

The Smart City Building Blocks & Their Synergy with Smart Villages

Invited Talk

Workshop on Smart Grid Empowering Smart Cities
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What is a Smart City

- There is **no** single consensus definition of a smart city, but there is some agreement that a smart city is one in which information and communication technology (ICT) facilitates improved insight into and control over the various systems that affect the lives of residents.



Picture from: <http://politic365.com/2017/09/01/smart-cities-require-smart-planning-policy-to-benefit-communities/>

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Smart City

A **smart city** is an urban development **vision** to integrate information and communication technology (ICT) and Internet of Things (IoT) technology in a **secure** fashion to manage a city's assets.

To be fully “smart,” a city must be “connected.”

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Building Blocks of a Smart City

BHUBANESWAR SMART CITY
THE BIG CONNECT ...

SMART CARE

SMART ENERGY

SMART SOCIETY

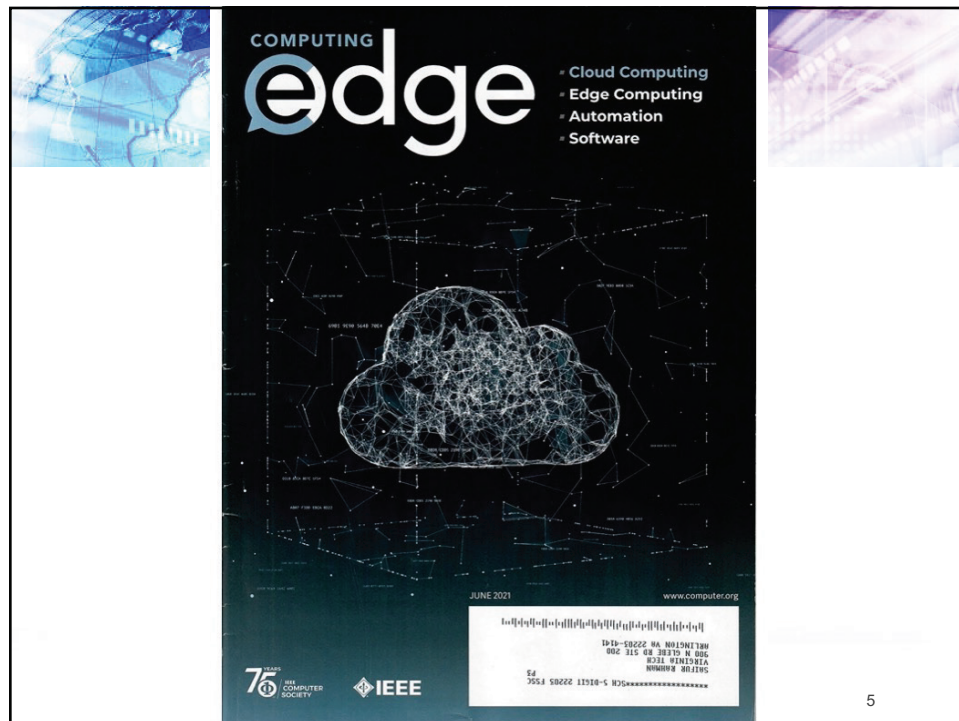
SMART OFFICE

SMART MOBILITY

SMART SPACE

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Range of Deployments in a Smart City

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

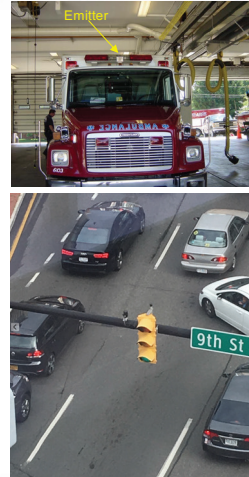
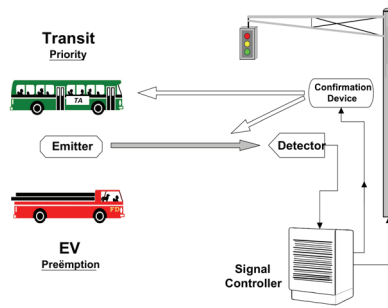


