

ROLE OF IOT IN A SMART CITY CONNECTED COMMUNITY



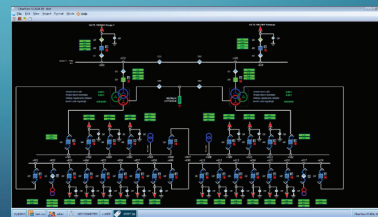
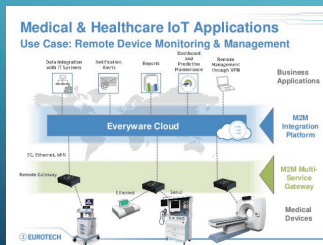
Professor Saifur Rahman

Director, Virginia Tech Advanced Research Inst., USA
President, IEEE Power & Energy Society, 2018-2019

2021 Tunisian Smart Cities Online Hackathon, 09 August, 2021

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IoT Applications in Agriculture, Transport, Healthcare, Energy

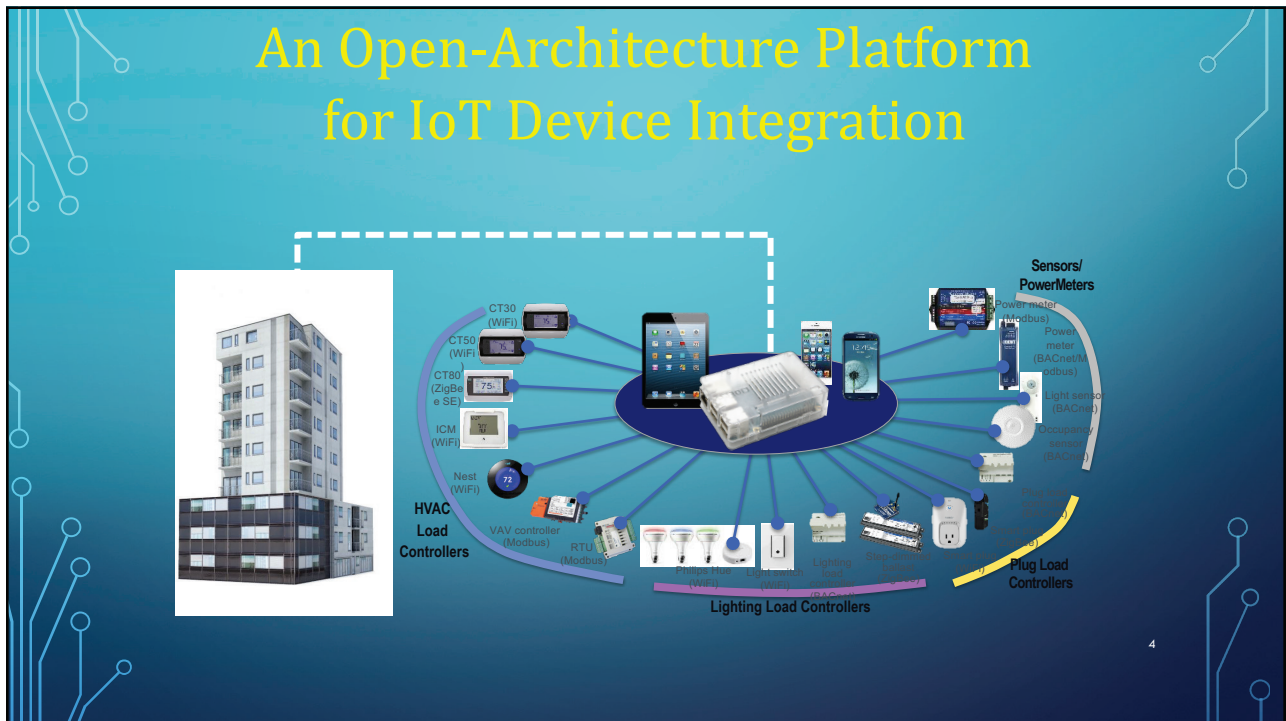


