

Module Interface Specification for Image Feature Correspondences for Camera Calibration

Kiran Singh

March 14, 2025

1 Revision History

Date	Version	Notes
2025-03-19	1.0	Initial Release

2 Symbols, Abbreviations and Acronyms

See SRS Documentation at <https://github.com/KiranSingh15/CAS-741-Image-Correspondences/blob/main/docs/SRS/SRS.pdf>.

[Also add any additional symbols, abbreviations or acronyms —SS]

Contents

1	Revision History	i
2	Symbols, Abbreviations and Acronyms	ii
3	Introduction	1
4	Notation	1
5	Module Decomposition	1
6	MIS of Input Format Module	3
6.1	Module	3
6.2	Uses	3
6.3	Syntax	3
6.3.1	Exported Constants	3
6.3.2	Exported Access Programs	3
6.4	Semantics	3
6.4.1	State Variables	3
6.4.2	Environment Variables	3
6.4.3	Assumptions	3
6.4.4	Access Routine Semantics	4
6.4.5	Local Functions	4
7	MIS of Specification Parameters Module	4
7.1	Module	4
7.2	Uses	4
7.3	Syntax	5
7.3.1	Exported Constants	5
7.3.2	Exported Access Programs	5
7.4	Semantics	5
7.4.1	State Variables	5
7.4.2	Environment Variables	6
7.4.3	Assumptions	6
7.4.4	Access Routine Semantics	6
7.4.5	Local Functions	7
8	MIS of Output Format Module	7
8.1	Module	7
8.2	Uses	7
8.3	Syntax	7
8.3.1	Exported Constants	7
8.3.2	Exported Access Programs	8

8.4	Semantics	8
8.4.1	State Variables	8
8.4.2	Environment Variables	8
8.4.3	Assumptions	8
8.4.4	Access Routine Semantics	8
8.4.5	Local Functions	8
9	MIS of Output Verification Module	9
9.1	Module	9
9.2	Uses	9
9.3	Syntax	9
9.3.1	Exported Constants	9
9.3.2	Exported Access Programs	9
9.4	Semantics	9
9.4.1	State Variables	9
9.4.2	Environment Variables	9
9.4.3	Assumptions	9
9.4.4	Access Routine Semantics	9
9.4.5	Local Functions	10
10	MIS of Control Module	10
10.1	Module	10
10.2	Uses	10
10.3	Syntax	10
10.3.1	Exported Constants	10
10.3.2	Exported Access Programs	10
10.4	Semantics	11
10.4.1	State Variables	11
10.4.2	Environment Variables	11
10.4.3	Assumptions	11
10.4.4	Access Routine Semantics	11
10.4.5	Local Functions	11
11	MIS of Image Smoothing Module	11
11.1	Module	12
11.2	Uses	12
11.3	Syntax	12
11.3.1	Exported Constants	12
11.3.2	Exported Access Programs	12
11.4	Semantics	12
11.4.1	State Variables	12
11.4.2	Environment Variables	12
11.4.3	Assumptions	12

11.4.4	Access Routine Semantics	12
11.4.5	Local Functions	13
12	MIS of Keypoint Detection Module	13
12.1	Module	13
12.2	Uses	13
12.3	Syntax	13
12.3.1	Exported Constants	13
12.3.2	Exported Access Programs	13
12.4	Semantics	13
12.4.1	State Variables	13
12.4.2	Environment Variables	14
12.4.3	Assumptions	14
12.4.4	Access Routine Semantics	14
12.4.5	Local Functions	14
13	MIS of Feature Descriptor Module	14
13.1	Module	14
13.2	Uses	14
13.3	Syntax	15
13.3.1	Exported Constants	15
13.3.2	Exported Access Programs	15
13.4	Semantics	15
13.4.1	State Variables	15
13.4.2	Environment Variables	15
13.4.3	Assumptions	15
13.4.4	Access Routine Semantics	15
13.4.5	Local Functions	15
14	MIS of Feature Matching Module	16
14.1	Module	16
14.2	Uses	16
14.3	Syntax	16
14.3.1	Exported Constants	16
14.3.2	Exported Access Programs	16
14.4	Semantics	16
14.4.1	State Variables	16
14.4.2	Environment Variables	16
14.4.3	Assumptions	16
14.4.4	Access Routine Semantics	16
14.4.5	Local Functions	17

