

# Development of a Mars Curiosity Rover Simulator

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A working model intended for modern space science education  
and outreach



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# Terms of Reference

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## **Title**

Development of a Mars Curiosity Rover Simulator for the Cape Town Science Centre

## **Description**

Our knowledge of the planet Mars has been greatly expanded by several rovers that have landed on the planet over the past twenty years. The most capable of these is the Mars Science Laboratory/Curiosity Rover, which is currently exploring the surface of Mars. The Cape Town Science Centre has requested the UCT SpaceLab to design and build a model of a Mars exploration rover that will be the centrepiece of a future Mars exhibit at the Centre.

## **Deliverables**

## **Skills and Requirements**

Mechanical Design, Software and Electronics Interfacing and Programming.

## **Area**

Science and Technology

## Declaration

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1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the IEEE convention for citation and referencing. Each contribution to, and quotation in, this report from the work(s) of other people has been attributed, and has been cited and referenced.
3. This report is my own work.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as their own work or part thereof.

Signature:.....  
Sean Wood

Date:.....

## Acknowledgments

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# Abstract

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- Open the **Project Report Template.tex** file and carefully follow the comments (starting with %).
- Process the file with **pdflatex**, using other processors may need you to change some features such as graphics types.
- Note the files included in the **Project Report Template.tex** (with the .tex extension excluded). You can open these files separately and modify their contents or create new ones.
- Contact the latex manual for more features in your document such as equations, subfigures, footnotes, subscripts & superscripts, special characters etc.
- I recommend using the **kile** latex IDE or *TeXstudio*, as they are simple to use.

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# Glossary

Abbreviations listed here are used throughout the document.

- MSL - Mars Science Laboratory

# Chapter 1

## Introduction

### 1.1 Background to the study

A very brief background to your area of research. Start off with a general introduction to the area and then narrow it down to your focus area. Used to set the scene [?]. The section should highlight challenges in the study area to put your work in context [1].

### 1.2 Objectives of this study

#### 1.2.1 Problems to be investigated

Description of the main problem(s) to be solved and/or hypothesis of your work. Questions to be answered in order to confirm the hypothesis or solve the problems are also articulated here.

#### 1.2.2 Purpose of the study

Give the significance of investigating these problems. It must be obvious why you are doing this study and why it is relevant. Contributions of your work should also be given here.

### 1.3 Scope and Limitations

Scope indicates to the reader what has been and not been included in the study. Limitations tell the reader what factors influenced the study such as sample size, time etc. It is not a section for excuses as to why your project may or may not have worked.

## 1.4 Plan of development

This section summarizes the methods, tools, techniques and the order of doing things followed in order to accomplish your work. It also includes such planning tools as project Gantt chart, Critical path analysis and mind mapping.

## 1.5 Report Outline

Here you tell the reader how your report has been organised and what is included in each chapter. You should give a synopsis for each of your chapters here.

**I recommend that you write this section last. You can then tailor it to your report.**

# **Chapter 2**

## **Literature Review**

### **2.1 Space Exploration and NASA's Journey to Mars**

The human race possesses the powerful will to explore what is unknown. It is the curiosity and the thrill to push past the boundaries of what is thought to be possible, perhaps felt stronger by some, that forms the basis of many scientific endeavours relating to facts of life and existence around and outside of the environment in which we live. A prime example of such a drive to explore is in the research and exploration of outer space.

### **2.2 The Mars Science Laboratory**

### **2.3 Space Education and Outreach**

### **2.4 Web Application Technologies Within the Context of Embedded Systems**

### **2.5 Additive Prototyping and Manufacturing Techniques**

# Chapter 3

## Discussion

Here is what the results mean and how they tie to existing literature...

Discuss the relevance of your results and how they fit into the theoretical work you described in your literature review.

# Chapter 4

## Conclusions

These are the conclusions from the investigation and how the investigation changes things in this field or contributes to current knowledge...

Draw suitable and intelligent conclusions from your results and subsequent discussion.

# Chapter 5

## Recommendations

Make sensible recommendations for further work.



# Bibliography

- [1] E. Kamen and B. Heck, *Fundamentals of Signals and Systems Using the Web and MATLAB*. Prentice Hall, 2000.
- [2] M. Tsoeu and M. Inggs, “Fully Parallel Electrical Impedance Tomography Using Code Division Multiplexing,” *Biomedical Circuits and Systems, IEEE Transactions on*, vol. 10, no. 3, pp. 556–566, 2015.
- [3] A. Wilkinson, E. Randall, J. Cilliers, D. Durrett, T. Naidoo, and T. Long, “A 1000-measurement frames/second ERT data capture system with real-time visualization,” *Sensors Journal, IEEE*, vol. 5, no. 2, pp. 300–307, April 2005.
- [4] G. Teague, “Mass Flow Measurements of Multi-Phase Mixtures by Means of % Tomographic Techniques,” Ph.D. dissertation, 2001.

# Appendix A

## Additional Files and Schematics

Add any information here that you would like to have in your project but is not necessary in the main text. Remember to refer to it in the main text. Separate your appendices based on what they are for example. Equation derivations in Appendix A and code in Appendix B etc.

# Appendix B

## Addenda

### B.1 Ethics Forms