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Optical Based Traffic Signal Preemption System For Emergency And Transit Vehicles



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

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Connected Transportation

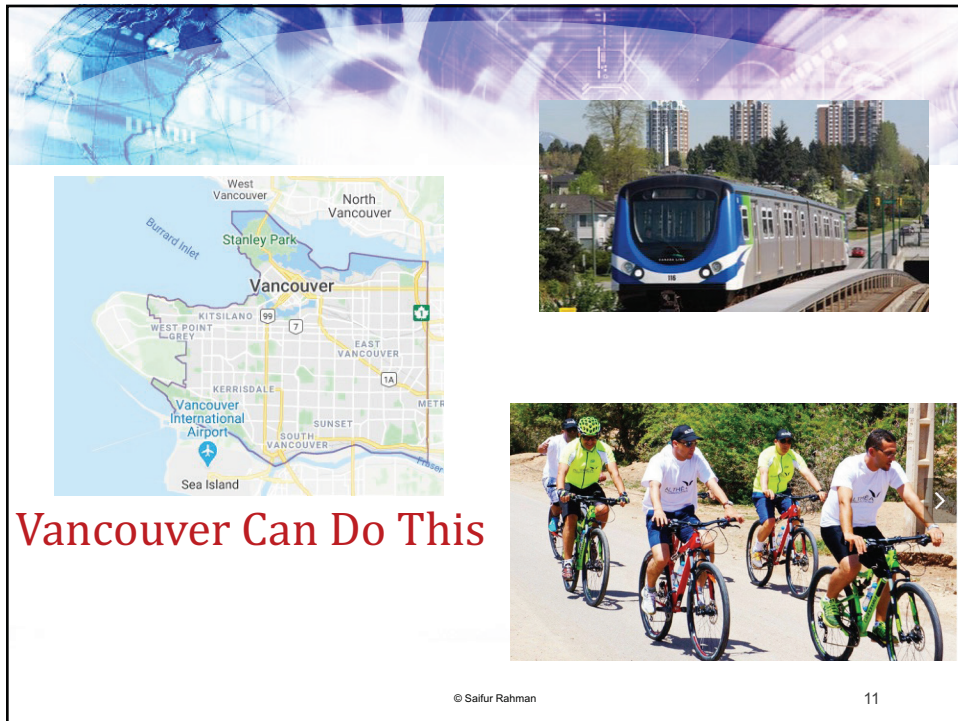
- Connected vehicles and travelers will be able to share data with all sorts of equipment, and be able to procure mobility as a service, whenever wherever.



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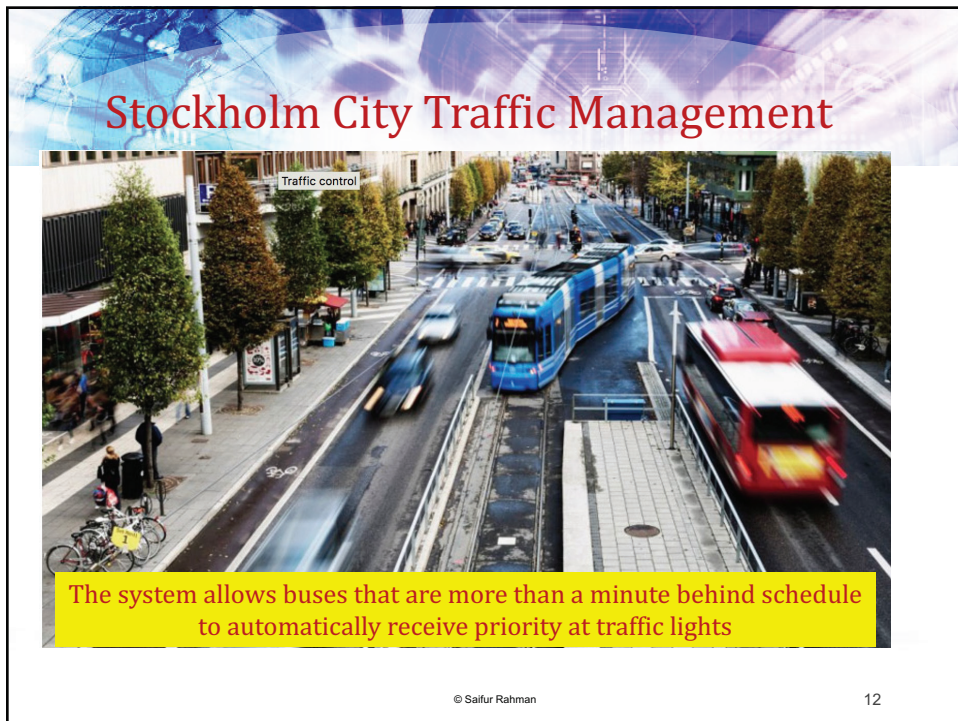
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Vancouver Can Do This

