

Voluntary Programs related to Zhaga Book 20

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PNNL is operated by Battelle for the U.S. Department of Energy





Multiple voluntary programs occurring in North America related to or similar to Zhaga Book 20

- U.S. Department of Energy:
 - L-Prize
 - IoT Upgradeable Lighting Challenge
- National Electrical Manufacturers Association
 - LSD ## document in production







L-Prize Phases and Awards

Pacific

Northwest





Consistent, Technical Requirements for All Phases

Efficacy	Quality of Light	Connectivity	Product Life Cycle
✓+□ Luminaire efficacy	 ✓ Chromaticity ✓ Dimming range ✓ Glare control ✓ Light output ✓ Spectral data reporting ✓ +□ Color rendition ✓ +□ Flicker □ White-tunable 	 ✓ Interoperability ✓ Addressability ✓ Energy reporting ✓ Lighting control strategies ✓ Luminaire-level lighting control ✓ +□ System resilience ✓ +□ Fault detection and diagnostics ✓ +□ Grid services capable □ Sensor ready and upgradeable □ Ease of install and configuration 	 ✓ Driver lifetime ✓ Chromaticity Maintenance ✓ +□ Replaceable components ✓ +□ Lumen maintenance □ Design for disassembly Possible Points One point (+1) will be avi include standardized point compliance with D4i or A established the Digital II ANSI C137.4. One point (+1) will be avi standardized sensor point compliance with Zhaga

✓ Requirement

□ Indicates optional points





varded for luminaires/systems that wer, data, and sensor capabilities in ANSI C137.4-202X (forthcoming) as Iumination Interface Alliance and/or

varded for luminaires that incorporate a t and power/data connections in Book 20 established by the Zhaga



IoT-Upgradeable Lighting Challenge: Sensor Shape and Connections

Transition

Current Situation



Many different sensor shapes, sizes, and connection methods across manufacturer

Need to shift away from proprietary connector / analog technology to standardized digital technology





IoT-Upgradeable Challenge



Standardizes on a set of shapes, sizes, and electrical / data



Challenge Approach

Make controls and sensors more accessible to broader set of users

- Reduce cost and complexity of getting sensors into buildings
- Price comparable to non-upgradeable products
- Simplify controls installation
- Reduce risk of being locked-in to proprietary or outdated technologies
- Support standardization of lighting, energy, diagnostics data for smart-buildings

Deployment focused and voluntary

Partner with industry and standards organizations

Match supply with demand

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IoT-Upgradeable Lighting Challenge Lighting Sensor Standardization



Zhaga Book 20: Smart Interface between indoor luminaires and communication/sensing modules

- 4 shapes / sizes &
- Standard electrical configuration
- International consortium





LSD-XX: Physical Interface of Luminaire Integrated Control Devices (in development)

- Zhaga + additional shapes/sizes
- Developed by NEMA member mfrs
- Includes old out-of-scope analog sensor shape/sizes and proprietary shapes/sizes
- Too many or proprietary sensor shape / sizes may affect future upgradeability

PNNL surveyed 20 North American manufacturers and reviewed over 60 sensors

Supplied data to both Zhaga and NEMA – informed their documents

IoT Challenge requires: 4 Zhaga shapes / sizes + 1 NEMA shape/size

Encourages standardization and reduces upgradeability uncertainty

Example Information About Sensor Space from Zhaga or NEMA

IoT-Challenge



- Standardizes the physical and electrical connections for the sensor
- **4** sensor-type options

Key Requirements

• 3 Options for Sensor Port

Dimensions

- 0.9" x 2.4" rectangular
- 0.7" x 1.7" rectangular
- 0.9" circular
- Standardized plug connector
- D4i power/data compliant









OVAL TOP OVAL BOTTOM

- Standardizes the physical connections for the sensor
- **≈12** sensor-type options

Key Requirements

- ≈7 Options for Sensor Port Dimensions
 - many
- NO standardized plug connector
- Doesn't specify D4i power/data compliance

* 4 of the NEMA shape/sizes match Zhaga



OPTION 3 - CYLINDER TOP- CYLINDER BOTTOM





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IoT-Challenge Sensor Research

PNNL Compiled list

• 20 North American manufacturers

66 sensors

- Luminaire focused
- Low voltage, DALI





Retention Ring

Push-in Terminals



Analog 0-10 V vs. D4i Digital LED Drivers



0 – 10 V Analog Driver

- Most common today
- Hold over from fluorescent
- Inefficient \rightarrow one-way communication signal in form of a voltage signal between 0 – 10 V. Can send only 1 channel of information
- Low first cost and contractors very familiar with the technology



D4i Certified Digital Driver

- Built on DALI-2 technology, overlaps with ANSI C137.4
- Provides power to sensors
- 2-way communication
- Standardizes lighting system data for energy use, hours of operation, diagnostic information
- Designed to work with Zhaga sensor
- REQUIRED AS PART OF CHALLENGE







D4i Certified LED Drivers



Multiple choices of protocols outside fixture &



Other Networks

Allows for flexibility of use



Challenge and L-Prize Comparison

Metric	Challenge	L-Prize
Market Proximity	Products close to market Uses currently available tech	Stretch for products Uses new tech and inno be currently available
Scope	Luminaire only	Full system
Timeframe	1 year	3 years
Location of manufacturer	Manufacturing agnostic	Requires US companies manufacturing content
Description	Good to excellent performance (quality, efficacy, controllability)	Superior performance (quality, efficacy, contro
Why / Scope	Addresses a specific market need/gap (IoT upgradeable)	Comprehensive - Addre energy, visual quality, co sustainability, US conte
Price component	<10% or <\$20 increment compared to non- upgradeable fixture	L Prize does not mention s
Monetary Incentive	No monetary prize	Significant monetary prize

ovations that may not

s, awards US

llability, sustainability)

esses all aspects of onnectivity, nt and manufacturing

system price



To learn more...

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