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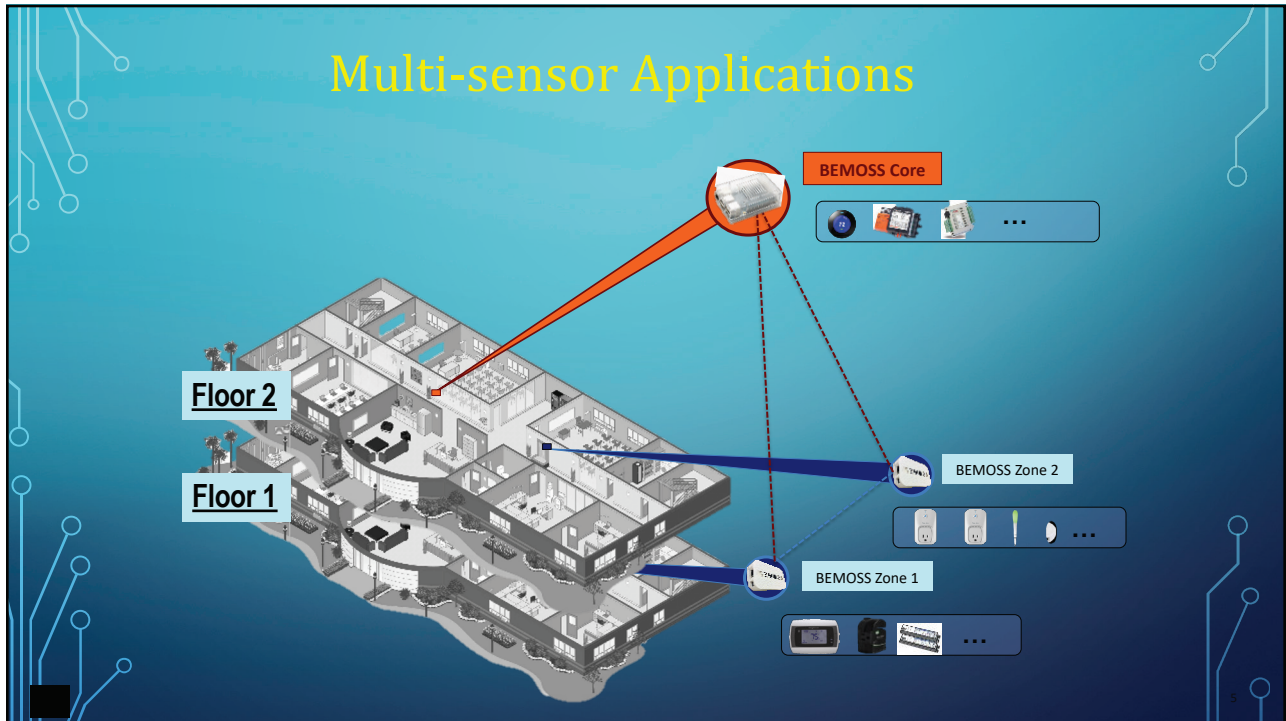
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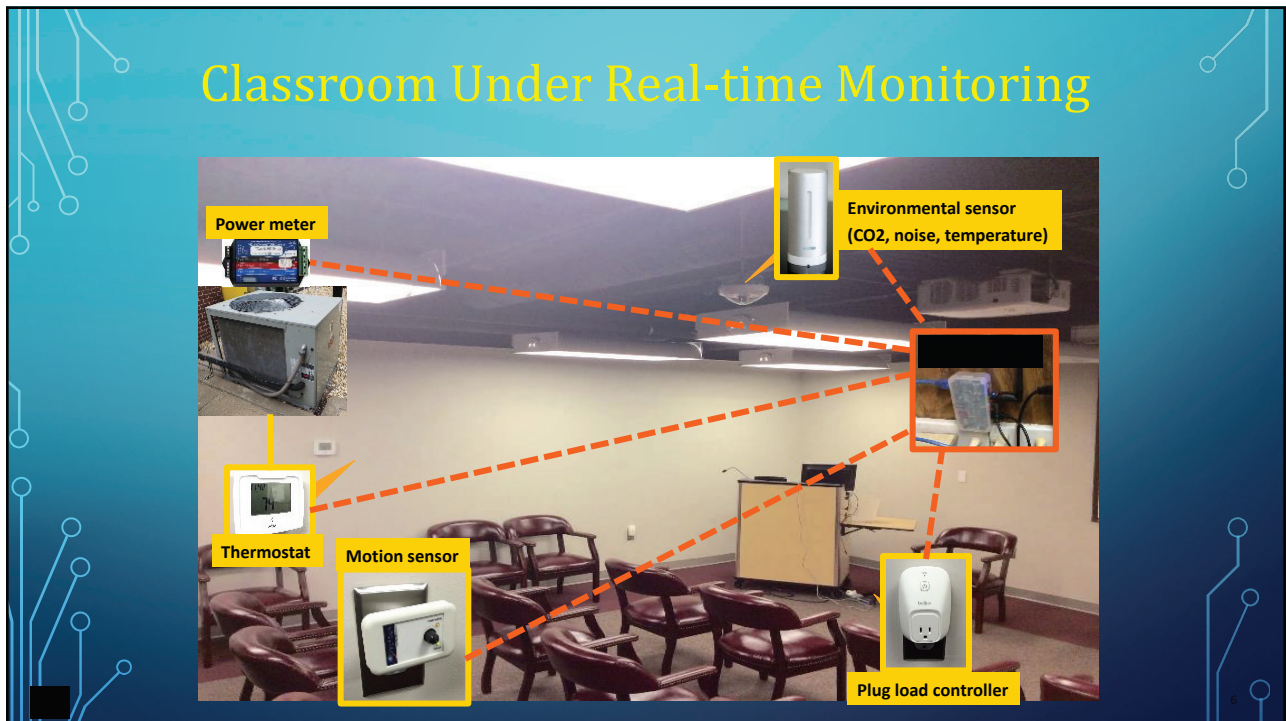
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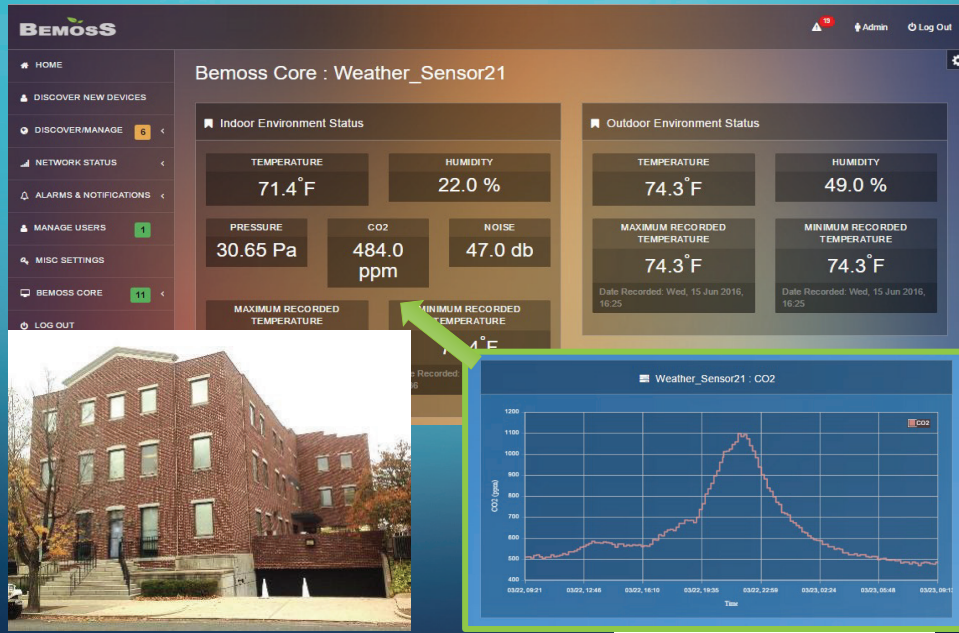