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Stockholm City Traffic Management

Traffic control

The system allows buses that are more than a minute behind schedule to automatically receive priority at traffic lights

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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 Baltimore, USA



Reduces the number of times a trash can needs to be emptied.

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Smart Trash Can in Stockholm, Sweden

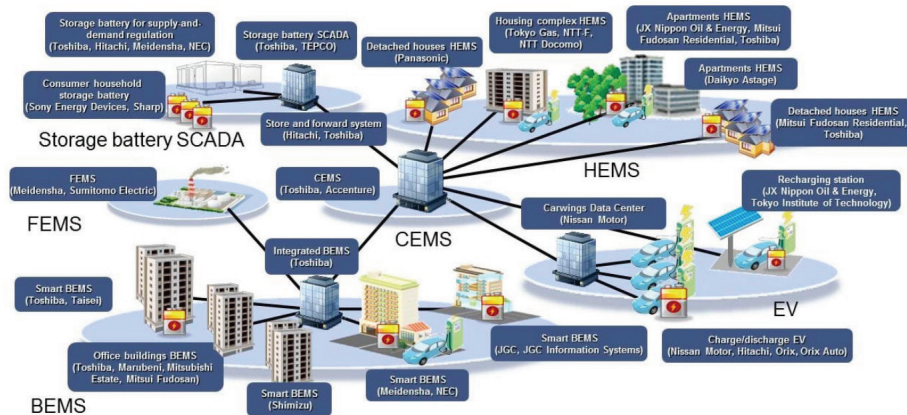


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Yokohama, Japan Smart City Demonstration

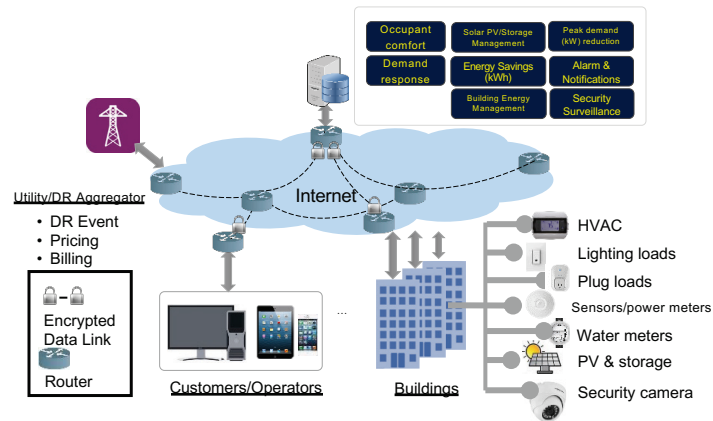


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A Building Energy Management Platform



