NASA Path: Phase 3

Software Engineering Project SWEN 670 9040

F. Cenal, J. Dostal, C. Farley, L. Powell, D. Varma and T. Weldesemayat

Sponsor: Extravehicular Activity (EVA), Johnson Space Center, NASA
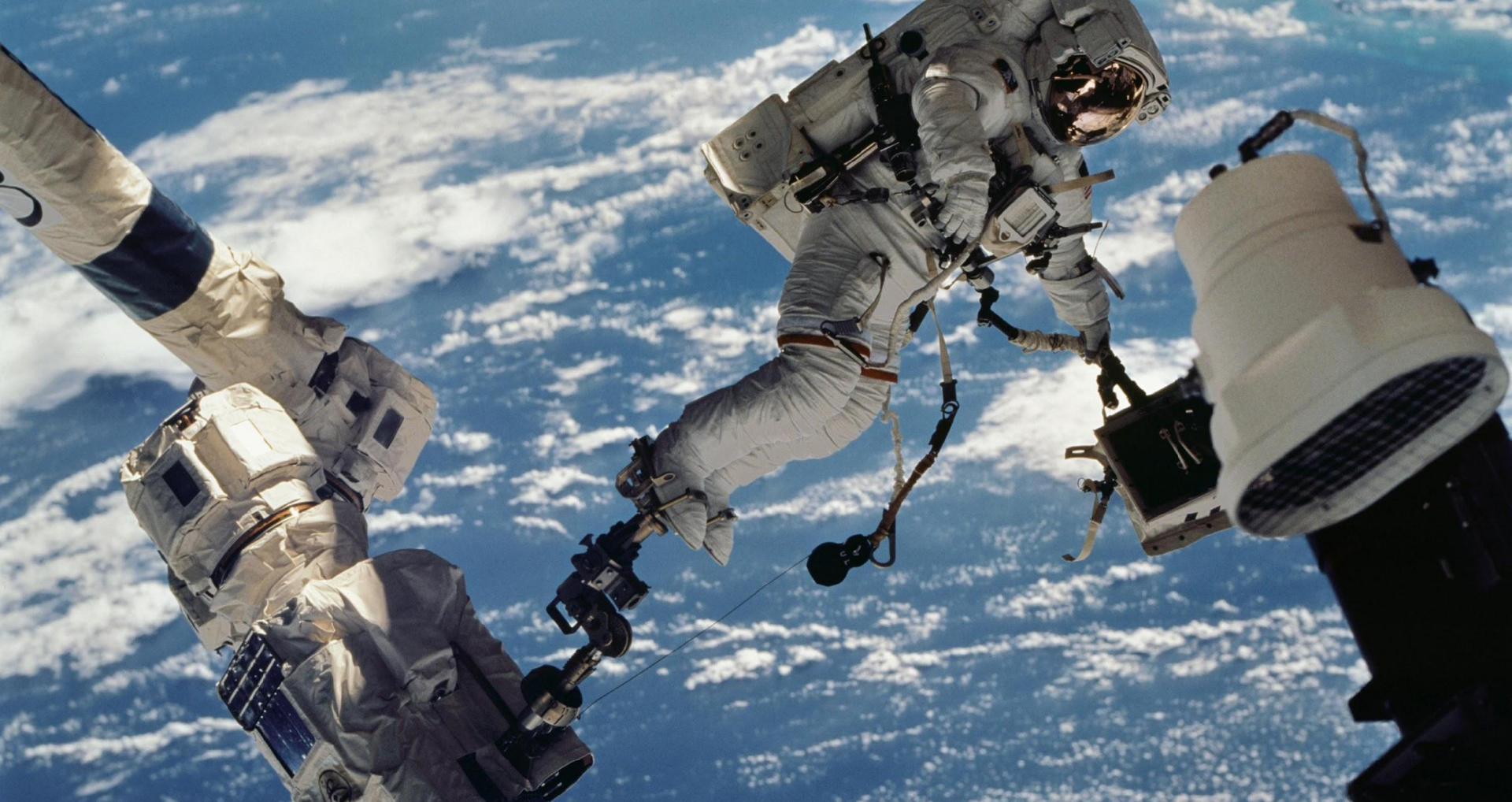*Liaison: Daren Welsh, EVA Instructor & Flight Controller | darenwelsh@gmail.com*

Overview

- **Introductions**
- **Overview**
- **Planning**
- **Strategy**
- **Soft Objectives**

International Space Station (ISS) (NASA, 2002).

