ArcGIS GeoEvent Extension for Server: The Internet of Things (IoT)

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The Internet of Things (IoT)

Everything Connected

• More things are connecting to the Internet than people
  - Over 12.5 billion devices in 2010 are tying together the physical, digital, and analytic worlds

Predictions are that 25 billion devices will be connected by 2015, and 50 billion by 2020.

Connected Cars

Smart Phone on Four Wheels

- AT&T Drive Studio
- Nissan, Tesla, GM, Ford, BMW, Audi
Connected Homes

Smart Homes

- Smart Appliances, Thermostat (Cooling/Heating), Security Monitoring
Connected Homes

*Smart Thermostat*

[Image of a smart thermostat]

[Image of a learning thermostat]

[Image of a connected home diagram]
Connected Homes

Smart Security Monitoring

Custom Activity Zones

Motion was detected in the driveway

Know when something enters a zone.
**Connected Homes**

*Bluetooth Low Energy (BLE) Tags*

**Ninja Sphere**

Uses trilateration, the intersection of 3 overlapping signals, to determine location and presence of an object.

**Ninja Spheramid – IoT gateway (open source)**

- **Stick ‘N Find**
- **Tile**
- **Gecko**
Connected Sports

*Smart Equipment*

- Infomotion 94Fifty smart sensor basketball
- Sony smart tennis racket sensor
Connected Environment
Nature to Machine Interface

HP Labs – CeNSE

Cisco Planetary Skin

IBM Smarter Planet

Central Nervous System of the Earth: Feel, taste, smell, see, and hear

Billions of networked sensors on land, sea, air, and space to detect and predict changes to the environment.

IBM Smarter Planet
Connected Environment
Nature to Machine Interface

Micro-Weather Station
Reports ambient temperature, relative humidity & barometric pressure

Chemical Sensor
Reports volatile organic compounds

Air Quality
Reports carbon dioxide (CO2)

Light Sensor
Reports luminosity
Connected Environment
Nature to Machine Interface

Esri CityEngine
Transform 2D Geo data into smart 3D city models.
Nature to Machine Interface
Real-Time Analytics on the IoT

- Light
- Air
- Chemical
- Weather
- Door

GeoEvent Extension
GeoEvent Services

Valarm
- Excessive CO2
- Chemical Present
- Excessive Light
- Alert

Text-to-Speech

ArcGIS Server

JSON (Push)

Excessive CO2
Chemical
Weather
Alert

Station-01 is reporting Excessive CO2, Ended at 7/9/14 7:31 PM and lasted for 7 seconds.

1,008.00
3,376.00

165
7.6

Excessive
Chemical
Weather

Door

Light
Air
Chemical
Weather
Personal Area Connectivity
*Wireless Personal Area Networks (WPANs)*

- Zigbee
  - Form a mesh network
  - Low data rate
  - Long battery life
- Bluetooth Low Energy (BLE)
Bluetooth Low Energy
*Bluetooth Smart – a wireless personal area network*

- iOS 5
- Android 4.3
- Windows Phone 8.1
- Linux 3.4
Beacons

*iBeacon – Apple Standard for Beacon broadcast format*

Gimbal Beacons
Context Awareness platform a product of Qualcomm Retail Solutions, Inc.

Estimote Beacons
Connected Schools

*Student Proximity*

- Modern solution for frantic and frequent head counts
Connected Museums

Smart Art

- Context-aware
  - Art description/narration
Connected Retail

*Smart Shopping*

- Proximity to brand
- Interest sensing
Connected Buildings

*Smart Workplace*

- Workplace Safety
Proximity Sensing

Estimote Beacons
Connected People

Smart Wearables

Google Glass

Platronics Headset

Sensoria Sports Bra/Shirt

Samsung Galaxy Gear

Jawbone Up

Under Armour Armour39

Sensoria Smart Socks

Google Glass

Platronics Headset

Sensoria Sports Bra/Shirt

Samsung Galaxy Gear

Jawbone Up

Under Armour Armour39

Sensoria Smart Socks
Smart Wearables

Firefighters
The Internet of Things (IoT)
*Everything Connected*

- Geospatial reasoning is needed amongst the Internet of Things.
- Performing geospatial reasoning closer to the things can improve their ability to sense.
- When meaningful patterns are found things can notify people or even other things.
Thank you...

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Questions / Feedback?

To learn more:
http://links.esri.com/geoevent-processor
https://geonet.esri.com/community/gis/enterprise-gis/geoevent

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