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| Project | **Standard for Actuator Interface for Cyber and Physical World**  <https://sagroups.ieee.org/2888/ **>** |
| Title | **Revised of Generic Command Type** |
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| Re: |  |
| Abstract | This contribution proposes the revised generic command type that the actuators can have same command type. |
| Purpose | To start discussion on purpose of the standard |
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# Introduction

At the last meeting, we proposed the Generic Command Type for the same actuator common types, and it just contained the percentile value of intensity and frequency type. But in some cases, actuators may not understand the percentile value. So, this contribution contains the revised Generic Command Type that has not only the percentile value but also the absolute value for the specific device.

2 Common class for defining individual actuator type

* 1. Data Formats for Generic Type
     1. General

This sub-clause specifies the command types for the commands that actuators have in general.

* + 1. Syntax

|  |
| --- |
| "genericCommandType":{  "genericIntensityType": {  "type": "number",  "anyOf":[  {  "minimum": 0,  "maximum": 100,  "default": 100,  "multipleOf": 0.1,  "description":"This type displays the percentile of frequency value"},  {  "multipleOf": 0.1,  "description":"This type displays the absolute frequency value for specific device"}  ]  },  "genericFrequencyType": {  "type": "number",  "anyOf":[  {  "minimum": 0,  "maximum": 100,  "default": 100,  "multipleOf": 0.1,  "description":"This type displays the percentile of frequency value"},  {  "multipleOf": 0.1,  "description":"This type displays the absolute frequency value for specific device"}  ]  }  }, |

* + 1. Semantics

The semantics of the genericCommandType:

|  |  |
| --- | --- |
| *Name* | *Definition* |
| genericCommandType | Provide a data type for describing a generic command type. |
| genericIntensityType | Describes the intensity value that some actuator can produce. The format of the value can be set as a percentage or a value that the actuator can have. |
| genericFrequencyType | Describes the frequency value that some actuator can produce. The format of the value can be set as a percentage or a value that the actuator can have. |

* 1. Data Formats for Individual Actuators
     1. Light actuator
        1. General

This sub-clause specifies the actuator command type which can generate a light effect.

* + - 1. Syntax

|  |
| --- |
| "lightCommandData": {  "type": "object",  "properties": {  "color": {  "$ref": "#/definitions/colorType"  },  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  },  "additionalProperties": false  }, |

* + - 1. Semantics

The semantics of the lightCommandData:

|  |  |
| --- | --- |
| *Name* | *Definition* |
| lightCommandData | Provide a structure for describing a command for a light actuator. |
| color | Describes the color that the light actuator can provide either as a reference to a term that shall be using the colorType. |
| intensity | Describes the intensity value that a light actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Examples

This example shows the description of the actuator command of light effect with the following semantics. This light actuator is commanded to perform the intensity of 60% of the maximum intensity with the color “blue”.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "lightCommandData": {  "color": "blue",  "intensity": 60  }  } |

* + 1. Flash actuator
       1. General

This Subclause specifies the actuator command type which can generate a flash effect.

* + - 1. Syntax

|  |
| --- |
| "flashCommandData": {  "type": "object",  "properties": {  "color": {  "$ref": "#/definitions/colorType"  },  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  },  "frequency": {  "$ref":"#/definitions/genericCommandType/genericFrequencyType"  }  },  "additionalProperties": false  }, |

* + - 1. Semantics

Semantics of the flashCommandData:

|  |  |
| --- | --- |
| *Name* | *Definition* |
| flashCommandData | Provide a structure for describing a command for a flash actuator. |
| color | Describes the color that the flash actuator can provide either as a reference to a term that shall be using the colorType. |
| intensity | Describes the intensity value that a flash actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |
| frequency | Describes the intensity value that a flash actuator can generate. The frequency value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericFrequencyType. The format of the value can be set up to the first decimal point. |

* + - 1. Example

This example shows the description of the actuator command of flash effect with the following semantics. This flash actuator is commanded to perform the light intensity is 60% of the maximum intensity and frequency is 150Hz.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "flashCommandData": {  "intensity": 60,  "frequency": 150  }  } |

* + 1. Scent actuator
       1. General

This sub-clause specifies an actuator command type which can generate a scent effect.

* + - 1. Syntax

|  |
| --- |
| "scentCommandData": {  "type": "object",  "properties": {  "scent": {  "$ref": "#/definitions/scentType"  },  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false,  "required": [  "scent"  ]  }, |

* + - 1. Semantics

Semantics of the scentCommandData:

| *Name* | *Definition* |
| --- | --- |
| scentCommandData | Provide a structure for describing a command for a scent actuator. |
| scent | Describes the scent that specific scent actuator can generate. The scent unit of the command value describes as a reference to a term that shall be using the scentType. |
| intensity | Describes the intensity value that a scent actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Examples

This example shows the description of an actuator command of scent effect with the following semantics. This scent actuator is commanded to perform the intensity 5% of the maximum intensity with the scent “rose”.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "scentCommandData": {  "scent": "rose",  "intensity": 5  }  } |

* + 1. Heating actuator
       1. General

This Subclause specifies the actuator command type which can generate a heating effect.

