The Smart City Building Blocks & Their Synergy with Smart Villages

Prof. Saifur Rahman

Director, Advanced Research Institute, Virginia Tech, USA
IEEE President-elect 2022

www.srahman.org
01 What is Smart City?
02 Building Blocks of a Smart City
03 Connected Transportation
04 Smart Village
05 Connected Cities
06 Impact of Solar PV in Rural Communities
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 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...
Smart Garbage Bin’s

Smart Bins Concept

Smart Trash Can in Baltimore, USA

Baltimore

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
Intelligent Transportation System and Smart City are closely coupled
What is Normal

The New Normal
Smart!

IEEE Smart Cities

IEEE Smart Village
Power a Village, Empower Community

Synergy
Solar Home System

1. Solar PV System
2. Hybrid Inverter DC / AC
3. Battery
4. Net Meter
5. Utility Grid

https://choosetherightsolar.com/solar-101/
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
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
Villagers Working with LED Lights
Loads served by roof-top Solar Photovoltaics
Locally Driven Initiatives
Children’s Library in a Boat with Solar-powered Light

Source: Grameen Shakti, Bangladesh
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
“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
IEEE Smart Village Success Story
Global Himalayan Expedition, India
Electrification of a Monastery in India

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

Impact

- 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.
Please Share your Idea in my Twitter account to
"make IEEE a more successful and resilient global technical organization"

@SRahmanVT

Prof. Saifur Rahman
IEEE President-elect 2022
THANK YOU

The Smart City Building Blocks & Their Synergy with Smart Villages

Prof. Saifur Rahman (www.srahman.org)

Islamic University of Technology
28 December 2021