

System Development Plan

for the

Smart Silvia System

DCN: SILVIASDP20240201-P1:44

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DOCUMENT CHANGE HISTORY

The following table is a simple list of released revisions sent for review. Records of reviews and the review artifacts are saved with reviewer information in the The KNEAD Project artifact repository.

Change Record

Date	Version	Author(s)	Change Reference
25 Dec 2023	P1	Lewis Collier	1st draft version

Each subsequent “section” outlines changes in each release.

Items in this version that are marked with change bars have been modified from the most recent previous version (e.g. P3 changes from P2) or are new as of the current revision. A list of all changed items may be found in the Index section under the heading “All Changes This Version”.

Draft P1 Preliminary version of this document.

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CHAPTER 1

Scope

ALL-1.0 :: IF APPLICABLE, EACH SECTION HAS A SUMMARY OF DATA ITEM DESCRIPTION (DID) INFORMATION SHOWN IN THIS FONT. THESE ARE DISPLAYED IN SMALL CAPITAL FONT AND ARE NOT PART OF THE FORMAL DOCUMENT. DISPLAY OF THESE DID INFORMATION NOTES CAN BE TURNED OFF FOR FORMAL RELEASES, BUT ARE DISPLAYED HERE FOR REFERENCE.

This document provides the System Development Plan (SDP) for the Smart Silvia. The system will be referred to as the Smart-Silvia-Sys.

1.1 Identification

ALL-1.1 :: THIS PARAGRAPH SHALL CONTAIN A FULL IDENTIFICATION OF THE SYSTEM TO WHICH THIS DOCUMENT APPLIES, INCLUDING, AS APPLICABLE, IDENTIFICATION NUMBER(S), TITLE(S), ABBREVIATION(S), VERSION NUMBER(S), AND RELEASE NUMBER(S).

The Smart Silvia described in this document shall be known as Smart-Silvia-Sys version 1.

1.2 System Overview

ALL-1.2 :: THIS PARAGRAPH SHALL BRIEFLY STATE THE PURPOSE OF THE SYSTEM TO WHICH THIS DOCUMENT APPLIES. IT SHALL DESCRIBE THE GENERAL NATURE OF THE SYSTEM; SUMMARIZE THE HISTORY OF SYSTEM DEVELOPMENT, OPERATION, AND MAINTENANCE; IDENTIFY THE PROJECT SPONSOR, ACQUIRER, USER, DEVELOPER, AND SUPPORT AGENCIES; IDENTIFY CURRENT AND PLANNED OPERATING SITES; AND LIST OTHER RELEVANT DOCUMENTS.

The Smart Silvia system is ...TBD....

Figure ?? shows the high-level architecture for the Smart-Silvia-Sys system. This diagram shows the major external interfaces that provide the capabilities of Smart-Silvia-Sys. As are shown, the Smart-Silvia-Sys can provide. This system's main goal is to automate functionality in order to make great Espresso.

The general concept of operations (CONOP) for this system is User Selects an input weight through an OLED screen using a rotary encoder. Espresso is prepared. User begins a shot, solid state relays are enabled and the shot begins to pull and a timer is started. As water falls into the cup and onto the load cells, the espresso cup is weighed. Once the desired weight is met the pump is turned off. The user is displayed their time and weight on the OLED screen and data is pushed ...TBD...

While the system is not actively pulling a shot, it will be monitoring the water level. If low water is detected the user will be notified.

1.3 Document Overview

ALL-1.3 :: THIS PARAGRAPH SHALL SUMMARIZE THE PURPOSE AND CONTENTS OF THIS DOCUMENT AND SHALL DESCRIBE ANY SECURITY OR PRIVACY CONSIDERATIONS ASSOCIATED WITH ITS USE.

