.1.2.   Source
Sponsor

19.2.1.3.   Applicable Constraints
N/A

19.2.1.4.   Applicable Standards
N/A

19.2.2. The user shall be able to access the camera's video feed

19.2.2.1.   Description
The MAVS System shall provide the video feed from the camera to the user mobile device application.

19.2.2.2.   Source
Sponsor

19.2.2.3.   Applicable Constraints
The mobile device must have the application open and be within the mobile network.

19.2.2.4.   Applicable Standards

N/A

19.2.3. The camera shall be capable of panning

19.2.3.1.   Description

The camera shall be capable of panning through the mobile application by the user.

19.2.3.2.   Source

Sponsor

19.2.3.3.   Applicable Constraints

N/A

19.2.3.4.   Applicable Standards

N/A

19.2.4. The camera shall pan automatically when certain selected sensors are triggered

19.2.4.1.   Description

Upon the triggering of certain sensor the camera shall pan to a preset position to allow optimal viewing/recording.

19.2.4.2.   Source

MAVS Team

19.2.4.3.   Applicable Constraints

The system must be connected to at least one sensor

19.2.4.4.   Applicable Standards

N/A

19.2.5. The MAVS System shall be able to detect motion

19.2.5.1.   Description

A maximum number of 4 motion sensors shall be able to connect to the system via one sensor interface. The system should be able to receive input from each sensor and notify the user's mobile device.

19.2.5.2. Source

Sponsor

19.2.5.3. Applicable Constraints

Requirement constrained by the sensors' operating temperatures.

19.2.5.4. Applicable Standards

N/A

19.2.6. The MAVS System shall allow user to call 911 with the touch of one button

19.2.6.1. Description

The security system's mobile application shall allow users to dial 911 with the touch of one button, should the user deem it necessary.

19.2.6.2. Source

Sponsor

19.2.6.3. Applicable Constraints

Requirement assumes that the user has a valid connection to their cellphone provider's mobile network.

19.2.6.4. Applicable Standards

N/A

19.2.7. The MAVS System shall save logs of triggered events on the central computer

19.2.7.1. Description

The security system shall save logs of triggered events on the central computer.

19.2.7.2. Source

Sponsor

19.2.7.3. Applicable Constraints

N/A

19.2.7.4.   Applicable Standards

N/A

19.2.8. The user shall be able to set up notification profiles on their mobile device that establish how to react to notifications concerning certain triggered events

19.2.8.1.   Description

The user shall be able to set up notification profiles on their mobile device that establish how it will react to notifications concerning certain triggered events. For example, the user may wish for the device to play an alarm tone when a high priority sensor is triggered.

19.2.8.2.   Source

Sponsor

19.2.8.3.   Applicable Constraints

N/A

19.2.8.4.   Applicable Standards

N/A

19.2.9. The MAVS System shall require user authentication to connect to the central computer

19.2.9.1.   Description

The central computer will require user authentication to connect to it. For example the user must be login remotely via the mobile device application before accessing the video from the camera.

19.2.9.2.   Source

Sponsor

19.2.9.3.   Applicable Constraints

N/A

19.2.9.4.   Applicable Standards

The user name and password shall not be stored in plain text on the central computer.

20. Design Guidelines

20.1.   General

MAVS Team shall follow the design guidelines below in order to maintain project specifications, reliability, and feasibility.

20.2.   Guidelines

20.2.1. The team shall use The Hybrid Staged Delivery Model

20.2.1.1.   Description

The team shall implement The Hybrid Staged Delivery Model per Dr. Huber's specification. Risk analysis shall be continually developed and analyzed throughout the project lifecycle.

20.2.1.2.   Source

Dr. Huber

20.2.1.3.   Applicable Constraints

N/A

20.2.1.4.   Applicable Standards

N/A

20.2.2. The team shall develop software by the architectural structure of the product

20.2.2.1.   Description

The team shall develop needed software in accordance with the product's architectural breakdown. This will allow for ease of development. When all software development is completed, implementation with the other systems will commence.

20.2.2.2.   Source

MAVS Team

20.2.2.3.   Applicable Constraints

N/A

20.2.2.4. Applicable Standards

N/A

20.2.3. The team shall use generic coding specification, naming conventions, and class structure

20.2.3.1. Description

The team shall follow Microsoft's Design Guidelines for Class Library Developers. This will allow readability and easier debugging.

