Interface Specification

< Intelligent Controller >

# Introduction

<Specify the aim of the document from the module’s point of view.>

This document is aimed to introduce Intelligent Controller’s interface specification to other groups and customers. Meanwhile, this document should clarify the border of function implements between IC and other parts.

By checking Section 2, you will know functions that the Intelligent Controller could provide and the Intelligent Controller need other parts to provide for Intelligent Controller.

The server part should check Section 4 in order to know how to communicate with Intelligent Controller.

The Section 5 is aimed to describe how to test all interfaces.

# Services

## Services Provided

|  |  |  |
| --- | --- | --- |
| Service | Provided By | Tested By |
| The server request an command for Intelligent Controller. | analysis\_check\_data, judge\_command, return\_information\_and\_errors | IC\_TC 1 |
| Hardware report data to server when it changes. | analysis\_check\_data,  set\_room\_inf,  Produce\_graph  return\_information\_and\_errors | IC\_TC 2 |
| The server update room information for Intelligent Controller. | analysis\_check\_data,  set\_room\_inf,  return\_information\_and\_errors | IC\_TC 3 |

## Access Method

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Access Method** | **Parameter name** | **Parameter type** | **Description** | **Exceptions** | **Map to services** |
| Analysis\_check\_data | data | Text in JSON format | The json format data should contains the following fields: ‘auth: 1(1 for student, 2 for teacher).  ‘camera’: True(True for someone in the room. False for opposite. )  ‘light’: on(The current state for light in room. )  ‘brightness’ : 234(The brightness in the room)  ‘button\_pressed’: true(If the button is pressed, this it would be true. )  ‘command’: on(To open or close the light, command is on or off) | The same packages are send for network delay. Or the data format is wrong. | 1, 2, 3 |
| Judge\_command | Auth, camera, light, brightness, button\_pressed, command | Integer,  bool,  string,  integer,  bool,  string | This method will run the rule diagram and decide whether this command can be executed or not. Before that, rule diagram have already existed. | Command parameters are less than excepted. | 1 |
| Return\_information\_and\_errors | Judgement, information | String, String | If yes, return command to be executed. If no, return wrong information. |  | 1, 2, 3 |
| Set\_room\_inf | data | Text in JSON format | The JSON format data should contains the following fields:  ‘rooms’: ‘’ (rooms of the system and their states. )  For each room, the JSON data should contain following context.  ‘camera’: True(True for someone in the room. False for opposite. )  ‘light’: on(The current state for light in room. )  ‘brightness’ : 234(The brightness in the room)  ‘button\_pressed’: true(If the button is pressed, this it would be true. ) | Wrong argument or missed this step. The update is so frequent that the bind width limits its transfer. | 2, 3 |
| Produce\_graph | data | Text in JSON format | The JSON format data should contains the following fields:  Have\_People (True or false),Authority\_Current (1 or 2), Authority\_Previous (1or2), Authority\_Current\_High (True or False), Room\_Light (integer), Button\_Pressed (True or false), Instruction (On or Off), Nobody\_For\_Set\_Time (True or false), Nobody\_Set\_Time (integer), No\_Instruction\_For\_Set\_Tim (True or false), Instruction\_Return (On or off) | The rules missed. | 2 |

## Access Method Effects

|  |  |
| --- | --- |
| **Access Method** | **Description** |
| Analysis\_check\_data | Every time the server put data to IC module, IC will use this method to check the data is in right format or not. If this method judge its error, the error message will be returned. |
| Judge\_command | Every time the server use IC module, it will send instruction to IC module , the IC module will deploy this instruction and judge whether it is a right instruction or not. If this instruction is in right format, IC will execute it, or IC returns error message.  Each time, the server should send a package of an room and its command, as well as the commander and information of the room to be tested. For this command, only the user with authority to access room can send its command. (This kind of filtration will be done in the server and database. )  The command is divided by the authority, that is student < teacher = administrator. If one command effects, another command should wait for at least one minute to change light state again. |
| Return\_information\_and\_errors | For each service, this method will be reused. For request, it will returns whether accept command or not. For initialize service, it will return the message about initialization. For updating, it will returns the rooms which state should be changed. |
| Set\_room\_inf | This method will refresh rooms’ state in IC memory. At the same time, if some room’s state should be changed, it will be reported to the service. |
| Produce\_graph | The server will initialize the IC module for rules. The rules are saved in the database, the server will fetch rules for IC module. |