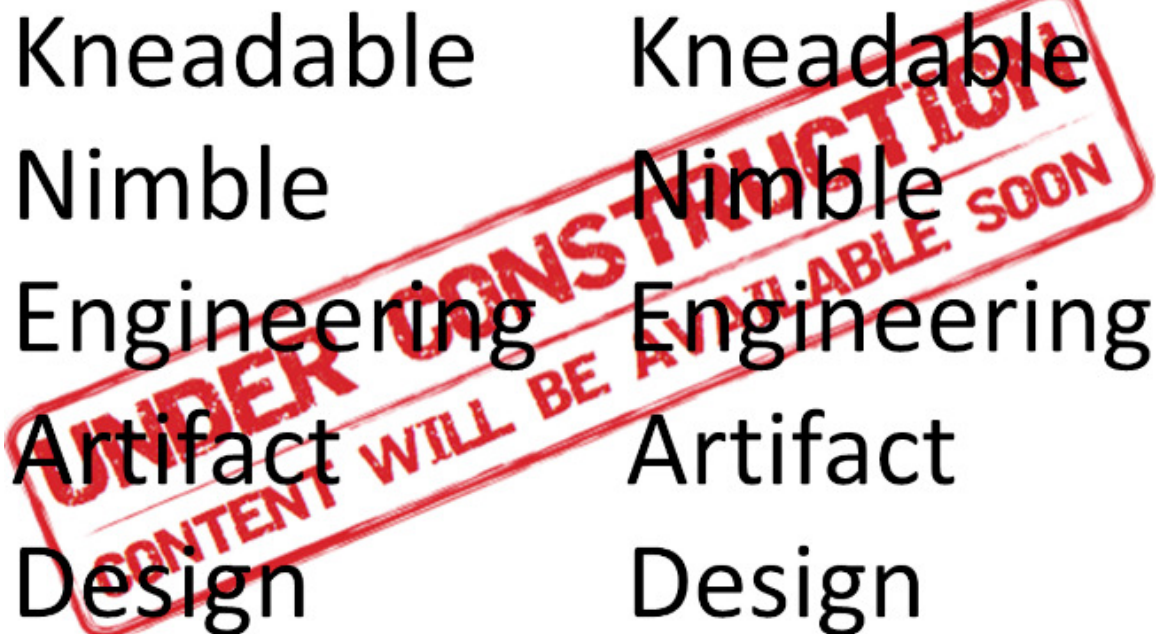


Figure 1: System Overview

This section provides information about this document's security/privacy considerations, contents, structure, and version information.

1.3.1 Security and Privacy Considerations

This document has been identified as "Controlled Unclassified Information" (CUI). Please follow the control block on the title page for ownership, creation, category, dissemination, and Point of Contact (POC) information. This information should be delineated, per <https://www.dodcui.mil> as:

Owner the name of the DoD Component (not required if identified in the letterhead)

Creator identification of the office creating the document

Category identification of the categories contained in the document

Dissemination applicable distribution statement or limited dissemination control (LDC)

POC name and phone number or email of POC

This section provides information about the format of this document.

This document is a short description of the design documentation philosophy for this project. The normal SDP format is not followed.

1.3.2 Document Version Information

This document was produced in \LaTeX and *BibLaTeX/Biber*. The editing and document preparation were performed using \LaTeX version 2.9 with the build option $\text{\LaTeX} \Rightarrow \text{PS}$

⇒ PDF]. The \LaTeX *svn-multi* package was used to glean SVN tracking information, when files are stored in an “SVN” version control system. The style `KNEADdocument` was used to provide the \LaTeX and *BibLaTeX/Biber* formatting details.

This revision of this document has the following properties:

Tracking Item	Data
Repository	https://svn.riouxsvn.com/kneadlatxinputs/ExampleArtifactFolders/1%20-%20SDP/KNEAD_SDP.tex
Author	
Revision	-2
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KNEADdocument Date	2021/12/05

CHAPTER 2

References

ALL-2.0.0 :: THIS SECTION SHALL LIST THE NUMBER, TITLE, REVISION, AND DATE OF ALL DOCUMENTS REFERENCED IN THIS SPECIFICATION. THIS SECTION SHALL ALSO IDENTIFY THE SOURCE FOR ALL DOCUMENTS NOT AVAILABLE THROUGH NORMAL GOVERNMENT STOCKING ACTIVITIES. IT ALSO SHALL INCLUDE A LIST OF ACRONYMS AND GLOSSARY TERMS SO THAT THEY ARE DEFINED BEFORE USE.

This section provides a list of referenced items for this document.

2.1 Acronyms and Abbreviations

ALL-2.1.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF DEFINITIONS FOR ALL ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN AN APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH GLOSSARY TERMS AND CITED REFERENCES TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

This section defines acronyms and abbreviations used in this and related documents.

Table 1: Acronym Definitions

Acronym	Definition
ADC	Analog to Digital Converter
A/V	Audio / Visual
End of acronym definition table	

2.2 Glossary and Definitions

ALL-2.2.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF GLOSSARY DEFINITIONS FOR ALL SPECIALTY TERMS USED IN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN AN APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH ACRONYMS / ABBREVIATIONS AND CITED REFERENCES AND GLOSSARY TERMS TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

This section defines glossary terms used in this and related documents.

Table 2: Glossary Terms and Definitions

Glossary Term	Definition
Communications	Communication is information transfer, among users or processes, according to agreed conventions.
Glossary terms continue on next page	

Glossary terms – continued from previous page

Glossary Term	Definition
Customer	The local government project lead who is acting as a general manager for the sponsor to ensure that the contractor team executes the project according to stakeholder goals.
End of glossary terms table	

2.3 Referenced Documents

ALL-2.3.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF ALL ARTIFACTS REFERENCED FROM WITHIN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN A FINAL CHAPTER/SECTION OR APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH ACRONYMS / ABBREVIATIONS AND GLOSSARY TERMS TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

This section lists the referenced documents for this document. The references are categorized into two categories:

External Documents not directly associated with this project.