20.2.3.2. Source

MAVS Team

20.2.3.3. Applicable Constraints

N/A

20.2.3.4. Applicable Standards

http://msdn.microsoft.com/en-us/library/czefa0ke%28v=vs.71%29.aspx

20.2.4. The product shall be designed to allow for future enhancements to be added with ease

20.2.4.1. Description

The product shall be a simple and modular design, allowing future enhancements to be added with ease.

20.2.4.2. Source

MAVS Team

20.2.4.3. Applicable Constraints

N/A

20.2.4.4. Applicable Standards

N/A

21. Assumptions

- *The MAVS System will be installed on a property with a working Internet connection.*

- *The MAVS System camera will be placed in a location with a clear field of view.*

- *The MAVS System sensors will be placed in locations close enough for connection to the IC.*

- *The MAVS System will be monitored by a user.*

- *The MAVS System central computer will be in an indoor, climate controlled environment.*

- *The MAVS System central computer will run the MAVS Systems software 24 hours a day.*

- *The MAVS System central computer will be on a computer capable of running the .NET version 3.0 framework*

22. Sources of Information

- Dr. Manfred Huber – Professor who gives guidelines for development and implementation of the project

- Microsoft's Design Guideline for class Library Developers
  http://msdn.microsoft.com/en-us/library/czefa0ke%28v=vs.71%29.aspx

- Senior Design Document Library
  http://ranger.uta.edu/~odell/Senior_Design_Document_Library/Senior_Design_Document_Library.html

- United States Consumer Product Safety Act
  http://www.cpsc.gov/businfo/cpsa.pdf

- United States Consumer Product Safety Commission – Substantial Product Hazard Reports
  http://www.cpsc.gov/LIBRARY/FOIA/FOIA06/brief/part1115.pdf

23. Use Cases

23.1.   General

Use cases are included for all major external functions. These are the result of analysis of the requirements and represent the workings of the product externals.

23.2.   Use Cases

23.2.1. The user arms the system

23.2.1.1.   General

Actors: *User*

Preconditions: T*he user has an internet connection.*

Description: *The user navigates to the user interface accessing the system settings.*

Post Conditions Applying to All Paths: *The system is now armed, and can be triggered.*

23.2.1.2.   Primary Path

Summary: *The user opens the user interface on a mobile device and connects to the central computer over the network. The user navigates to the system settings.*

Post Conditions: *The user sees a notification within the mobile GUI that the system has been armed.*

Special Requirements: *None*

Frequency of Occurrence: *None*

23.2.1.3.   Alternate paths

The user opens the user interface directly on the central computer and navigates to the system settings.

23.2.1.4.   Outstanding Issues

None

23.2.2. The user controls the camera

23.2.2.1.   General

Actors: *User*

Preconditions: *User has GUI open*

Description: *The user controls the camera's pan, tilt, and zoom settings manually from within the GUI.*

Post Conditions Applying to All Paths: *The camera moves to the specified location.*

The user views the video feed from within the GUI.

23.2.2.2.   Primary Path

Summary: *The user navigates to the camera controls in the user interface on a mobile device.*

Post Conditions: *The camera moves to the specified location. The user views the video feed from within the GUI.*

Special Requirements: *None*

Frequency of Occurrence: *None*

23.2.2.3.   Alternate paths

Summary: *The user navigates to the camera controls in the user interface on the central computer.*

Post Conditions: *The camera moves to the specified location. The user views the video feed from within the GUI.*

Special Requirements: None

Frequency of Occurrence: *None*

23.2.2.4.   Outstanding Issues

None

23.2.3. The user accesses Video/Audio from within the GUI

23.2.3.1.   General

Actors: User

Preconditions: The user has the GUI open.

Description: The user accesses video from within the GUI.

Post Conditions Applying to All Paths: The user sees video displayed.

23.2.3.2.   Primary Path

Summary: Video/audio is streamed over the network from the camera, through the central computer to a mobile device.

Post Conditions: None

Special Requirements: None

Frequency of Occurrence: None

23.2.3.3. Alternate paths

Summary: Video/audio is streamed over the network from the camera to the central computer.

Post Conditions: The user views video from within the GUI.

Special Requirements: None

Frequency of Occurrence: None

23.2.3.4. Outstanding Issues

None

23.2.4. Subject triggers alert

23.2.4.1. General

Actors: Subject, User

Preconditions: The system is armed.

Description: A subject's movement is detected by a motion sensor, and the alarm is triggered.

Post Conditions Applying to All Paths: Alert is sent to user's mobile device based on profile settings.

23.2.4.2. Primary Path

Summary: subject's movement is detected by a sensor, which triggers an alert.

Post Conditions: User receives alert on mobile device.

