

Real-time Fire Management System Based on Sensor Web Services

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2018 52°North Student Innovation Challenge

<https://github.com/chsimon4/Emergency-Fire-Evacuation-System>

Outline

- Background
- Objective
- System Design
- Data use
- Demonstration
- Future work



Background



- Disaster prevention and management
 - ✓ Alarm notification
 - ✓ Evacuation route simulation
- **Sensor Web** → Environment observation
- **Building model** → Three dimensional visualization
- **Route network** → Interior space navigation



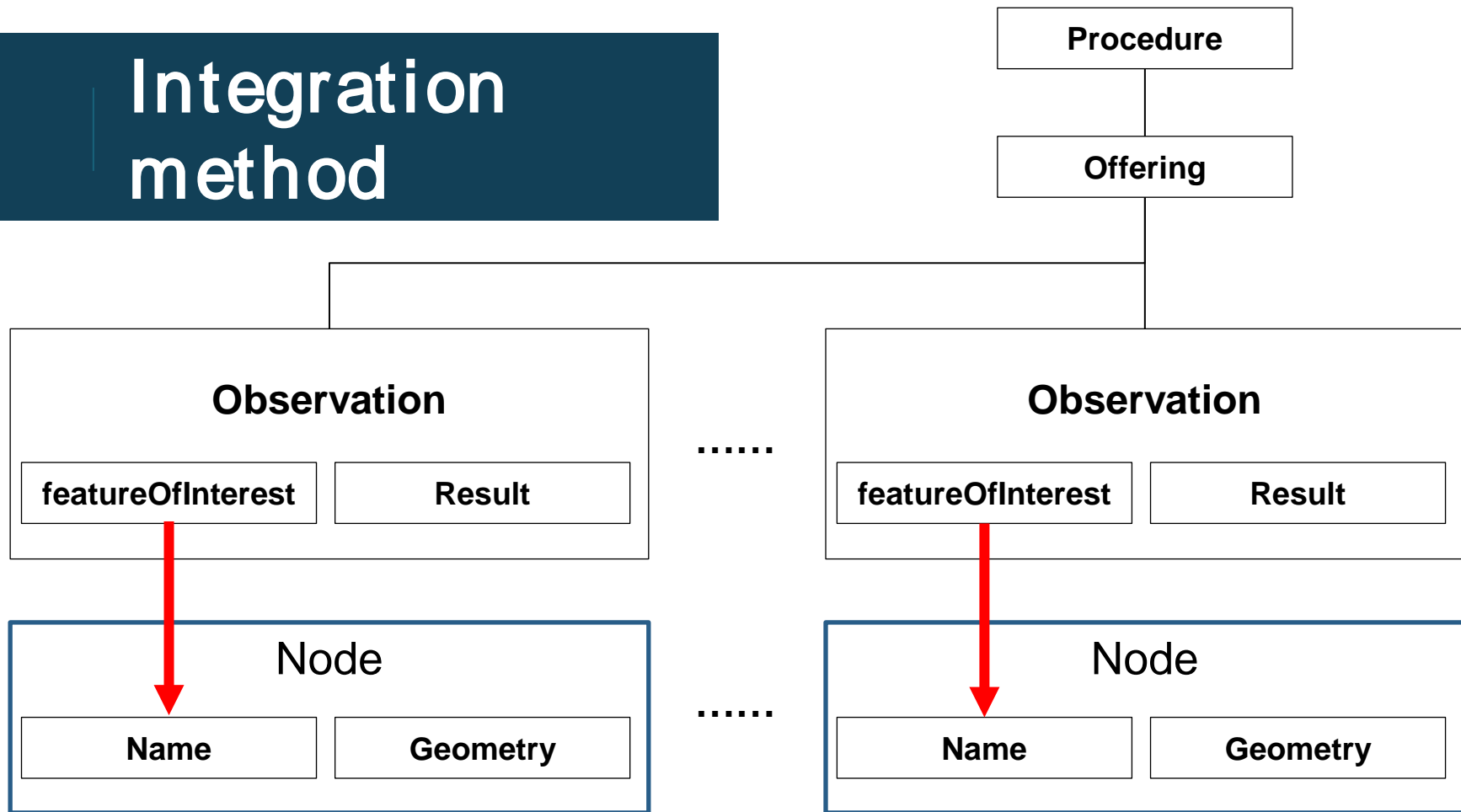
Objective

Integrate indoor route network and sensor service.

- Analyze the safe evacuation route more effectively.
- Support real-time evacuation information.

