Management Of Networked IoT Wearables – Very Large Scale Demonstration of Cultural and Security Applications

MONICA

Using wearable and IoT data to create situational awareness

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Using wearable and IoT data to create situational awareness

- Overview of components involved
  - Instance Data
- Common Operational Picture UI (COP)
  - Examples of visualisations
Overview of Components for Situational Awareness

- Common Operational Picture
- High Level Data Fusion and Anomaly Detection
- Decision Support System
- IoT Storage
- OGC SensorThings API
- Instance Data
- Service Catalogue
- COP UI
- APPS
Overview of Components for Situational Awareness

• High Level Data Fusion and Anomaly detection
  • Fuse data from different sources, e.g. people heatmap
  • Detecting anomalies such as ”High risk queues”

• Decision Support System
  • intervention strategies for incidents of different types
  • No automatic resolvement of incidents

• Common Operational Picture COP
  • Maintains the current state of the event

• Service Catalogue
  • Implemented on top of OGC SensorThings API
    • Most high-level services act as data streams
Instance Data: Event specific information

- Limits
  - Sound / people density
- Intervention plans
- POIs
  - Sensor positions
  - Event POIs
    - Stalls, toilets, rides et c.
- Areas of interest
  - Exclusion zones
  - Camera coverage areas
Common Operational Picture User Interface

• Goals
  • Give an overview of the status of the event
  • Provide more detailed information when needed
  • Indicate problems/incidents and provide support for resolving them

• Two main flavours
  • Crowd and Security
    • Focus on security incidents
    • Crowd monitoring
    • Staff tracking
  • Sound
    • Sound monitoring
    • Sound incidents (Both over threshold and sound quality problems)
Crowd Counting Visualization
<table>
<thead>
<tr>
<th>Zone ID</th>
<th>Count (Visitors)</th>
<th>Capacity (%)</th>
<th>Max Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>LYON_163</td>
<td>49</td>
<td>5%</td>
<td>922 visitors</td>
</tr>
<tr>
<td>LYON_161</td>
<td>238</td>
<td>70%</td>
<td>341 visitors</td>
</tr>
<tr>
<td>LYON_162</td>
<td>45</td>
<td>4%</td>
<td>1,224 visitors</td>
</tr>
<tr>
<td>LYON_164</td>
<td>39</td>
<td>64%</td>
<td>61 visitors</td>
</tr>
<tr>
<td>LYON_165</td>
<td>24</td>
<td>13%</td>
<td>188 visitors</td>
</tr>
<tr>
<td>LYON_166</td>
<td>164</td>
<td>43%</td>
<td>378 visitors</td>
</tr>
</tbody>
</table>
Points of interest
Incident and intervention plan

Security Incidents
Wind, queues, overcrowd, fight etc.

WHAT
Wind: (Test) Ab 15 m/s muss der Betrieb eingestellt werden. Plane an der Rückwand sind zu entfernen
Probability: 80 %
Nov 15, 2018, 2:16:53 PM
ONGOING

WHERE

Zone Capacity
All zones with active people count

DOM_101 (35 visitors)
Nov 16, 2018, 7:32:24 PM
70%
Max. 50 visitors

DOM_102 (52 visitors)
Nov 16, 2018, 7:32:23 PM
102%
Smart Glasses

• Integrated in the COP
  • Localization
  • Create incidents in the COP using text/video/pictures
  • Receive commands and images from the COP
Crowd Heatmap
Sound Level data

ThingMONICA0004_000608 (376)

1/3 Octave spectra

LAeq & LCEq

Nästa Vecka Nuits Sonores • IoT Week demo i midsommarveckan • Första helgen i juli: Kappa FuturFestival • Mitten av augusti: Woodstower festival • Första helgen i september: Tivoli Friday rock + Pütchzens Markt • Slutet av september: Leeds cricket • + MOVIDA + fler TIVOLI
Sound Heatmaps

- Nästa Vecka: Nuits Sonores demo i midsommarveckan
- Första helgen i juli: Kappa FuturFestival
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Sound Level Data over time

- At Sound engineer’s console
- At most critical point in audience (location)

**15 MINUTES AVERAGE**
- 101.4 dBC
- 105.4 dBC

**MAXIMUM ALLOWABLE**
- 118 dBC

Jun 1, 2019, 10:39:18 PM
Sound Contribution

Overall Sound Level

- **15 MINUTES AVERAGE**
  - 64.5 dBA
  - 50 dBA
  - 49.9 dBA
  - 50 dBA

- **MAXIMUM ALLOWABLE**
  - 65 dBA (current)
  - 51.8 dBA (at 10:40:28 PM)

Octave bands

- **Measured**
- **Contribution Stage 1**
- **Contribution Stage 2**
- **Contribution Stage 3**