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Indoor Environmental Monitoring



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Smart Light-Intensity Control



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Energy Savings By Controlling Light Intensity

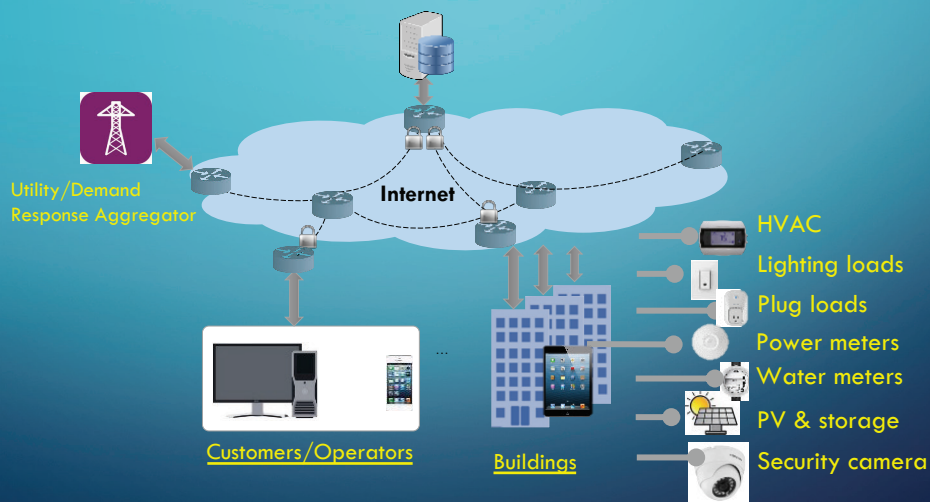
Based on occupant requirements, light intensity level was reduced during October – December 2016. Results indicate the average kWh savings of about 34%.

Month	Total Measured Energy Consumption (kWh)	Total Calculated Energy Consumption without Dimming (kWh)	Energy Savings by Dimming (%)
October 2016	264.37	399.90	33.89%
November 2016	278.13	423.78	34.37%
December 2016	280.76	426.40	34.16%
Total (October-December)	823.26	1250.08	34.14%

Note: Scheduled dimming level from 6:30am to 9:00pm. Open office area A: 50%; Open office area B: 45%; Chief office's desk area: 60%; Chief office's meeting area: 50%; Conference room A: 50%; Conference room B: 45%. Lights are off after 9:00pm.

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Smart Campus



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Electricity Savings in Street Lighting



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HPS vs LED



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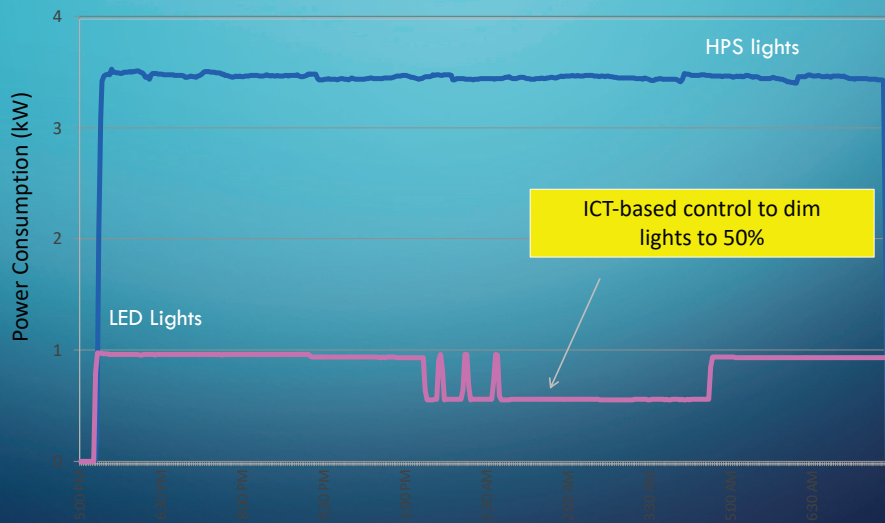
ICT-based Lighting Intensity control (80%)