15 MIS of Image Data Structure Module	17
15.1 Module	17
15.2 Uses	17
15.3 Syntax	17
15.3.1 Exported Constants	17
15.3.2 Exported Access Programs	17
15.4 Semantics	17
15.4.1 State Variables	17
15.4.2 Environment Variables	18
15.4.3 Assumptions	18
15.4.4 Access Routine Semantics	18
15.4.5 Local Functions	18
16 MIS of Image Plot Module	18
16.1 Module	18
16.2 Uses	18
16.3 Syntax	19
16.3.1 Exported Constants	19
16.3.2 Exported Access Programs	19
16.4 Semantics	19
16.4.1 State Variables	19
16.4.2 Environment Variables	19
16.4.3 Assumptions	19
16.4.4 Access Routine Semantics	19
16.4.5 Local Functions	19
17 MIS of Feature Match Data Module	20
17.1 Module	20
17.2 Uses	20
17.3 Syntax	20
17.3.1 Exported Constants	20
17.3.2 Exported Access Programs	20
17.4 Semantics	20
17.4.1 State Variables	20
17.4.2 Environment Variables	20
17.4.3 Assumptions	20
17.4.4 Access Routine Semantics	20
17.4.5 Local Functions	21
18 MIS of Dataframe Structure Module	21
18.1 Module	21
18.2 Uses	21
18.3 Syntax	21

18.3.1	Exported Constants	21
18.3.2	Exported Access Programs	21
18.4	Semantics	21
18.4.1	State Variables	21
18.4.2	Environment Variables	22
18.4.3	Assumptions	22
18.4.4	Access Routine Semantics	22
18.4.5	Local Functions	22
19	MIS of ORB Data Structure Module	22
19.1	Module	22
19.2	Uses	22
19.3	Syntax	23
19.3.1	Exported Constants	23
19.3.2	Exported Access Programs	23
19.4	Semantics	23
19.4.1	State Variables	23
19.4.2	Environment Variables	23
19.4.3	Assumptions	23
19.4.4	Access Routine Semantics	23
19.4.5	Local Functions	23
20	MIS of [Module Name —SS]	24
20.1	Module	24
20.2	Uses	24
20.3	Syntax	24
20.3.1	Exported Constants	24
20.3.2	Exported Access Programs	24
20.4	Semantics	24
20.4.1	State Variables	24
20.4.2	Environment Variables	24
20.4.3	Assumptions	24
20.4.4	Access Routine Semantics	24
20.4.5	Local Functions	25
21	Appendix	27

3 Introduction

The following document details the Module Interface Specifications for [Fill in your project name and description —SS]

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at [provide the url for your repo —SS]

4 Notation

[You should describe your notation. You can use what is below as a starting point. —SS]

The structure of the MIS for modules comes from Hoffman and Strooper (1995), with the addition that template modules have been adapted from Ghezzi et al. (2003). The mathematical notation comes from Chapter 3 of Hoffman and Strooper (1995). For instance, the symbol $:=$ is used for a multiple assignment statement and conditional rules follow the form $(c_1 \Rightarrow r_1 | c_2 \Rightarrow r_2 | \dots | c_n \Rightarrow r_n)$.

The following table summarizes the primitive data types used by the Image Feature Correspondences for Camera Calibration software.

Data Type	Notation	Description
character	char	a single symbol or digit
integer	\mathbb{Z}	a number without a fractional component in $(-\infty, \infty)$
natural number	\mathbb{N}	a number without a fractional component in $[1, \infty)$
real	\mathbb{R}	any number in $(-\infty, \infty)$

The specification of Image Feature Correspondences for Camera Calibration uses some derived data types: sequences, strings, and tuples. Sequences are lists filled with elements of the same data type. Strings are sequences of characters. Tuples contain a list of values, potentially of different types. In addition, Image Feature Correspondences for Camera Calibration uses functions, which are defined by the data types of their inputs and outputs. Local functions are described by giving their type signature followed by their specification.

5 Module Decomposition

The following table is taken directly from the Module Guide document for this project.

