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| Project | **Specification of Sensor Interface for Cyber and Physical World**<https://sagroups.ieee.org/2888/ > |
| Title | **Proposal of JSON-formatted information for unmanned aerial vehicle to control UAV with interface in the virtual world** |
| DCN | **2888-20-0001-00-0001** |
| Date Submitted | **February 20, 2020** |
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| Re: |  |
| Abstract | Contributing JSON-formatted unmanned aerial vehicle information in order to be synchronized virtual UAV and physical UAV with interface in the virtual world. |
| Purpose | To start discussion on purpose of the standard |
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# Introduction

Such as for surveillance, crime prevention, delivery and etc., UAV (Unmanned Aerial Vehicle) can be controlled remotely. In order to remote control a drone, which is a kind of UAV, interface based on virtual space is necessary. In this paper, we propose well-formatted UAV information which obtained from physical UAV for controlling UAV in the virtual world.

# UAV information

For remote controlling UAV with interface in the virtual world, virtual UAV and physical UAV have to be synchronized between the worlds. Physical UAV in the real world can provide an information related to location, velocity and posture. In the cyber space, the virtual UAV should move/act like the physical UAV by acquiring the information of real UAV and expressing virtual UAV. So we should check which data can be obtained from physical UAV.

Commonly physical UAV can provide information as following:

* GPS
* 3-Axis Accelerometers
* 3-Axis Gyroscopes
* Compass (Magnetometers)
* Barometer

And to add some more, Posture of UAV can be controlled by utilizing accelerometers and gyroscopes. Therefore, by uptake of these 5 kinds information, cyber UAV can be represented in the virtual world.

# JSON-formatted UAV Information

We searched that data we can obtain from physical UAV for synchronizing the physical UAV into virtual UAV in the cyber space. By using JSON, we constructed well-formed UAV information which is acquired from the real UAV. Furthermore, we made JSON-formatted syntax and example of UAV information.

{

 "$Schema" : "http://json-schema.org/draft-04/schema#",

 "title" : "UAV Information Scheme",

 "type" : "object",

 "properties" : {

 "Model" : {"type" : "string"},

 "Date" : {"type" : "string"},

 "GPS" : {

 "Latitude" : {"type" : "number"},

 "Longitude" : {"type" : "number"}

 },

 "3-Axis-Accelerometers" : {

 "X" : {"type" : "number"},

 "Y" : {"type" : "number"},

 "Z" : {"type" : "number"}

 },

 "3-Axis-Gyroscopes" : {

 "X" : {"type" : "number"},

 "Y" : {"type" : "number"},

 "Z" : {"type" : "number"}

 },

 "Magnetic-Field" : {

 "X" : {"type" : "number"},

 "Y" : {"type" : "number"},

 "Z" : {"type" : "number"}

 },

 "Barometer" : {

 "Value" : {"type" : "number"},

 "Unit" : {"type" : "string"}

 }

}

}

}

Figure 1. JSON-formatted UAV information syntax

{

 "Model" : "3DR SOLO",

 "Date": "2020-02-19",

 "GPS" : {

 "Latitude" : 37.540734,

 "Longitude" : 127.079362

 },

 "3-Axis-Accelerometers" : {

 "X" : 396,

 "Y" : -64,

 "Z" : 16932

 },

 "3-Axis-Gyposcopes" : {

 "X" : -345,

 "Y" : 136,

 "Z" : 56

 },

 "Magnetic-Field" : {

 "X" : -648,

 "Y" : 78,

 "Z" : -443

 },

 "Barometer" : {

 "Value" : 1007.64,

 "Unit" : "mbar"

 }

}

Figure 2. An example of JSON-formatting UAV information

# Conclusion

In this contribution, we proposed JSON data format UAV information. We collected information we can get from the real UAV and created JSON syntax and example based on the information.