Source: www.bemcontrols.com

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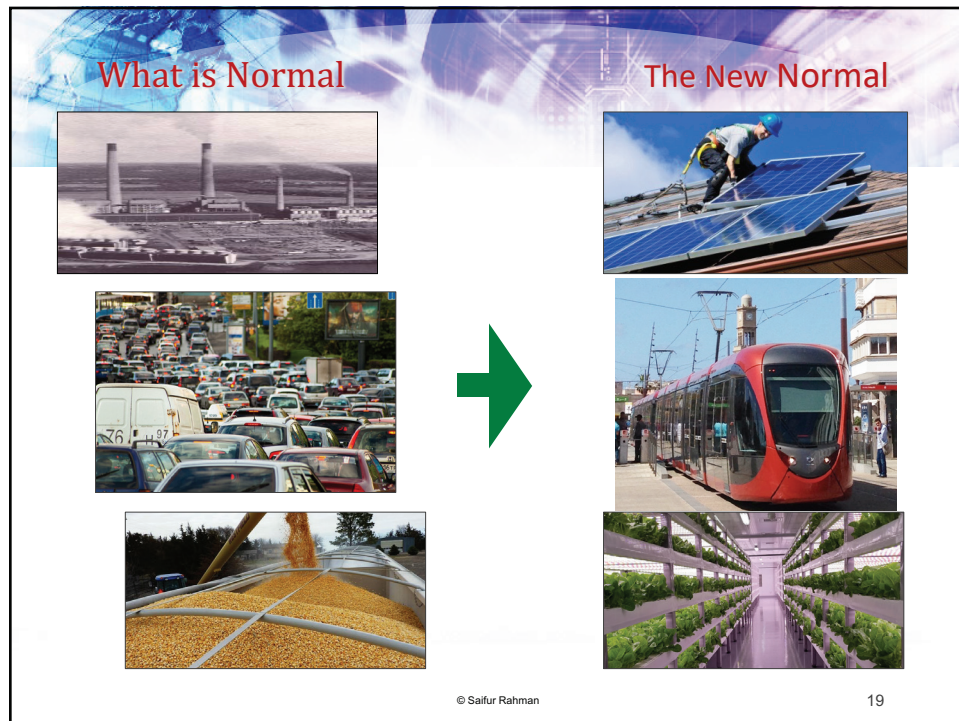
Smart Cities in India (60)



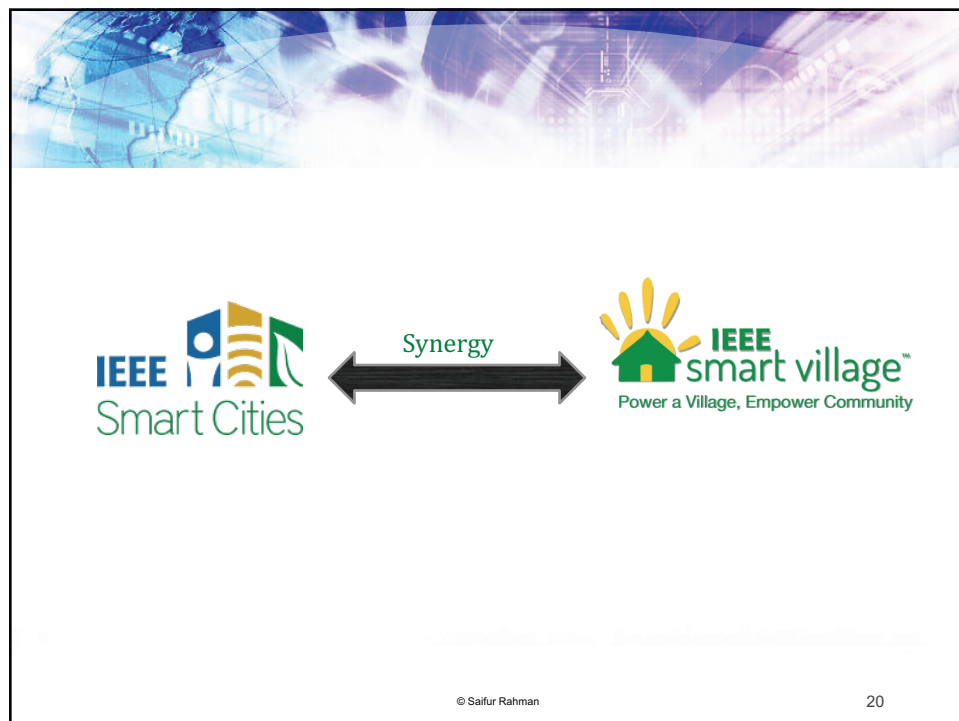
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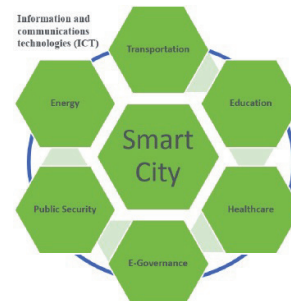
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Smart/Connected City

