

Software Requirements Specification for Chimera Extinction Coefficient Module

Version 0.1 approved

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Revision History

Name	Date	Reason For Changes	Version
Original	2/25/ 09	Original Document	1.0

1.Introduction

1.1 Purpose

The purpose of this project is to extend the current Chimera code to include a function that will find the extinction coefficient of a star given data collected from images of a star by use of a robotic telescope. This project will work in conjunction with the current code as well as work with two other projects that are being developed simultaneously.

1.2 Intended Audience and Reading Suggestions

This document is intended for developers, project managers, users, testers, and documentation writers.

1.3 Project Scope

This project specifically includes the implementation of a method to determine the extinction coefficient within the existing Chimera architecture. It also includes the creation of a user interface for this specific tool which will integrate with the existing user interface. Unanticipated issues which are experienced along the way with dependencies will be resolved and tested, but extra time will not be devoted to debugging the entire system.

1.4 References

<http://chimera.sf.net/>

<http://code.google.com/p/csc480-chimera/>

<http://code.google.com/p/chimera/>

2.Overall Description

2.1 Product Perspective

The final product will enhance what is currently written in the chimera code. Our product will use existing classes and we will be creating new ones for the purpose of calculating the extinction coefficient from images collected from the telescope.

Within Chimera, the objects that are used to control the observatory are divided into controllers, core, instruments, and utilities. Our product will be located in the controllers. Controllers are responsible for automating the instruments (hardware).

2.2 Product Features

The user will give information about the image of a particular star in the form a text file or user interface input. Based on the information given, the telescope will then take several images for the particular star at different times during the night. These images will be reduced using the photometry package automatically. All information (Name of the object, Air Mass, RA, DEC, and Flux) could conceivably be saved into a database given that one is configured. The program will plot out the magnitude, which is the $2.5 \cdot \log(\text{Flux})$ and the air mass in a form of a graph. The slope of the line is the extinction coefficient.

2.3 User Classes and Characteristics

There are two main groups of people who will be using this product. These include the astronomers and other scientists. The astronomers may not have an understanding of the underlying workings of the project but will understand the astronomical science behind it. Other scientists on the other hand may not be as experienced with the science behind the project.

2.4 Operating Environment

Chimera currently relies on the following operating environment:

- Python 2.5
- Java 6
- Subversion
- Ubuntu 8.10
- Chimera Files (install script and global configuration file)

It is possible that Chimera will run on other environments but these scenarios are currently unsupported and are outside the scope of this project.

2.5 Design and Implementation Constraints

The Chimera project itself is currently written entirely in Python with a user interface written in Java. We will continue to follow this constraint. Chimera uses a highly distributed client/server model, so great care must be taken to ensure excess network traffic is not utilized due to this module. The user interface will be developed to integrate and remain consistent with what is already in place. It is unknown what class of machine this project will be run on, so we will constrain the project to using no higher than 1024x768 screen resolution.

2.6 User Documentation

At the completion of this project there will be a users manual which explains our implementation of the extinction coefficient. We will also have completed other design documents such as UML diagrams.

2.7 Assumptions and Dependencies

This project assumes that Chimera is set up with a running server connected to a telescope dome and camera (real or simulated).

3. System Features

3.1 Calculation of Extinction Coefficient

3.1.1 Description and Priority

Calculates the extinction Coefficient of a specific star that has been photographed.
Highest Priority.

3.1.2 Stimulus/Response Sequences

User supplies a list of objects to be used
Photographs of the objects are taken
Extinction Coefficient is calculated using data from the photographs
Extinction coefficient is then available for any methods that may need it.

3.1.3 Functional Requirements

REQ-1: The calculation of the extinction coefficient must be correct.
REQ-2: Any input must be able to lead to a extinction coefficient.

3.2 Graph of Extinction Coefficient Calculation

3.2.1 Description and Priority

Whenever the user desires the graph used to calculate the extinction coefficient is shown.
Medium Priority.

3.2.2 Stimulus/Response Sequences

User selects to calculate extinction coefficient with the graph visible
Extinction coefficient is calculated (see 3.1)
Graph from extinction coefficient data is displayed

3.2.3 Functional Requirements

REQ-1: Correctly working Extinction Coefficient calculation
REQ-2: Presenting this graph in a clear and concise manor.
REQ-3: Calculating a Best Fit Line and displaying it on the graph.

3.3 Creation of a User Interface

3.3.1 Description and Priority

Creation of an interface for the display of requirement 3.2 and integrating it with the existing user interface.
Medium Priority

3.3.2 Functional Requirements

REQ-1: Help graphically display requirement 3.2

4. External Interface Requirements

4.1 User Interfaces

The user interface will consist of both a console command system and a graphical user interface capable of displaying the extinction coefficient graph.

4.2 Hardware Interfaces

The extinction coefficient module does not directly access hardware, but accesses it indirectly through the Chimera instruments package.

4.3 Software Interfaces

The extinction coefficient module relies on several other Chimera modules using standard Python classes and function calls. These interfaces include the camera, point verification, and photometry modules.

4.4 Communications Interfaces

The extinction coefficient is built on top of other Chimera components that provide communication between client components and a Chimera server.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Since Chimera runs on a highly distributed client/server model, sufficient network bandwidth is required. Care should be taken to make the response time of this module as low as possible.

5.2 Safety Requirements

There are no anticipated risks involved with using this product.

5.3 Security Requirements

The security of Chimera itself is outside of the scope of this project, we only wish to not make Chimera any less secure through the use of this module.

5.4 Software Quality Attributes

Our product must contain the following attributes:

- Easy to maintain or update
- Easy to use
- Where necessary fault tolerant coding techniques should be used
- There must be no compilation errors or warnings
- Code must be readable
- Code must be documented, and test cases must be included.
- Code should be checked against known values of the extinction coefficient as a check for correctness.

6. Other Requirements

Appendix A: Glossary

Airmass: The optical path length through the atmosphere for the light from the given star.

RA and DEC: "RA (right ascension) and DEC (declination) are to the sky what longitude and latitude are to the surface of the Earth. RA corresponds to east/west direction (like longitude), while Dec measures north/south directions, like latitude." (From: <http://curious.astro.cornell.edu/question.php?number=112>)

Flux: "A measure of the amount of energy given off by an astronomical object over a fixed amount of time and area." (From: <http://space.about.com/od/glossaries/g/flux.htm>)

Appendix B: Issues List

While Chimera itself is known to have issues, there are no currently known issues with the existing code surrounding the extinction coefficient.