Level 1	Level 2
Hardware-Hiding	
Behaviour-Hiding	Input Parameters Input Format Module Specification Parameters Output Format Module Output Verification Module Control Module Image Smoothing Module Keypoint Detection Module Feature Descriptor Module Feature Matching Module
Software Decision	Sequence Data Structure Image Data Structure Module Image Plot Module Feature Match Data Module Dataframe Structure Module ORB Data Structure Module

Table 1: Module Hierarchy

6 MIS of Input Format Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

6.1 Module

config

6.2 Uses

- specParams (Section 7)

6.3 Syntax

6.3.1 Exported Constants

6.3.2 Exported Access Programs

Name	In	Out	Exceptions
get_head_directory	-	string	noHeadFound
get_active_functions	-	dictionary of string	badFxnSelections
get_chosen_parameters	-	dictionary of string, integer, and floats	badKernelSize, badStdDeviation, badFASTThreshold, badBinSize, badPatchSize, badDistThreshold

6.4 Semantics

6.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

6.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

6.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

6.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

6.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

7 MIS of Specification Parameters Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

7.1 Module

specParams (Section 6)

7.2 Uses

None.

7.3 Syntax

7.3.1 Exported Constants

7.3.2 Exported Access Programs

Name	In	Out	Exceptions
set_default_parameters	-	$kernel_sz : \mathbb{Z}$ $std_deviation : \mathbb{R}$ $FAST_threshold : \mathbb{Z}$ $bin_sz : \mathbb{Z}$ $patch_sz : \mathbb{Z}$	-
set_default_methods	-	$mthd_img_smoothing : \mathbb{Z}$ $mthd_kp_detection : \mathbb{Z}$ $mthd_kp_description : \mathbb{Z}$ $mthd_ft_match : \mathbb{Z}$	-
check_limits	$kernel_sz : \mathbb{Z}$ $std_deviation : \mathbb{R}$ $FAST_threshold : \mathbb{Z}$ $bin_sz : \mathbb{Z}$ $patch_sz : \mathbb{Z}$	-	badKernelSize, badStdDeviation, badFASTThreshold, badBinSize, badPatchSize, badDistThreshold

7.4 Semantics

7.4.1 State Variables

$kernel_sz : \mathbb{Z}$
 $std_deviation : \mathbb{R}$
 $FAST_threshold : \mathbb{R}$
 $bin_sz : \mathbb{Z}$
 $patch_sz : \mathbb{Z}$
 $mthd_img_smoothing : \mathbb{Z}$
 $mthd_kp_detection : \mathbb{Z}$
 $mthd_kp_description : \mathbb{Z}$
 $mthd_ft_match : \mathbb{Z}$

7.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

7.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

7.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

set_default_parameters():

- output: [if appropriate —SS]
 - *kernel_sz* : \mathbb{Z}
 - *std_deviation* : \mathbb{R}
 - *FAST_threshold* : \mathbb{Z}
 - *bin_sz* : \mathbb{Z}
 - *patch_sz* : \mathbb{Z}

set_default_methods():

- output: [if appropriate —SS]
 - *mthd_img_smoothing* : \mathbb{Z}
 - *mthd_kp_detection* : \mathbb{Z}
 - *mthd_kp_description* : \mathbb{Z}
 - *mthd_ft_match* : \mathbb{Z}
- exception: none

check_limits():

- output: none

- exception: exc:=

$\neg(kernel_sz < 1)$	\Rightarrow badKernelSize
$\neg(kernel_sz > 15)$	\Rightarrow badKernelSize
$\neg(kernel_sz \% 2 == 1)$	\Rightarrow badKernelSize
$\neg(0 < std_deviation < 10)$	\Rightarrow badStdDeviation
$\neg(2 \leq FAST_threshold \leq 255)$	\Rightarrow badFASTThreshold
$\neg(1 \leq FAST_threshold \leq 2048)$	\Rightarrow badBinSize
$\neg(5 \leq FAST_threshold \leq 100)$	\Rightarrow badPatchSize

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

7.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

8 MIS of Output Format Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

8.1 Module

formatOutput

8.2 Uses

- matchStruct (Section 10)
- dataframeStruct (Section 18)

8.3 Syntax

8.3.1 Exported Constants

Not applicable.