Special Requirements: None

Frequency of Occurrence: None

23.2.4.3. Alternate paths

None

23.2.4.4. Outstanding Issues

None

23.2.5. User dials 9-1-1 from within the mobile application

23.2.5.1.   General

Actors: User

Preconditions: An alert is triggered and mobile device is connected to a mobile network.

Description: The user pushes a single button in the user interface and the mobile device dials 9-1-1.

Post Conditions Applying to All Paths: User speaks with emergency operator on mobile device.

23.2.5.2.   Primary Path

Summary: An alert is triggered. The 9-1-1 button becomes active. The user presses the button on the mobile device. The mobile device dials 9-1-1.

Post Conditions: The user speaks with emergency operator on mobile device.

Special Requirements: None

Frequency of Occurrence: None

23.2.5.3.   Alternate paths

None

23.2.5.4.   Outstanding Issues

None

23.2.6. The user disarms the system

23.2.6.1.   General

Actors: User

Preconditions: The alarm is armed.

Description: The user navigates to the system settings in the user interface and disarms the alarm.

Post Conditions Applying to All Paths: User receives notification that the system has been disarmed.

23.2.6.2.   Primary Path

Summary: The user navigates to the system settings in the user interface on the mobile device and disarms the alarm.

Post Conditions: The user receives notification that the system has been disarmed.

Special Requirements: None

Frequency of Occurrence: None

23.2.6.3.   Alternate paths

Summary: The user navigates to the system settings in the user interface on the central computer and disarms the alarm.

Post Conditions: The alarm is not armed.

Special Requirements: None

Frequency of Occurrence: None

23.2.6.4.   Outstanding Issues

None

23.2.7. The user speaks to subject

23.2.7.1.   General

Actors: User, subject

Preconditions: Subject is within audible range of camera with two way sound capability.

Description: The user speaks into mobile device and sound is transmitted to speakers mounted with camera.

Post Conditions Applying to All Paths: Subject hears user's voice

23.2.7.2.   Primary Path

Summary: The user speaks into mobile device and sound is transmitted to speakers mounted with camera.

Post Conditions: Subject hears user's voice.

Special Requirements: None

Frequency of Occurrence: None

23.2.7.3.   Alternate paths

Summary: The user speaks into a microphone attached to central computer to record sound which is later transmitted to speakers with camera.

Post Conditions: Subject hears user's recording

Special Requirements: None

Frequency of Occurrence: None

23.2.7.4.   Outstanding Issues

None

23.2.8. The user creates an alarm profile

23.2.8.1.   General

Actors: User

Preconditions: None

Description: The user navigates to the system settings in the user interface and creates an alarm profile. The user can choose days of the week and/or times of days during which the alarm is active/inactive. The user can choose alert priorities and audible notification volume.

Post Conditions Applying to All Paths: User sees notification that the alarm profile has been created and is able to select/activate it.

23.2.8.2.   Primary Path

Summary: The user navigates to the system settings in the user interface of the mobile device and creates an alarm profile. The user can choose days of the week and/or times of days during which the alarm is active/inactive. The user can choose alert priorities and audible notification volume.

Post Conditions: User sees notification that the alarm profile has been created and is able to select/activate it.

Special Requirements: None

Frequency of Occurrence: None

23.2.8.3.   Alternate paths

Summary: The user navigates to the system settings in the user interface on the central computer and creates an alarm profile. The user can choose days of the week and/or times of days during which the alarm is active/inactive. The user can choose alert priorities and audible notification volume.

Post Conditions: User sees notification that the alarm profile has been created and is able to select/activate it.

Special Requirements: None

Frequency of Occurrence: None

23.2.8.4.   Outstanding Issues

None

24. Glossary of Terms

CSE	Computer Science and Engineering
MAVS System	Maverick Audio Visual Security System: The name of the product
MAVS Team	Maverick Audio Visual Security Team. The name of our team
IEEE	IEEE (Institute of Electrical and Electronics Engineers) is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity
Sensor	A device that detects or measures a physical property and records, indicates, or otherwise responds to it.
Security	Security is the degree of protection against danger, damage, loss, and crime.
Central Computer	The main hub for computing processing for the MAVS system.
I.C.	An integrated circuit that will be the used for sensors communication to the central computer.
SOG	SOG – Standard Operating Guidelines
SOP	SOP – Standard Operating Procedure
SRD	Refers to the System Requirements Document (this document)
AC power	Alternating Current power source.
User	Home owner using the MAVS system.
UTA	University of Texas at Arlington
UPS	Uninterruptible Power Supply