OurCS: Augmented Reality Visualizations of IoT

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*Victor H. Yngve Distinguished Professor of ISE and Information Science Director, Cyberinfrastructure for Network Science Center School of Informatics, Computing and Engineering Indiana University, USA

OurCS Event at Indiana University

Oct 26-28, 2018
Amatria Dendrite

Amatria Dendrites, on display in the Luddy Hall Visualization Lab (room 4012), are pieces of living architecture. Each comprises one light sensor (the eye) and actuators such as lights and a strand of shape memory alloy that makes the sculpture move. Software controls the sensor and actuators. Dendrite fields were built in the 2017 ISE Summer camp. See below for events and activities where you can build or view dendrites.

Resources: Amatria Dendrite Manual | Code on GitHub

Amatria Moth

Amatria Moths, on display in the Luddy Hall Visualization Lab (room 4012), are the newest generation of Amatria-related architectural elements. For a limited time you can purchase a moth kit and build one yourself. Kits are $25 and can be ordered at go.iu.edu/moth. See below for additional events and activities where you can build or view moths.

Resources: Amatria Moth Manual

https://cns.iu.edu/amatria.html
Different Question Types

Terabytes of data

Find your way

Descriptive & Predictive Models

Find collaborators, friends

Identify trends
### Tasks

<table>
<thead>
<tr>
<th>LEVELS</th>
<th>MICRO: Individual Level</th>
<th>MESO: Local Level</th>
<th>MACRO: Global Level</th>
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<th>Statistical Analysis</th>
<th>Knowledge Cartography</th>
<th>Productivity of Russian life sciences research teams</th>
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<td>page 135</td>
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<tr>
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<td>page 157</td>
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<table>
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<tr>
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<td>page 50</td>
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See Atlas of Science: Anyone Can Map, page 5
## Visualization Framework

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<tr>
<th>Insight Need Types</th>
<th>Data Scale Types</th>
<th>Visualization Types</th>
<th>Graphic Symbol Types</th>
<th>Graphic Variable Types</th>
<th>Interaction Types</th>
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<tr>
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See page 24
# Graphic Variable Types Versus Graphic Symbol Types

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<td>Closure</td>
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<td>Saturation</td>
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## Graphic Variable Types Versus Graphic Symbol Types

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Some table cells are left blank to encourage future exploration of combinations.
Sci2 Tool Interface Components Implement Vis Framework
Download tool for free at http://sci2.cns.iu.edu
Load **One** File and Run **Many** Analyses and Visualizations

<table>
<thead>
<tr>
<th>Times Cited</th>
<th>Publication Year</th>
<th>City of Publisher</th>
<th>Country</th>
<th>Journal Title (Full)</th>
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**Statistical Analysis**—p. 44  
**Temporal Burst Analysis**—p. 48  
**Geospatial Analysis**—p. 52  
**Geospatial Analysis**—p. 52
Load One File and Run Many Analyses and Visualizations

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<td>A Multi-Level Systems Perspective for the Science of Team Science</td>
<td>Cell Biology</td>
<td>Borner, K</td>
</tr>
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</table>

Co-author and many other bi-modal networks.
Books Used in the IVMOOC

Teaches timely knowledge:
Advanced algorithms, tools, and hands-on workflows.

Teaches timeless knowledge:
Visualization framework—exemplified using generic visualization examples and pioneering visualizations.
S637/E583/IVMOOC
Information Visualization

Learn to Harness the Power of Data

CNS launched the inaugural Information Visualization MOOC (IVMOOC) in January 2013, attracting participants from more than 100 countries. The course provides an overview about the state of the art in information visualization, emphasizing a user-needs-driven process. Anyone interested in generating visualizations would benefit from the course, and there are also opportunities to work with real-world clients on a variety of data visualization projects.
ENGR-E484/E584 | Fall 2019

Scientific Visualization

Instructor: William R. Sherman, shermanw@indiana.edu
Monday/Wednesday 4:00–5:15 p.m.
Visualization Lab, Luddy Hall 4012

This 3-credit course teaches basic principles of human cognition and perception; techniques and algorithms for designing and critiquing scientific visualizations in different domains (neuro, nano, bio-medicine, IoT, smart cities); hands-on experience using modern tools for designing scientific visualizations that provide novel and/or actionable insights; 3D printing and augmented reality deployment; and teamwork/project management expertise.

Topics covered:

- Scientific visualization: Past, present, and future trends
- Human cognition and perception
- Techniques and algorithms for neurological sciences, nanotechnologies, bio-medicine, IoT, etc.
- Virtual and augmented reality visualizations
- 3D printing deployment
- Choosing and working with clients
- User and task analysis
- Client-oriented projects
<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Activity</th>
<th>Location</th>
<th>Who</th>
<th>Needed</th>
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</thead>
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| Fri Oct 26| 11a-12.30p | Self-introductions
Intro to Sentient Architecture (Katy), Amatria tour (Andreas), Dendrite Moth Field Array, show videos Q&A | VIS/Fab Lab   | Katy, Mike, Andreas  | 15 handouts of Dendrite instructions
- 15 handouts of Moth instructions
- Printouts of Amatria schematics and plans |
|           | 2.15-3.30p | Moth building part 1, build base for electronics                          | VIS/Fab Lab   | Mike                 | 15 kits, spargate, crazy long screwdriver                               |
|           | 4-5.45p    | Moth building p2, extruding, assemble frond + actuators                   | VIS/Fab Lab   | Mike                 |                                                                         |
| Sat Oct 27| 9-10.30a   | Intro to laser-cutting, also cut Chevrons                                 | VIS/Fab       | Mike                 | Cut for 30(?) more Moths? How many laser-cutters do we have? Precut elements? Minimize waiting times |
|           | 11-12.30p  | Manual writing, figure out what to capture in what way                    | VIS/Fab Lab   | Katy                 | Camera setup for this.                                                 |
|           | 3.15-3.30p | **Group picture!**                                                        |               | Andreas              |                                                                        |
|           | 4-6p       | Manual writing, p. 2
Kit construction, impacted by                                             | VIS/Fab Lab   | Mike                 |                                                                        |
All papers, maps, tools, talks, press are linked from http://cns.iu.edu
These slides will soon be at http://cns.iu.edu/presentations.html

CNS Facebook: http://www.facebook.com/cnscenter
Mapping Science Exhibit Facebook: http://www.facebook.com/mappingscience