INTRODUCTIONS

NASA PATH PHASE 3

Introductions
FritzGerald Cenal

Skills

- Java
- Database administrator
- Some coding
- Mobile device management
- Security and Data Protection

About Me

- Currently doing my internship with 202 IT solutions
- Undergrad in Business Administration
- Doing a weekly workshop: Intro to Code
- Currently learning ASP.net Core MVC HTML, Open Source

Introductions
Jennifer Dostal

Skills

- Web and web application development
- Microsoft Dynamics CRM and Sharepoint development
- SQL and relational databases
- Certified Scrum Master

About Me

- 20 years of experience in IT in the government and non-profit sectors
- Developed Peace Corps Volunteer Information application in Microsoft Dynamics CRM
- Developed web-based statistical tutorials and document management systems at the Centers for Disease Control and Prevention
- Undergraduate degrees in Environmental Science and Journalism.

Introductions
Cameron Farley

Skills

- PowerShell and Bash Shell Scripting
- Java Application Development
- JUnit Testing
- Windows Server Management
- Web Server Management

About Me

- Worked as a Systems Administrator for 3 years at Virginia Tech NCR providing infrastructure support and software support.
- Worked as a Build and Release Engineer for 3 years at Exostar LLC and Logistics Management Institute
- Currently working as a Senior Systems Administrator at In-Q-Tel supporting IT infrastructure and software application

Introductions
Lincoln Powell

Skills

- Back-end: Java, Python, C, C++, Groovy, Oracle PL/SQL, MySQL
- Front-end: HTML/HTML5, CSS, JavaScript, PHP, JQuery
- Mobile: iOS - Swift; Android
- Frameworks: Spring MVC, Grails
- Build tools: Maven, Docker, Kubernetes, AWS, Jenkins
- Version control systems: Git

About Me

- Previously served in US Air Force from 2007 to 2014
    - Staff Sergeant (E-5)
    - Security Forces Craftsman (3P071)
- Currently works as an Application Analyst at Virginia Tech

Introductions
Deepali Varma

Skills

- Language: Core Java 5.0 /J2EE, SQL
- Database: Oracle 9i, Oracle 10g
- Framework: Struts, Spring, Hibernate
- Web Technologies: SOA, JSP, JavaScript, Java Bean, Swing, EMF E-Core Model, RCP, XSL, XSLT, XML, Apache FOP
- Tools/Utilities: TOAD, SQL Developer, Putty, Enterprise Architect, MS Visio, JIRA, MS-Project
- Middleware: JCAPS, JMS, Sun SeeBeyond eGate Integrator 5.1
- Application Server: Oracle 10g Release 2, SunOne 7, Pramati 3.0

About Me

- 9 years experience in developing applications using Java/J2EE
- Developed applications for German Railways to maintain data required for sales and reservation process, shows/ Manage Delay in Schedule of Current Running Trains, windows mobile application for managing wagons,automation of ticketing system.
- Worked in Java Caps for Sun Microsystems, Santa Clara USA.
- Developed applications for Ambank-Malaysia and Bangkok Bank-Bangkok which offer online services to its retail and corporate customers.

Introductions
Tenadam Weldesemayat

Skills

- SharePoint technologies: MOSS 2007/ SharePoint Server 2010/2013/2016
- Databases: MS SQL Server 2005/2008
- Programming/ Scripting Languages: C#.NET,, HTML and CSS
- Other Tools: Microsoft Visual Studio 2008/2010/2012, SharePoint Designer 2007/2010/2013, InfoPath Designer, PowerShell and Microsoft Office
- Source Code Control: TFS

About Me

- Over 7 years of professional experience on SharePoint 2007/2010/2013 and 2016
- Involved through all the phases of Software Development Life Cycle (SDLC) including Requirements Gathering, Data Analysis, Architecture Design, Development, Testing, Production and Post-production Support
- Currently working as a SharePoint Developer for the National Institutes of Health

View of the Skylab space station cluster photographed against black sky, (NASA 1973).