* + - 1. Syntax

|  |
| --- |
| "heatingCommandData": {  "type": "object",  "properties": {  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false  }, |

* + - 1. Semantics

Semantics of the heatingCommandData:

| *Name* | *Definition* |
| --- | --- |
| heatingCommandData | Provide a structure for describing a command for a heating actuator. |
| intensity | Describes the intensity value that a heating actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Examples

This example shows the description of an actuator command of heating effect with the following semantics. This heating actuator is commanded to perform the intensity of 70% of the maximum intensity.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "heatingCommandData": {  "intensity": 70  }  } |

* + 1. Cooling actuator
       1. General

This Subclause specifies the actuator command type which can generate a cooling effect.

* + - 1. Syntax

|  |
| --- |
| "coolingCommandData": {  "type": "object",  "properties": {  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false  } |

* + - 1. Semantics

Semantics of the coolingCommandData:

| *Name* | *Definition* |
| --- | --- |
| coolingCommandData | Provide a structure for describing a command for a cooling actuator. |
| intensity | Describes the intensity value that a cooling actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Example

This example shows the description of an actuator command of heating effect with the following semantics. This cooling actuator is commanded to perform the intensity of 10 degrees Celsius.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "coolingCommandData": {  "intensity": 10,  }  } |

* + 1. Vibration actuator
       1. General

This Subclause specifies the actuator command type which can generate a vibration effect.

* + - 1. Syntax

|  |
| --- |
| "vibrationCommandData": {  "type": "object",  "properties": {  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  },  "frequency": {  "$ref":"#/definitions/genericCommandType/genericFrequencyType"  }  },  "additionalProperties": false,  "anyOf": [  {  "required": [  "intensity"  ]  },  {  "required": [  "frequency"  ]  }  ]  } |

* + - 1. Semantics

Semantics of the vibrationCommandData:

| *Name* | *Definition* |
| --- | --- |
| vibrationCommandData | Provide a structure for describing a command for a vibration actuator. |
| intensity | Describes the intensity value that a vibration actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |
| frequency | Describes the frequency value that a vibration actuator can generate. The frequency value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericFrequencyType. The format of the value can be set up to the first decimal point. |

* + - 1. Example

This example shows the description of an actuator command of vibration effect with the following semantics. This vibration actuator is commanded to perform the frequency is 50% of the maximum frequency.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "vibrationCommandData": {  "frequency": 50  }  } |

* + 1. Sprayer actuator
       1. General

This sub-clause specifies a actuator command type which can generate a spraying effect.

* + - 1. Syntax

|  |
| --- |
| "sprayerCommandData": {  "type": "object",  "properties": {  "sprayingType": {  "$ref": "#/definitions/sprayingType"  },  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false,  "required": [  "sprayingType"  ]  }, |

* + - 1. Semantics

Semantics of the sprayerCommandData:

| *Name* | *Definition* |
| --- | --- |
| sprayerCommandData | Provide a structure for describing a command for a sprayer actuator. |
| sprayingType | Describes the type of the sprayed material that shall be using the sprayingType. |
| intensity | Describes the intensity value that a sprayer actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Examples

This example shows the description of an actuator command of the sprayer effect with the following semantics. This sprayer actuator is commanded to perform the material to be sprayed pure water, and the intensity shall be 45% of the maximum intensity.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "sprayerCommandData": {  "sprayingType": "water",  "intensity": 45  }  } |

* + 1. Fog actuator
       1. General

This Subclause specifies an actuator command type which can generate a fog effect.

* + - 1. Syntax

|  |
| --- |
| "fogCommandData": {  "type": "object",  "properties": {  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false,  }, |

* + 1. Semantics

Semantics of the fogCommandData:

| *Name* | *Definition* |
| --- | --- |
| fogCommandData | Provide a structure for describing a command for a fog actuator. |
| intensity | Describes the intensity value that a fog actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + 1. Example

This example shows the description of an actuator command of fog effect with the following semantics. This fog actuator is commanded to perform the intensity 50% of the maximum intensity.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "fogCommandData": {  "intensity": 50  }  } |

* + 1. Wind actuator
       1. General

This Subclause specifies an actuator command type which can generate a wind effect.

* + - 1. Syntax

|  |
| --- |
| "windCommandData": {  "type": "object",  "properties": {  "intensity": {  "$ref":"#/definitions/genericCommandType/genericIntensityType"  }  },  "additionalProperties": false,  } |

* + - 1. Semantics

Semantics of the windCommandData:

| *Name* | *Definition* |
| --- | --- |
| windCommandData | Provide a structure for describing a command for a wind actuator. |
| intensity | Describes the intensity value that a wind actuator can generate. The intensity value shall be set as either the percentage value with respect to the maximum value or the specific actuator value that the actuator can produce using genericIntensityType. The format of the value can be set up to the first decimal point. |

* + - 1. Example

This example shows the description of an actuator command of wind effect with the following semantics. This wind actuator is commanded to perform the intensity 60% of the maximum intensity.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "windCommandData": {  "intensity": 60  }  } |

* + 1. Bubble actuator
       1. General

This sub-clause specifies the actuator command type which can generate a bubble effect.

* + - 1. Syntax

|  |
| --- |
| "bubbleCommandData": {  "type": "object",  "properties": {},  "additionalProperties": false  } |

* + - 1. Semantics

Semantics of the bubbleCommandData:

| *Name* | *Definition* |
| --- | --- |
| bubbleCommandData | Tool for describing a bubble actuator command. |

* + - 1. Example

This example shows the description of an actuator command of bubble effect with the following semantics. This bubble actuator is commanded to turn on to activate this actuator.

|  |
| --- |
| {  "commandInfoBaseAttributes": {},  "bubbleCommandData": {  }  } |