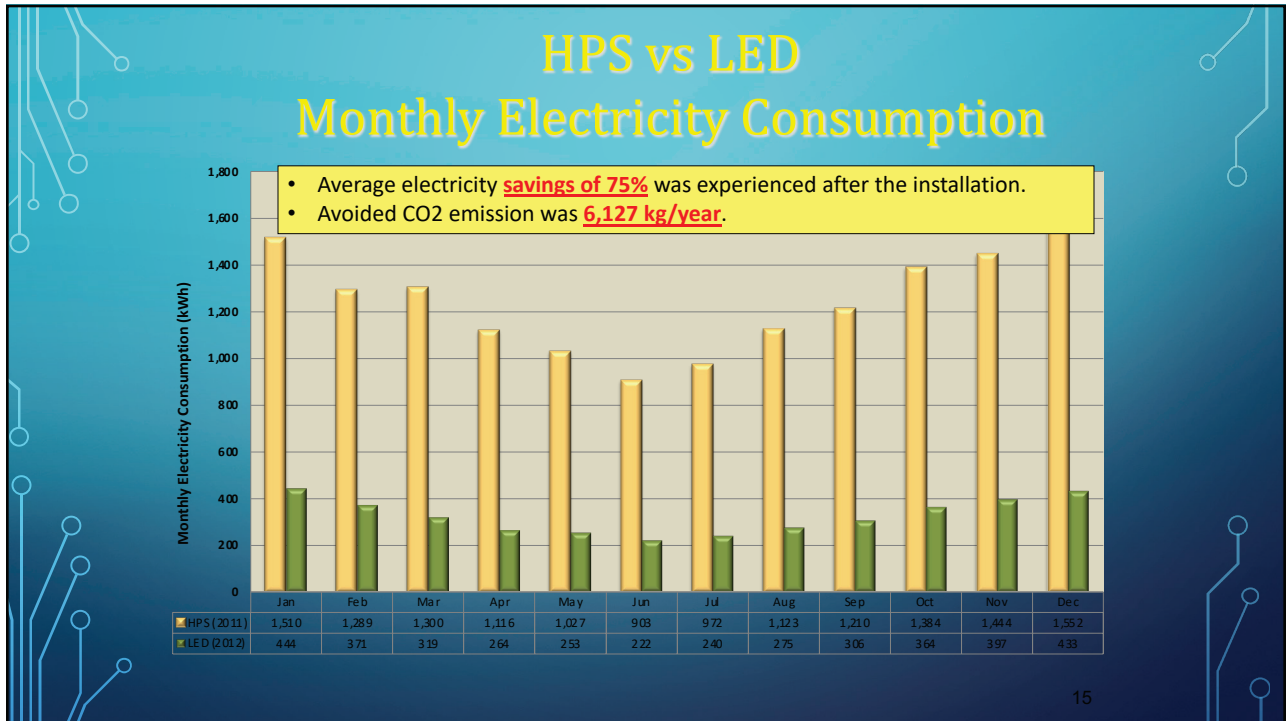
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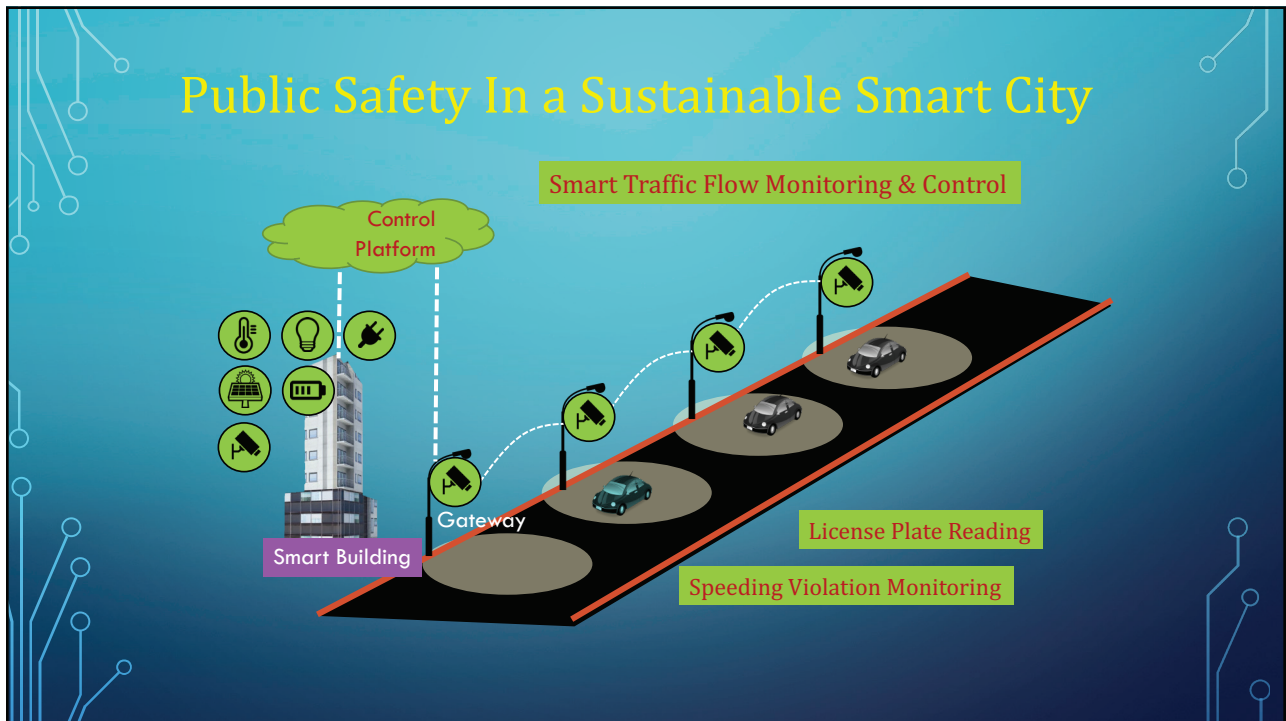
Infrared Sensors to Monitor Traffic