OVERVIEW

NASA PATH PHASE 3

Overview

Intent

NASA Path project is intended to be an aid in training simulations and real-world ExtraVehicular Activity (EVA or "space walks").

The application utilizes 3D modelling (Dynamic Onboard Ubiquitous Graphics or DOUG) to include all the modules and hardware on the International Space Station (ISS), as well as each handrail.

The aim of the presumed application is to allow a user to input start and end points (handrails) along with route options such as hazard avoidance, user wingspan and safety tether routing.
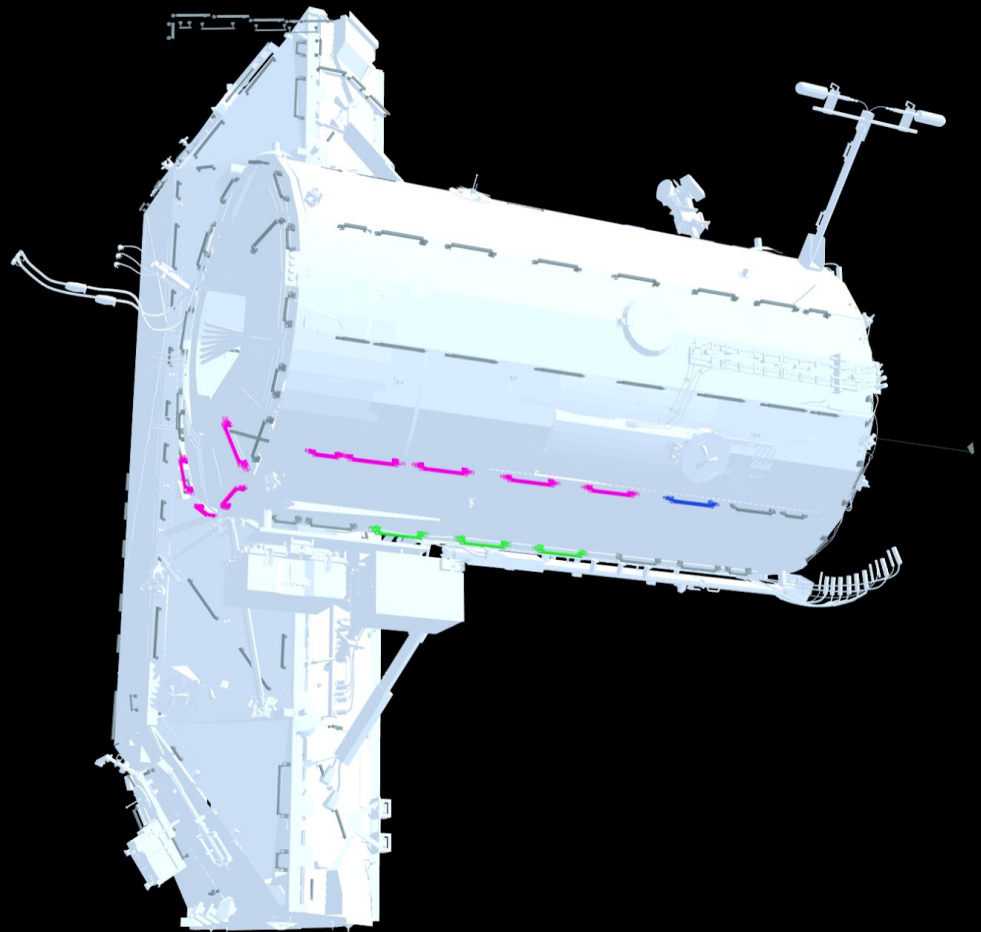
Overview

December 2006: Constructing the Space Station
(NASA, 2006)

PLANNING

NASA PATH PHASE 3

Planning

Backlog

1. Verify basic functionality
2. Update model to include all of ISS
3. Provide a legend/key on how to maneuver ISS
4. Can the movement controls be improved to allow a 3-axis movement and 3-axis rotation?
5. Add extra highlighting or some halo effect to make start and end points more obvious in 3D model
6. Use the wingspan slider input to effect the potential paths calculated
7. Add distances between each handrail pair in each path
8. Add indications of when axial direction and plane changes (e.g. from port to zenith or from face 1 to face 2)
9. Allow users to click a handrail in the 3D model to select start and end points
10. Add UI and update calculation based on volume and orientation of space suit (maybe display tube illustrating path traversed by suit extremities)
11. Add UI and update calculation to avoid hazards

