

# HSML

Hypermedia for Connected Things

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# HSML

- Hypermedia content format for IoT sensors and actuators
- Combines IoT data and hypermedia controls
- Re-uses core link-format
  - <https://tools.ietf.org/html/rfc6690>
  - <https://tools.ietf.org/html/draft-ietf-core-links-json-09>
- Re-uses SenML
  - <https://tools.ietf.org/html/draft-ietf-core-senml-11>
- Suitable for constrained networks
  - Maps to CBOR, EXI Serializations, keyword sets

# HSML Design

- HSML is a content format with a specified interaction model
- **Hypermedia controls**, like HTML Links and Forms
- **Collections** with group and batch operations through link embedding
- Asynchronous and structured interaction models for machine use cases
- Optimized for minimal interaction models wrt. workflow; data-only, links-only

# HSML - Collections

- HSML extends the collection model of CoRE Interfaces
  - <https://tools.ietf.org/html/draft-ietf-core-interfaces-10>
- Defines update modes and additional semantics through link relation types
- Can specialize collection interactions through content-formats or interface types

# HSML – Actions and Events

- HSML extends the REST interaction model
- Defines hypermedia controls for submitting Actions and Observing Events
- Extends CoRE Dynamic Linking (Dynlink)
  - <https://datatracker.ietf.org/doc/draft-ietf-core-dynlink/>
- Action model based on Forms

# HSML – Status of the Work

- Revision in progress, tracking the final Link-format and SenML documents
- Implementation work being done, generating good feedback
- Demonstration of system level integration including semantic discovery and client interaction through hypermedia controls – MachineHypermediaToolkit
  - <https://github.com/mjkoster/MachineHypermediaToolkit>
  - <https://github.com/connectIOT/HypermediaDemo>

# HSML Example, JSON Serialization

```
[
  {
    "bn": "/example/sensors/" ← SenML Base Element
  },
  {
    "href": "temp",
    "rt": "urn:iot:temperature" ← RFC6690 Link Elements
  },
  {
    "href": "humid",
    "rt": "urn:iot:humidity"
  },
  {
    "n": "temp",
    "v": 29 ← SenML Data Elements
  },
  {
    "n": "humid",
    "v": 61
  }
]
```

The diagram illustrates the JSON serialization of an HSML (HTTP Sensor Markup Language) document. The JSON array contains five objects. The first object is a SenML Base Element with the property "bn" set to "/example/sensors/". The next two objects are RFC6690 Link Elements, each with "href" and "rt" properties. The final two objects are SenML Data Elements, each with "n" (name) and "v" (value) properties. Arrows point from the labels on the right to the corresponding elements in the JSON structure.