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Building Blocks of a Smart City



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Range of Deployments in Smart Cities

Cities across the world are deploying technology to gather data trying to become cleaner, reduce traffic, and improve urban life. Starting with **energy management**, to **disaster preparedness**, to **public safety**, to **parking spot assistance**, to **paying bills online**, to **facilitate emergency vehicle movement**, and much more.

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Elements of a Smart City



A neighborhood in a smart city:

- A smart traffic crossing sensitive to traffic volume
- Synchronized traffic lights for smooth flow
- Emergency vehicle priority access



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Connected Transportation

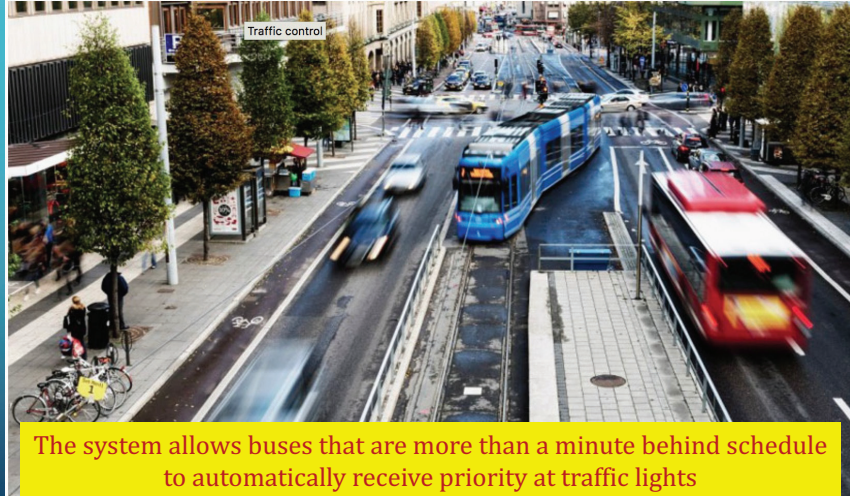
- Connected vehicles and travelers will be able to share data with all sorts of equipment, and be able to procure mobility as a service, whenever wherever.