Project Documents that are directly associated with this project.

2.3.1 External Documents**2.3.2 Project Specific Documents**

CHAPTER 3

Required Work Overview

SDP-3.0.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION. IT SHALL INCLUDE, AS APPLICABLE, AN OVERVIEW OF: A. REQUIREMENTS AND CONSTRAINTS ON THE SYSTEM TO BE DEVELOPED; B. REQUIREMENTS AND CONSTRAINTS ON PROJECT DOCUMENTATION; C. POSITION OF THE PROJECT IN THE SYSTEM LIFE CYCLE; D. THE SELECTED PROGRAM/ACQUISITION STRATEGY OR ANY REQUIREMENTS OR CONSTRAINTS ON IT; E. REQUIREMENTS AND CONSTRAINTS ON PROJECT SCHEDULES AND RESOURCES; F. OTHER REQUIREMENTS AND CONSTRAINTS, SUCH AS ON PROJECT SECURITY, PRIVACY, METHODS, STANDARDS, INTERDEPENDENCIES IN HARDWARE AND SOFTWARE DEVELOPMENT, ETC.

This chapter is ...TBD....

3.1 Program Status

SDP-3.1.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

3.2 SDLC Situation

SDP-3.1.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

3.3 Requirement Plans

SDP-3.2.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

3.4 Documentation Plans

SDP-3.3.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

The following documents are listed here just to test reference generation. A “real” SDP would reference these as applicable for the project.

- ref`KNEAD`OCD`ExProj, ref`KNEAD`OCD`ExProj [ref`KNEAD`OCD`ExProj]
is the OCD, which outlines the project overall so, generally, it is created first.
- ref`KNEAD`SDP`ExProj, ref`KNEAD`SDP`ExProj [ref`KNEAD`SDP`ExProj]
is this document.

- **ref`KNEAD`SPS`ExProj, ref`KNEAD`SPS`ExProj [ref`KNEAD`SPS`ExProj]**
is the SPS, which should come from the customer or end user, but often is generated by the developer with customer approval.
- **ref`KNEAD`SSS`ExProj, ref`KNEAD`SSS`ExProj [ref`KNEAD`SSS`ExProj]**
is the SSS that is the developer's design specification to meet the SPS requirements.
- **ref`KNEAD`SUM`ExProj, ref`KNEAD`SUM`ExProj [ref`KNEAD`SUM`ExProj]**
is the SUM that acts somewhat like part of the SSS since it illustrates the UI design part of the SSS, but in a separate artifact that also can be used as a standalone users' manual.
- **ref`KNEAD`HRS`ExProj, ref`KNEAD`HRS`ExProj [ref`KNEAD`HRS`ExProj]**
is a HRS, which often is not used for smaller projects but can have multiple instances for large projects to more fully detail hardware design.
- **ref`KNEAD`SRS`ExProj, ref`KNEAD`SRS`ExProj [ref`KNEAD`SRS`ExProj]**
is a SRS, which often is not used for smaller projects but can have multiple instances for large projects to more fully detail software or firmware design.
- **ref`KNEAD`IRS`ExProj, ref`KNEAD`IRS`ExProj [ref`KNEAD`IRS`ExProj]**
is the IRS, which often is not use but may be needed, even if HRS or SRS artifacts are not, to fully document detailed interfaces such as Application Programming Interfaces (API) or other detailed mechanical or electrical interfaces.
- **ref`KNEAD`SSDD`ExProj, ref`KNEAD`SSDD`ExProj [ref`KNEAD`SSDD`ExProj]**
is the SSDD that provides a road map to the design and other design details needed to understand the hardware and software design.
- **ref`KNEAD`STP`ExProj, ref`KNEAD`STP`ExProj [ref`KNEAD`STP`ExProj]**
is the STP that highlights the planning for system testing.
- **ref`KNEAD`STS`ExProj, ref`KNEAD`STS`ExProj [ref`KNEAD`STS`ExProj]**
is the STS, which is sometimes called a test procedure. There could be multiple of these based on the overall project size.
- **ref`KNEAD`STR`ExProj, ref`KNEAD`STR`ExProj [ref`KNEAD`STR`ExProj]**
is an STR that documents the results of a given test. Multiple instances are expected

based on the test plan. And, there could be multiple versions of a given test plan to document repeated occurrences of a given test specification/procedure.

