Context-Aware Dynamic Lighting
Responsive Low-Energy Lighting System via Wireless Sensor Networks and LED Lighting

The Problem
• Buildings consume ~3/4 of U.S. electricity.
  • Lighting accounts for ~1/3 of a typical office building’s energy.
  • Up to 40% wasted by illuminating:
    • Unoccupied spaces.
    • Spaces with sufficient natural light.
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Current Lighting Technology

**Sensing:** occupancy

**Lighting:** Fluorescent

A binary approach – on/off
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Next Generation Lighting Technology

Sensing
MITes

Control
I/O

Lighting
LED

A gradient approach – many “in between” states
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MITes A kit of wireless sensors for environmental data collection

Motion sensors
To detect the movement of people in the office

Object motion sensors
Attached to office chairs and tables to detect when used

Light sensors
To detect the level of natural light in the office
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**LED** An innovative lighting panel by OSRAM-SYLVANIA

Prototype of LED panel
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LED An innovative lighting panel by OSRAM-SYLVANIA
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Mixing light to save energy
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I/O Converting data into light

Benefits:
• Save Energy
• Comfort
• Health
• Security
• ...

MITes → I/O → LED

Logic
A suite of algorithms
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Examples  Save Energy

The system:
Knows you’re working at your desk

You get high-quality light around your desk

The rest of your office gets low-quality light
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Examples Save Energy

The system:
Knows you’re having a private conversation with a colleague

You get high-quality light around your sitting area

The rest of your office gets low-quality light
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Examples Security

The system:
• Anticipates your path
• Detects you’re alone
• Knows the time
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Examples Security

The system:
• Increases light levels
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Examples Health

The system:
Knows your boss just yelled at you because:
• You’re pacing restlessly in your office
• You’re kicking around furniture
• Your body heat is rising
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Examples Health

The system:
Adjusts the light to something more relaxing...enjoy.
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Contributions
• A new approach to lighting: binary to gradient
• A new role for light in our day-to-day spaces
• A way to save energy (...and make Obama smile)
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How soon can you have this system up & running?