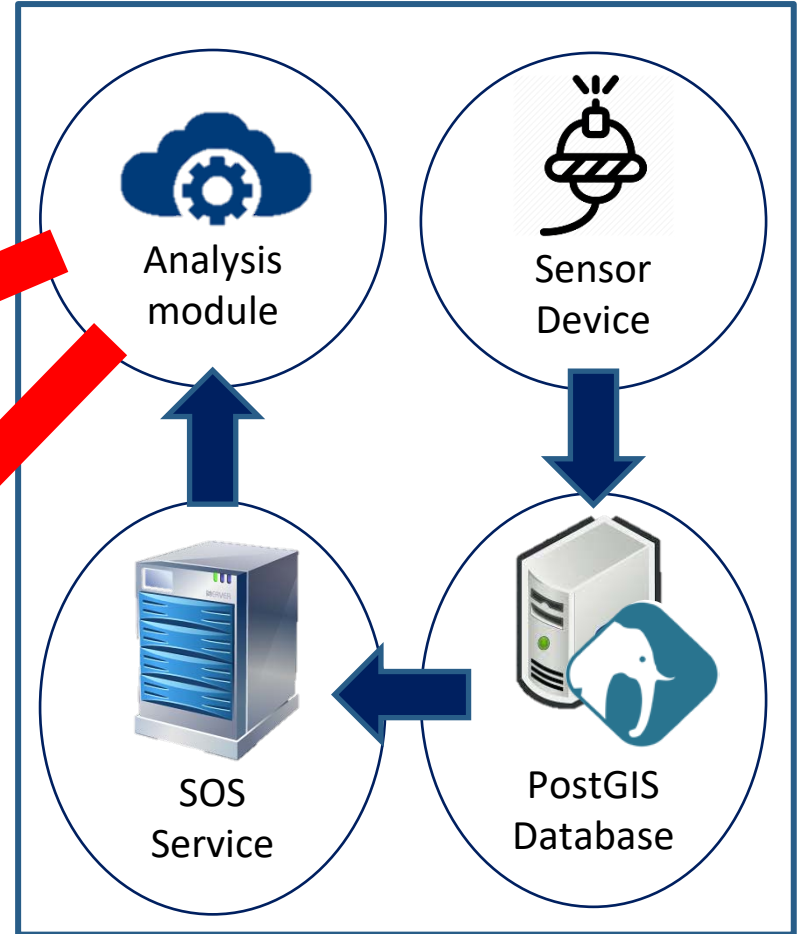
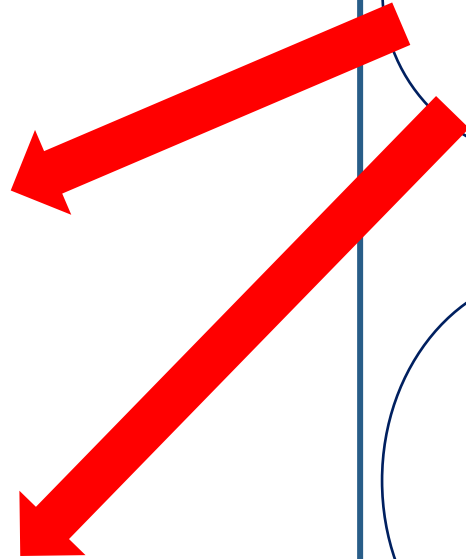
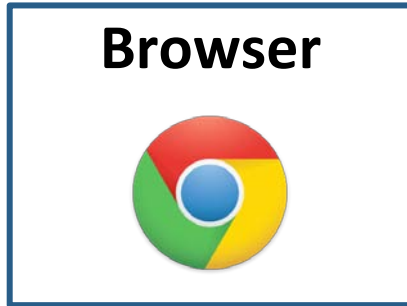
- Base on open standards
 - ✓ Sensor Observation Service (SOS)
 - ✓ GeoJSON
 - ✓ JSON

Integration method





System Architecture



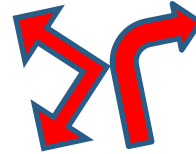


Analysis module

- Routing module
The shortest evacuation route
- Warning module
Temperature > 60 Celsius
Obscuration percentage > 22.5%
→ Danger area
- **Analysis module**
The shortest safe evacuation route



**Analysis
module**



Routing module

Dijkstra's algorithm



Warning module

temperature
obscuration percentage



User

- **Victim of fire disaster**
Safe evacuation route planning
- **Firefighter**
Real-time disaster information
- **Building manager**
Building condition monitoring
- **Building designer**
Evacuation route simulation



Data use

▪Sensors (Simulate)

1. Procedure: **DHT22, EN54-7**
2. Observable property: **Temperature, Obscuration**
3. Service: **Sensor Observation Service**