- **ref`KNEAD`SVD`ExProj, ref`KNEAD`SVD`ExProj [ref`KNEAD`SVD`ExProj]**
is an SVD that documents a given release of a system. Multiple versions of these “release notes” are expected, with one SVD issued for each system release cycle.

3.5 Schedule and Resource Constraints

SDP-3.4.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This system will be created and developed for a Minimum Viable Product. This is to be released by the end of the Spring 2024 UMD Semester and the end of ENPM818I. The first cut of this system will be considered a prototype and may not meet requirements set forth in these documents. Testing will be limited due to timeline.

3.6 Other Constraints

SDP-3.5.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

Note that this system is meant as a platform for learning. Portions of this design are used purely for educational purposes.

CHAPTER 4

System Development Plans

SDP-4.0.0 :: THIS SECTION SHALL BE DIVIDED INTO PARAGRAPHS AS NEEDED TO ESTABLISH THE CONTEXT FOR THE PLANNING DESCRIBED IN LATER SECTIONS.

This chapter highlights the development plan for different portions of the design. ...TBD...

4.1 Hardware Development Plans

SDP-4.1.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This system will interface with a Rancillio Silvia V2 Espresso Machine. This will require access to the inside parts of this machine. This hardware will be tested in steps. Focusing on individual parts, confirming functionality with reference designs or basic manual functionality. This hardware must interface with the existing Espresso Machine. This will require wiring into AC circuits and building or attaching parts into the mechanical features that already exist.

4.2 Firmware Development Plans

SDP-4.2.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

Firmware will be developed in parts with unit level tests for each piece that is added. Common libraries will be targeted to accelerate development. All new firmware should be tested as it is developed. The specifics of this code are ...TBD....

4.3 Software Development Plans

SDP-4.3.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section will focus on the network design and is ...TBD....

4.4 Integration Plans

SDP-4.4.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section will discuss the requirements for the hardware and software to interface with the existing hardware as well as the firmware and software communication. ...TBD....

4.5 Testing Plans

SDP-4.5.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This system will be tested with the development of unit tests and control testing. Specifics are ...TBD...

4.6 Other Development Activities

SDP-4.6.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

CHAPTER 5

System Transition Plans

SDP-5.0.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This chapter is going to highlight how to move from a college level project to full blown product and is ...TBD....

5.1 Configuration Management Plans

SDP-5.1.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

All firmware and software will be revisioned controlled using Github in the Smart Silvia Repo. Additional information is ...TBD....

5.2 Release Plans

SDP-5.2.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

Releases will require system level testing and confirmation that functionality has been achieved. It will follow a minor, major, patch revisioning scheme.

5.3 User Support Plans

SDP-5.3.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

5.4 Other Transition Plans

SDP-5.4.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

CHAPTER 6

Management and Control Activities

SDP-6.0.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This chapter is ...TBD....

6.1 Technical Review Events

SDP-6.1.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

6.2 Skills and Resources Needed

SDP-6.2.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

The firmware for this system will be written in C and CPP. Installation of this system will require knowledge of AC circuits and potentially soldering skills.

6.3 Scheduled Development and Monitoring

SDP-6.3.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

6.4 Other Management and Control Activities

SDP-6.4.0 :: THIS CHAPTER PROVIDES AN OVERVIEW OF THE REQUIRED WORK FOR DEVELOPMENT OF SMART SILVIA. SEE REFERENCE [ref`SDP`DID] FOR MORE INFORMATION.

This section is ...TBD....

CHAPTER 7

Notes

ALL-NOTES :: THIS SECTION SHALL CONTAIN ANY GENERAL INFORMATION THAT AIDS IN UNDERSTANDING THIS DOCUMENT (E.G., BACKGROUND INFORMATION, RATIONALE, ETC.)

This chapter is ...TBD....

7.1 Note Area 1

ALL-NOTES :: THIS SECTION SHALL CONTAIN ANY GENERAL INFORMATION THAT AIDS IN UNDERSTANDING THIS DOCUMENT (E.G., BACKGROUND INFORMATION, RATIONALE, ETC.)

This section is ...TBD....

7.2 Note Area 2

ALL-NOTES :: THIS SECTION SHALL CONTAIN ANY GENERAL INFORMATION THAT AIDS IN UNDERSTANDING THIS DOCUMENT (E.G., BACKGROUND INFORMATION, RATIONALE, ETC.)

This section is ...TBD....

APPENDIX

Other Info

ALL-APPENDIX :: THIS SECTION SHALL CONTAIN ANY GENERAL INFORMATION THAT AIDS IN UNDERSTANDING THIS DOCUMENT (E.G., BACKGROUND INFORMATION, RATIONALE, ETC.)

This section provides other information, as necessary, to document the system development plan.