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| Tunnel-K Software Design Description (SDD) |
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| **Josh Calahan, Wes Cothran, Chris Davis, Michael Lynch, Brian Pittman** |
| **12/1/2011** |

**Approvals**

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Instructor Approval: Dr. Jeffrey Kulick Date

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Team Member: Josh Calahan Date

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_**

Team Member: Wes Cothran Date

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Team Member: Chris Davis Date

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Team Member: Michael Lynch Date

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Team Member: Brian Pittman Date

**Revisions**

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| --- | --- | --- |
| **Revision Number** | **Date** | **Description** |
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### Scope

### Identification

Tunnel-K is an effort by graduate software engineering students at the University of Alabama in Huntsville enrolled in a two-semester Software Engineering Studio course (CPE656 and CPE658). The endeavor is aimed at building a small-scale wind tunnel and associated software systems and is intended to be used by science museums, schools, etc. for educational purposes. The work is being done in association with the Hands-On Science Center (HOSC) in Tullahoma, TN, and the team will draw upon their professional experience working as professional software engineers.

### System overview

The overall Tunnel-K system consists of a wind tunnel structure along with associated computer hardware and software, wiring, sensors, motors, fans, power supplies, etc. used for controlling and monitoring the operation of the tunnel. Additionally, a two-dimensional flow solver application suite will provide the opportunity for experimentation with various shapes in a virtual wind tunnel environment and graphically displayed mach and pressure gradients. The suite will also provide integration with the physical wind tunnel controls so that simulated conditions and be illustrated in the real world.

### Document overview

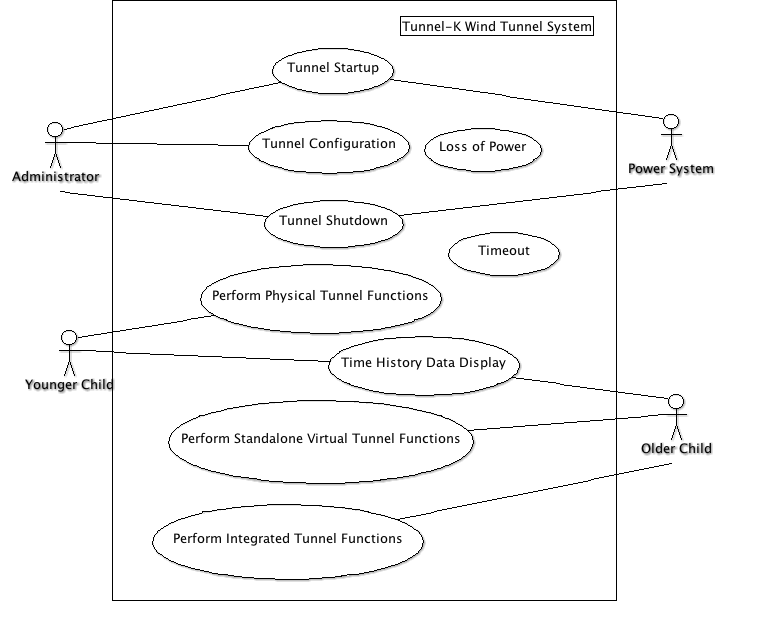
This document addresses system design issues bridging the gap between requirements and implementation. Elements in this document will tie individual requirements to their respective design issues drawing heavily on the Unified Modeling Language and existing prototypes.

### Referenced documents

* Tunnel-K Statement of Work (SOW)
* Tunnel-K Rough Order of Magnitude Estimate (ROM)
* Tunnel-K Software Requirements Specification (SRS)
* Tunnel-K Software Development (SDP)
* Tunnel-K Google Code site, <http://code.google.com/p/tunnelk>
* Tunnel-K Google Groups site, <http://groups.google.com/group/tunnelk>
* Trial-Use Standard for Information Technology Software Life Cycle Processes Software Development Acquirer-Supplier Agreement, J-STD-016-1995
* UAH CPE656 Fall 2011 Course Syllabus, Dr. Jeffry Kulick
* Code Conventions for the Java Programming Language, <http://www.oracle.com/technetwork/java/codeconvtoc-136057.html>
* Code Style Guidelines for Contributors, (Google Android Style Guide) <http://source.android.com/source/code-style.html>
* Writing a Library for Arduino, <http://arduino.cc/en/Hacking/LibraryTutorial>

### System item-wide design decision

Foremost, the team will use engineering judgment will make design decisions. UML will be used to model the software in order to refine the design on paper prior to making implementation level decisions. An appropriate balance between the hardware wind tunnel and the software wind tunnel will be sought. Here is a use case diagram of the complete system:



For a complete description of the actors, please see the system requirements document.

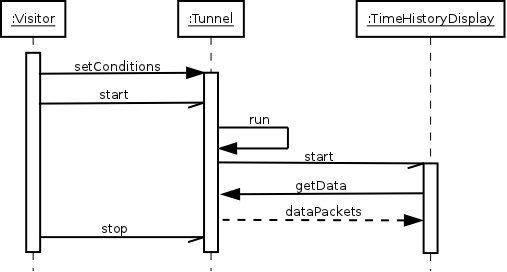
### Software item architectural design

### Software item components

* + 1. Virtual Wind Tunnel
    2. Application Controller
    3. Arduino API Routines

### Concept of execution

[wordy description of workflow] :@



### Interface design

### Interface identification and diagrams

These diagrams focus on the workflow of the Tunnel-K system. Each diagram is marked with a design designator…

### (Project-unique identifier of interface)

### Software item detailed design

### (Project-unique identifier of a software unit, or designator of a group of software units)

### Requirements traceability

This table maps requirements listed in section 3 requirements document with design solutions listed in the section 4 and 5 of this document.

|  |  |
| --- | --- |
| Requirement(s) | Addressed by Design Elements |
|  |  |

### Notes

None

### Annexes

None