▪Building Model

1. Study area: R3 building in National Central University
2. Format: GeoJSON

▪Route Network

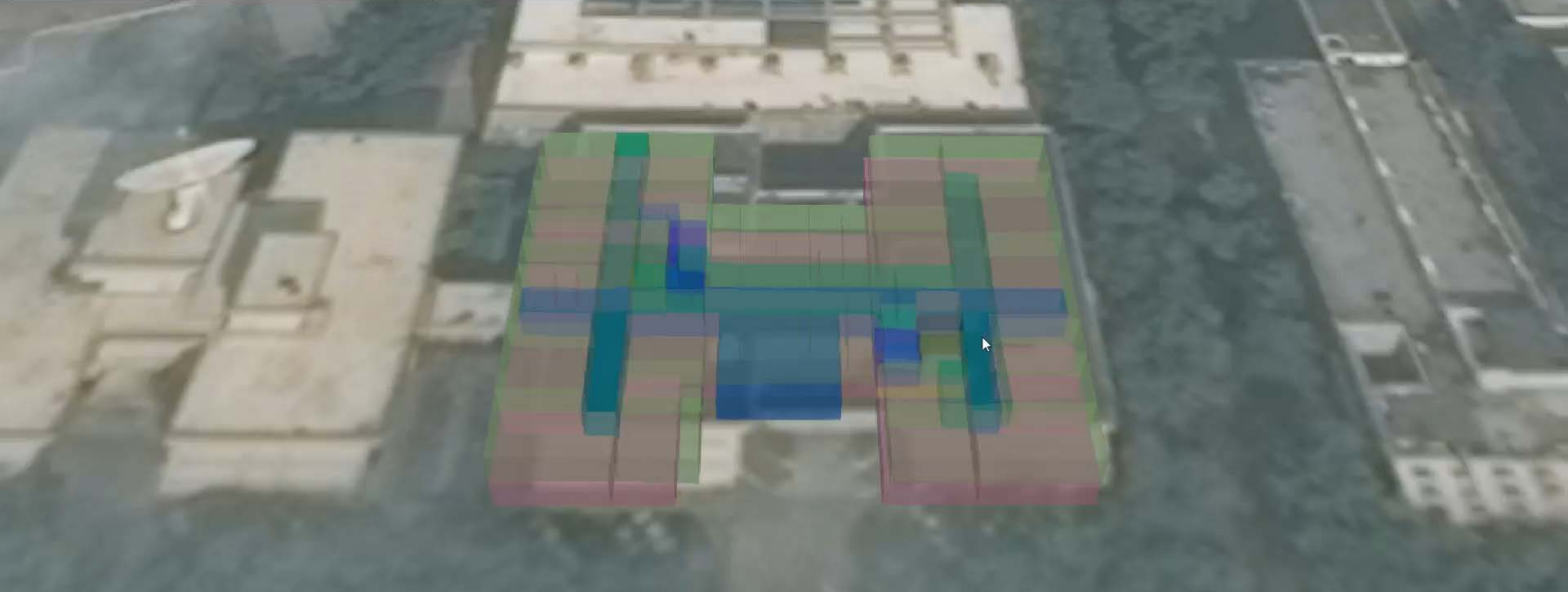
1. Study area: R3 building in National Central University
2. Format: JSON





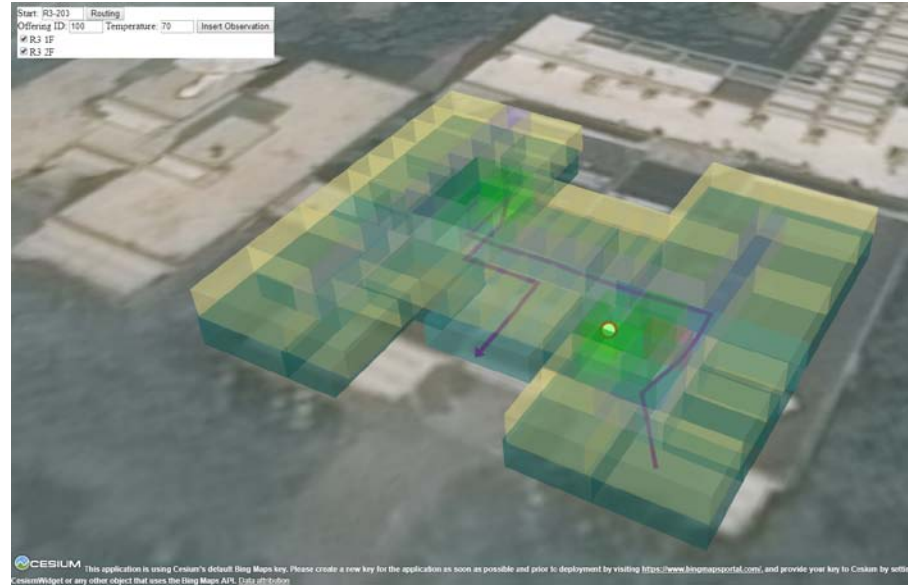
Demonstration

Start: R3-203	Routing	
FeatureOfInterest ID: 100	Temperature: 70	Insert Observation
FeatureOfInterest ID: 21	Obscuration Rate: 50	Insert Observation





Future work



- ❑ Dynamically coloring based on the value of observation.
- ❑ Consider more observable property in warning module.
(Wind speed → plume mode analyze)
- ❑ History data management.



Thank you !

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