## Services Required

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Name** | **Access Method** | **Parameter name** | **Parameter type** | **Description** | **Exceptions** | **Map to services** |
| Server\_initialize\_IC | Initialize the rules and rooms’ state. | data | HTTP request parameters package | The JSON format data should contains the following fields: ‘auth’: 1(1 for student, 2 for teacher).  ‘camera’: True(True for someone in the room. False for opposite. )  ‘light’: on(The current state for light in room. )  ‘brightness’ : 234(The brightness in the room) |  | 2 |
| DB\_get\_rules | Database get rules of IC module. | data | HTTP request parameters package | The data should contains the following fields:  Have\_People (True or false),Authority\_Current (1 or 2), Authority\_Previous (1or2), Authority\_Current\_High (True or False), Room\_Light (integer), Button\_Pressed (True or false), Instruction (On or Off), Nobody\_For\_Set\_Time (True or false), Nobody\_Set\_Time (integer), No\_Instruction\_For\_Set\_Tim (True or false), Instruction\_Return (On or off) |  | 2 |
| Server\_update\_to\_IC | Updates the rooms’ state to IC. | data | HTTP request parameters package | Each time, one room’s state will be submitted. |  | 3 |

# Local Types

<Specify the data formats inside/between the module(s).>

|  |  |
| --- | --- |
| **Type** | **Value Space** |
| JSON | A text-format dictionarywhich contains some field. |

# Interface Design Issues

<Describe any design issues that arose during development. Describe the alternatives and the rationale for the alternative chosen.>

Eg. 1. Whether there is a database of email we can store all the emails there?

### 4.1 The server request an command for Intelligent Controller.

When server gets an command to switch the light, it should request for the IC module for result in the following steps:

1. Push the json package to /api/IC/switch.
2. Wait for IC module push its answer to the same place.
3. The server may get a package in form of ‘{‘Accept’: 0, ‘Deny’: 1, ‘reason’: ‘Please wait for another minute.’ ...}’

### 4.2 The server initialize Intelligent Controller.

When the system initialized, a package of all the rooms and rules should be given to the IC module in the following steps:

1. Push the json package to /api/IC/initialize.
2. Wait for IC module push its answer to the same place.
3. The server may get a package in form of ‘{‘Success’: 1, ‘Failure’: 0, ‘reason’: ‘’... }’

### 4.3 The server update room information for Intelligent Controller.

When server get known with rooms’ information changed or per 5 seconds, it should give an update request for IC module in the following steps:

1. Push the json package to /api/IC/update.
2. Wait for IC module push its answer to the same place.
3. The server may get a package in form of ‘{‘Success’: 1, ‘Failure’: 0, ‘reason’: ‘’, ‘change roomid’: 348dx2kdo, ‘change state’: ‘on’ ... }’

# Test Cases

<Characterize the expected value of the outputs over sets calls to the module.>

### IC\_TC 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step** | **Description** | **Input Type/Value** | **Expected Results** | **Service** | **Preamble** |
| 1 | analysis\_check\_data | Text in JSON format | Analyse the JSON successfully to get correct and necessarily data about the command |  | 1 |
| 2 | judge\_command | A structure {  Integer Auth,  Bool camera,  String light,  integer brightness,  Bool button\_pressed,  String command  } | judge whether it is a right instruction or not.  Produce two kind of data, one is like‘{‘Accept’: 0, ‘Deny’: 1}’, another is like‘{‘Accept’: 1, ‘Deny’: 0}’ |  | 2 |
| 3 | return\_information\_and\_errors | String Judgement(judge\_command’s results),  String information | For request, it will returns whether accept command or not. If yes, return command to be executed. If no, return wrong information. |  | 3 |

### IC\_TC 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step** | **Description** | **Input Type/Value** | **Expected Results** | **Service** | **Preamble** |
| 1 | analysis\_check\_data | Text in JSON format | Analyse the JSON successfully to get correct and necessarily data about the rooms and rules. |  | 1 |
| 2 | set\_room\_inf | Text in JSON format | This method will refresh rooms’ state in IC memory. At the same time, if some room’s state should be changed, it will be reported to the service. |  | 2 |
| 3 | Produce\_graph | Text in JSON format | The server will initialize the IC module for rules by running the algorithm to produce a graph for judging commands |  | 3 |
| 4 | return\_information\_and\_errors | String Judgement, String information | For initialize service, it will return the message about initialization |  | 4 |

### IC\_TC 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step** | **Description** | **Input Type/Value** | **Expected Results** | **Service** | **Preamble** |
| 1 | analysis\_check\_data | Text in JSON format | Analyse the JSON successfully to get correct and necessarily data about the rooms. |  | 1 |
| 2 | set\_room\_inf | Text in JSON format | This method will refresh rooms’ state in IC memory. At the same time, if some room’s state should be changed, it will be reported to the service. |  | 2 |
| 3 | return\_information\_and\_errors | String Judgement, String information | For updating, it will returns the rooms which state should be changed. |  | 3 |