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Stockholm City Traffic Management



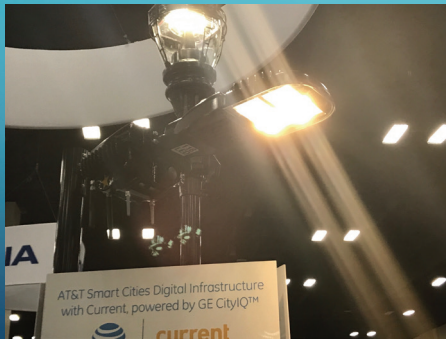
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US Deployment: Smart Lamppost with Camera

Camera provides surveillance and locates empty parking spaces



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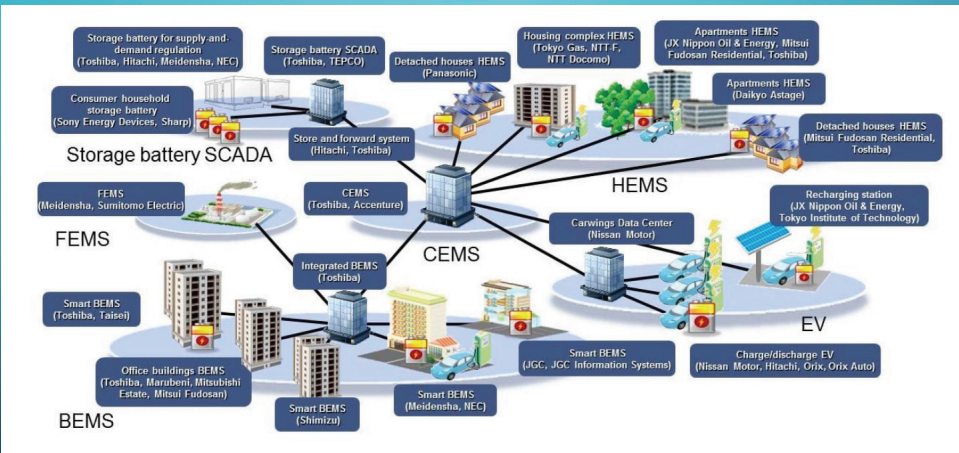
Smart Trash Can in Stockholm, Sweden



Regular trash cans need to be emptied 1-3 times per day
Smart ones only need to be emptied four times a week.

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Yokohama, Japan Smart City Demonstration



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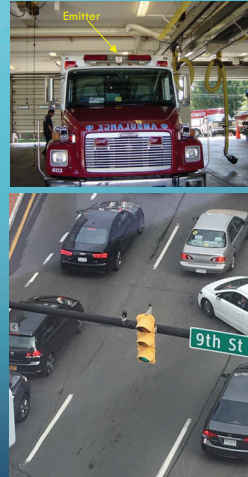
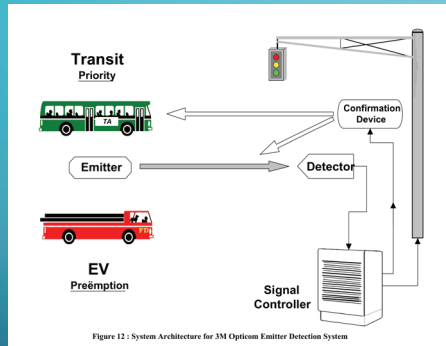


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Optical based traffic signal preemption system for emergency and transit vehicles



<https://vtechworks.lib.vt.edu/bitstream/handle/10919/31319/ThesisFinalVersion.pdf?sequence=1>