Planning

Backlog

12. Add UI and update calculation accounting for two crew members, to deconflict routes
13. Add UI and update calculation to allow additional waypoint(s)
14. Add UI and update calculation to minimize suit rotations and plane changes (translating around corners and edges)
15. Display tether routing
16. Deconflict tethers from two crew
17. Suggest minimal fairleads to avoid hazards
18. Integrate output into DOUG application
19. Verify functionality of UI to drag and drop new model file
20. Add UI allowing user to specify starboard and port SARJ angles (and other articulating structures?)
21. Add UI allowing user to specify location of MT and CETA carts
22. Add UI option to choose optimal path for 1G environment (in the NBL) instead of optimal path for microgravity

Planning

Challenges

- Product backlog consists of high-level, undecomposed requirements
  - Will need to afford time with customer to decompose requirements to tasks
  - Planning around manpower utilization and time allocation ambiguous
- Application build requires sensitive configuration for setup and use
- Unknown build environment from Phase 2 handoff
  - Will need time to establish SRAs and best practices
- Constrained time due to course equates to limited sprints
- Uncompleted features from Phase 2 unknown with no documentation or Git branching
- Utilized technologies from previous phases may require familiarity training
  - Git
  - Docker
  - Yarn

Planning

Assumptions

- The GitHub repository created by Phase 2 is in its final state with no unmerged or untested branches
- Hardware, software and user interfaces, beyond new features, are aligned with customer requirements
- Technical stack (front-end, back-end, build tools and version control systems) are aligned with customer requirements

Planning

Constraints

- The UMUC SWEN 670 9040 (2185) course will end August 12th
- The course deliverables require submissions in milestone increments
    - Milestone 1: Week 3 (June 10th)
    - Milestone 2: Week 6 (July 1st)
    - Milestone 3: Week 9 (July 22nd)
    - Milestone 4: Week 12 (August 12th)
- Schedule availability of project team (including stakeholder)
    - Will dictate sprint duration

Planning

Risks

- Certain technologies posed on the project team are new
- Uptime will be required to assimilate project team to the application build and appropriate development environment
- Ambiguous requirements will result in unavoidable downtime in the beginning of the project
- Due to the nature of the backlog and its high-level contents, traditional artifacts may be difficult to construct with forecasted precision

A Proving Ground in Space (NASA, 2017).

STRATEGY

NASA PATH PHASE 3

Strategy

Methodology and Tools

- Agile methodology
    - Phase 3 project team will continue previous phases' commitment to sprint-based work to deliver incremental software features
    - Based on Phase 2's lessons learned, it is made apparent of a lack of involvement to communicate with stakeholder to provide routine updates, feature prototyping, feedback and approval of features into production
    - Redirect focus
        - Individuals and interactions over processes and tools
        - Working software over comprehensive documentation
        - Customer collaboration over contract negotiation
        - Responding to change over following a plan
- Kanban adoption
    - Phase 3 project team will focus on evolutionary roles which fit changing needs of the project versus prescribed roles
    - Use of a Kanban board using Trello.com to track and monitor all tasks
    - Embrace task flexibility, reprioritization and rework
    - Terminate wasteful activities which do not add value to the stakeholder

Strategy

Methodology and Tools

- Git/GitHub
    - Phase 3 project will be duplicated from Phase 2's project repository
    - An initial pull request will be made to EVANav repository to update repository
    - Upon approval of sprint feature addition or changes, those approved changes will be merged via pull requests, requiring stakeholder approval for merge

NASA's Science Aircraft Flies Over Thomas Fire in California, (NASA, 2017).

SOFT OBJECTIVES

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Soft Objectives

Milestone 1: Week 3 (June 10th)

- Project Plan
- Presentation

Milestone 2: Week 6 (July 1st)

- Sprint Retrospectives
- Project Plan (if revised)
- Feature Documentation and Test Plan (as completed)

Milestone 3: Week 9 (July 22nd)

- Sprint Retrospectives
- Project Plan (if revised)
- Feature Documentation and Test Plan (as completed)

Milestone 4: Week 12 (August 12th)

- Sprint Retrospectives
- Project Plan (if revised)
- Feature Documentation and Test Plan (as completed)
- Presentation

Summary

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