8.3.2 Exported Access Programs

Name	In	Out	Exceptions
main	-	-	-

8.4 Semantics

8.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

8.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

8.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

8.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: Modify the state of the Specification Parameters Module and the environment variables for the Image Plot Module and Dataframe Structure modules through the following steps.
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

8.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

9 MIS of Output Verification Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

9.1 Module

verifyOutput

9.2 Uses

None.

9.3 Syntax

9.3.1 Exported Constants

9.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

9.4 Semantics

9.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

9.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

9.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

9.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]

- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

9.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

10 MIS of Control Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

10.1 Module

main

10.2 Uses

- matchFeatures (Section 14)
- plotImage (Section 16)
- formatOutput (Section 8)
- verifyOutput (Section 9)

10.3 Syntax

10.3.1 Exported Constants

10.3.2 Exported Access Programs

Name	In	Out	Exceptions
main	-	-	-

10.4 Semantics

10.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

10.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

10.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

10.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

10.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

11 MIS of Image Smoothing Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

11.1 Module

smoothImage

11.2 Uses

- config (Section 10)
- imageStruct (Section 15)

11.3 Syntax

11.3.1 Exported Constants

11.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

11.4 Semantics

11.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

11.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

11.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

11.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

11.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

12 MIS of Keypoint Detection Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

12.1 Module

detectKeypoints

12.2 Uses

- config (Section 6)
- smoothImage (Section 11)
- imageStruct (Section 15)
- orbStruct (Section 19)

12.3 Syntax

12.3.1 Exported Constants

12.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

12.4 Semantics

12.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

12.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

12.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

12.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

12.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

13 MIS of Feature Descriptor Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

13.1 Module

assignDescriptors

13.2 Uses

- detectKeypoints (Section 12)

13.3 Syntax

13.3.1 Exported Constants

13.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

13.4 Semantics

13.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

13.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

13.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

13.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

13.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

14 MIS of Feature Matching Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

14.1 Module

matchFeatures

14.2 Uses

- assignDescriptors (Section 13)

14.3 Syntax

14.3.1 Exported Constants

14.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

14.4 Semantics

14.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

14.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

14.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

14.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]

- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

14.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

15 MIS of Image Data Structure Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

15.1 Module

imageStruct

15.2 Uses

None.

15.3 Syntax

15.3.1 Exported Constants

15.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

15.4 Semantics

15.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

15.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

15.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

15.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

15.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

16 MIS of Image Plot Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

16.1 Module

plotImage

16.2 Uses

- imageStruct (Section 16)

16.3 Syntax

16.3.1 Exported Constants

16.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

16.4 Semantics

16.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

16.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

16.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

16.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

16.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

17 MIS of Feature Match Data Module

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

17.1 Module

matchStruct

17.2 Uses

None.

17.3 Syntax

17.3.1 Exported Constants

17.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

17.4 Semantics

17.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

17.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

17.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

17.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]

- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

17.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

18 MIS of Dataframe Structure Module

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

18.1 Module

dataframeStruct

18.2 Uses

None.

18.3 Syntax

18.3.1 Exported Constants

18.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

18.4 Semantics

18.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

18.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

18.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

18.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

18.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

19 MIS of ORB Data Structure Module

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

19.1 Module

orbStruct

19.2 Uses

None.

19.3 Syntax

19.3.1 Exported Constants

19.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

19.4 Semantics

19.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

19.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

19.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

19.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

19.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

20 MIS of [Module Name —SS]

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

20.1 Module

[Short name for the module —SS]

20.2 Uses

20.3 Syntax

20.3.1 Exported Constants

20.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

20.4 Semantics

20.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

20.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

20.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

20.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]

- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

20.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

References

- Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli. *Fundamentals of Software Engineering*. Prentice Hall, Upper Saddle River, NJ, USA, 2nd edition, 2003.
- Daniel M. Hoffman and Paul A. Strooper. *Software Design, Automated Testing, and Maintenance: A Practical Approach*. International Thomson Computer Press, New York, NY, USA, 1995. URL <http://citeseer.ist.psu.edu/428727.html>.

21 Appendix

[Extra information if required —SS]