- A smart/connected city is a system of interconnected systems including:
 - **Employment**
 - **Health care**
 - **Retail/entertainment**
 - **Public services**
 - Residences
 - Energy distribution
 - Transportation
- The system of systems is tied together by information and communications technologies (ICT) that transmit and process data about all sorts of activities within the city.



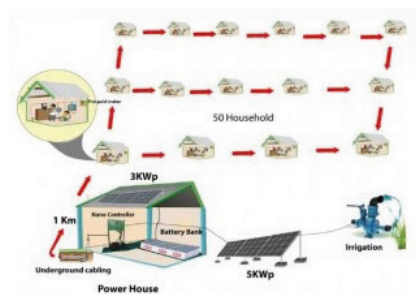
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Solar Nanogrid in Bangladesh

ICT-based power meter and bill payment using smart phones



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Introducing Technology

- Enables light after sunset using solar micro-grids
- Illuminates kitchens, schools and clinics
- Lets communities live cleaner, safer, and more prosperous lives
- Stimulates local commerce and builds new enterprises



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Expanding Education



Photo by Paula Bronstein

- Creating a network of engineers, entrepreneurs, and practitioners
- Facilitating ongoing learning and mentorship for continued success
- Innovative Global Classroom helps people around the world access the internet and educational resources

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IEEE Smart Village Success Story
Global Himalayan Expedition, India

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Lingshed Monastery – Ladakh Region, Indian Himalayas – Elevation 12,000 feet.
Founded in 1440 Illuminated with IEEE Smart Village in 2016
Global Himalayan Expedition

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Villagers working with LED Lights

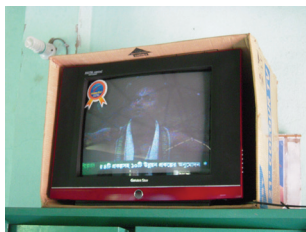


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Loads served by roof-top Solar Photovoltaics



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Locally Driven Initiatives



Source: Grameen Shakti, Bangladesh

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Ownership by Citizens

❑ Development of local technicians and entrepreneurs at the grass-roots level:

To create local stakeholder for promoting, installing and providing efficient after-sales service of the technologies.



❑ Local capacity development and creation of green jobs:

Local entrepreneurs, especially women are offered financial and technical assistance to set-up a renewable energy technology business.



Source: Grameen Shakti, Bangladesh

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Life Changing Experience

"The customers love coming to my shop, now that I have bright light . "They can see what they are buying and what I have in stock. And they can watch television and charge mobile phones. My sales have gone up by at least 50%."



Source: Grameen Shakti, Bangladesh

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Children's Library in a Boat with Solar-powered Light



Source: Grameen Shakti, Bangladesh

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Impact of Solar PV in Rural Communities

- Education
- Healthcare
- Retail Business
- Electricity

Some of the experience from the Smart Village can show examples of social interactions which can be transferred to the Smart City and help in community building

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The Connected City Village

A connected ~~city~~ village is one where all relevant ~~city~~ village systems— utilities, transportation, employment, health care, public safety, education, and others—are capable of communicating with each other to allow coordination and reduce waste.

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Thank you

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