The Smart City Building Blocks & Their Synergy with Smart Villages

Invited Talk

IEEE Benelux PES/PELS/IAS Joint Chapter Webinar
19 November 2020

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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.

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.”
Building Blocks of 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.
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
Optical Based Traffic Signal Preemption System For Emergency And Transit Vehicles

Figure 12: System Architecture for 3M Opticom Emitter Detection System

https://vtechworks.lib.vt.edu/bitstream/handle/10919/31319/ThesisFinalVersion.pdf?sequence=1
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.
Vancouver Can Do This
Stockholm City Traffic Management

The system allows buses that are more than a minute behind schedule to automatically receive priority at traffic lights.
US Deployment: Smart Lamppost with Camera

Camera provides surveillance and locates empty parking spaces
Smart Trash Can in Baltimore, USA

Reduces the number of times a trash can needs to be emptied.
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.
Yokohama, Japan Smart City Demonstration
A Building Energy Management Platform

- Occupant comfort
- Solar PV/Storage Management
- Peak demand (kW) reduction
- Demand response
- Energy Savings (kWh)
- Alarm & Notifications
- Building Energy Management
- Security Surveillance

Utility/DR Aggregator
- DR Event
- Pricing
- Billing

Encrypted Data Link

Router

Internet

Customers/Operators
- HVAC
- Lighting loads
- Plug loads
- Sensors/power meters
- Water meters
- PV & storage
- Security camera

Buildings

Source: www.bemcontrols.com

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Smart Cities in India (60)
Synergy

IEEE Smart Cities

Power a Village, Empower Community

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A smart/connected city is a system of interconnected systems including:
- Employment
- Health care
- Retail/entertainment
- Public services

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.
Solar Nanogrid in Bangladesh

ICT-based power meter and bill payment using smart phones
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

• 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

Photo by Paula Bronstein

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IEEE Smart Village Success Story
Global Himalayan Expedition, India
Lingshed Monastery – Ladakh Region, Indian Himalayas – Elevation 12,000 feet.
Founded in 1440                  Illuminated with IEEE Smart Village in 2016
Global Himalayan Expedition
Villagers working with LED Lights
Loads served by roof-top Solar Photovoltaics

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Locally Driven Initiatives

Source: Grameen Shakti, Bangladesh
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
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
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.
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.
Thank you

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