**ShowRobbie**

**MTM Program Product**

**Software Concept of  
Operations**

*Version 1.1*

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*Applying MTM ConOps Template Version 1.1*

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Version History

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| 1.0 | 08/28/15 | Frank Ackerman | Initial Version |
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**Montana Tech Software Engineering Students:**

These Montana Tech Method software engineering standards encapsulate Dr. Ackerman’s decades of experience in the software industry, the IEEE software engineering standards, and many suggestions from various texts. They have gone through many revisions and additions over the last several years. They are part of your software engineering studies so that (1) you may have the experience of developing software to a standard (which you may find you need to do if you take a job that requires high reliability software), and so that (2) you will have the experience of developing high quality software. You are also invited to participate in the continuing evolution of these standards by studying them critically and making suggestions for their improvement and correction.

TABLE CONTENTS

[1 Introduction 4](#_Toc428117340)

[1.1 Purpose of this ConOps 4](#_Toc428117341)

[1.2 Scope of this ConOps 4](#_Toc428117342)

[1.3 Definitions, Acronyms, and Abbreviations 4](#_Toc428117343)

[1.3.1 Definitions 4](#_Toc428117344)

[1.3.2 Acronyms and Abbreviations 4](#_Toc428117345)

[2 The Current Situation 4](#_Toc428117346)

[3 Justification of Change 5](#_Toc428117347)

[4 Concept of Operations for the Proposed System 5](#_Toc428117348)

[5 Operational Scenarios for Proposed System 5](#_Toc428117349)

[6 Summary of Impacts 5](#_Toc428117350)

[7 Preliminary Milestone Schedule 7](#_Toc428117351)

[8 Preliminary Budget 7](#_Toc428117352)

# Introduction

This document provides a high level overview of the proposed ShowRobbie system. ShowRobbie is a extension of the ShowNAO project that was developed as a Summer Undergraduate Research Project (SURF) in 2014 and builds on the Software Maintenance class project in the spring of 2015.

## Purpose of this ConOps

The purpose of this document is to provide the Computer Science Department Faculty and Staff, The Tech Student Guides, and the Software Engineering Senior design team with some background and an overview of this project’s goals

## Scope of this ConOps

The scope of this document is all the Choregraphe and C++ modules that have been, or will be constructed to provide the CS Department NAO robot (nicknamed “Robbie”) with behaviors that will support Tech recruiting efforts.

## Definitions, Acronyms, and Abbreviations

### Definitions

|  |  |
| --- | --- |
| Choregraphe | A visual programming environment for NAO robots develop by Aldebaran Robotics, Paris, France |

### Acronyms and Abbreviations

|  |  |
| --- | --- |
| ConOps | Concept of Operations Document |
| CS | Computer Science |
| SURF | Summer Undergraduate Research Fund |
| Tech | Montana Tech of the University of Montana |

# The Current Situation

The ShowNAO 2014 SURF project provide Robbie with two Choregraphe programs sittingRecruitBehavior.crg, and standingRecruitBehavior.crg that can be used in recruiting interview situations in the CS Department conference room. It also investigated the use of C++ to programs to control Robbie at a more sophisticated level than that provide by the available Choregraphe modules. The ShowNAO project is documented on the CS Department website [here](http://cs.mtech.edu/main/index.php/component/content/article/45-surf2014-shownao/234-introduction-to-shownao).

The 2015 Software Maintenance class project “Robbie” realized the goal of programming the version of Robbie that was available at that time using two C++ programs.

# Justification of Change

The behaviors provided to Robbie by the current programs are very limited. Robbie is one of the more expensive CS Department resources. She should be endowed with behaviors that support Tech’s recruiting efforts as much as possible.

# Concept of Operations for the Proposed System

Currently the previous version of Robbie could only be used during recruiting interviews in the CS Department conference room. But several times each week student guides bring prospective students and their parents through the MUS lab. The general concept of ShowRobbie is that in some way Robbie will “show off” for prospective student visitors to the MUS lab.

# Operational Scenarios for Proposed System

A major limiting factor on Robbie’s behavior is that her battery is only good for approximately 30 minutes. One solution to this limitation is have a little pack back made for her so she could carry her charging transformer around with her, and plug herself into a power receptacle when her battery got too low. If she could do this we could simplify the scenario below; but at this point we don’t know if we can control her fingers well enough to have her do this. And even if we can, such a feat is probably beyond the scope of this project.

For this project, therefore, we will aim for more limited, yet still quite challenging behaviors – ones which Robbie can carry out in a few minutes.

This project will start with Robbie sitting on a big red disk near the big water bottles in Tami’s office. She will not be powered on. A few minutes before bringing visitors to the Museum lab the student guide will call Tami (a cell phone is assumed) to alert her that a group of visitors is coming. Tami will then push Robbie’s power-on button, and when she is fully awake, will communicate with her using an application that she will have installed on her desktop. When visitors are about to enter the Museum lab “cat walk” (they always come this way) Tami will instruct Robbie to go and greet them.

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# Summary of Impacts

Since C++ programming of Robbie is a new area for the project team, and since the project team will have at most 600 hours to devote to this project, the proposed behaviors will be implemented in a series of software releases. We propose 2 releases as described below.

Release 1

When Tami commands Robbie to go and greet prospective student visitors and their guests Robbie will stand up, walk out of the office door, and then stop to look for the fact of one of the student guides. When she recognizes a guide she will walk up to him/her (within 4 feet) and say:

*Hello <guide’s-name>, I see you have some guests today*.

The guide will respond:

Yes Robbie, these people are interested in learning more about Tech.

Robbie will respond:

*That’s great <guide’s-name>, I hope they will their visit interesting. If I can be any assistance please let me know.*

Robbie will then turn to one of the visitors and say:

*I hope you enjoy your visit, please come again if you would like more information.*

Robbie will then turn around, walk back to sitting spot in Tami’s office and sit back down.

Release 2

Robbie’s initial behavior will be the same as in release 1, but in response to the guide’s “interested in learning more” sentence Robbie will say:

*That’s great <guide’s-name>. Is there any way I can help?*

The guide will respond:

Yes Robbie, can you tell us a little bit about yourself and the Department of Computer Science?

Robbie will respond:

*OK <guide’s-name>. I’m a NAO robot. I’m designed and manufactured by the Aldebaran company in France, but all of my present behaviors have been programmed as part of a Senior Software Engineering project. There’s very little I can do without the programs that have been designed and constructed by the Senior Software Engineering students here at Montana Tech. I’m afraid that programming me is not easy, but these students have been well equipped by their education here at Tech to deal with complex problems.*

The guide will respond:

Thank you Robbie. You’ve been very helpful. I’ll visit you again soon.

Robbie then picks up the end of his Release 1 “I hope you enjoyed” response and finishes with his release 1 behavior.

# Preliminary Milestone Schedule

|  |  |
| --- | --- |
| **End Date** | **MileStone** |
| 09/16/15 | Startup |
| 10/07/15 | Exploration |
| 03/11/16 | Release 1 |
| 04/09/16 | Release 2 |
| 04/28/16 | Techxpo |

# Preliminary Budget

|  |  |
| --- | --- |
| **Who** | **Hours** |
| Mitchell | 150 |
| Nikki | 150 |
| Josh | 150 |
| Mack | 150 |
| *total* | 600 |