VIRGINIA TECH
ARI
Invited Talk
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The Smart City Building Blocks & Their Synergy with Smart Villages
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IEEE President-elect 2022

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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

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

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.

https://medium.com/zify/the-importance-of-smart-cities-2a4f7f89a6cd

Internet Of Things

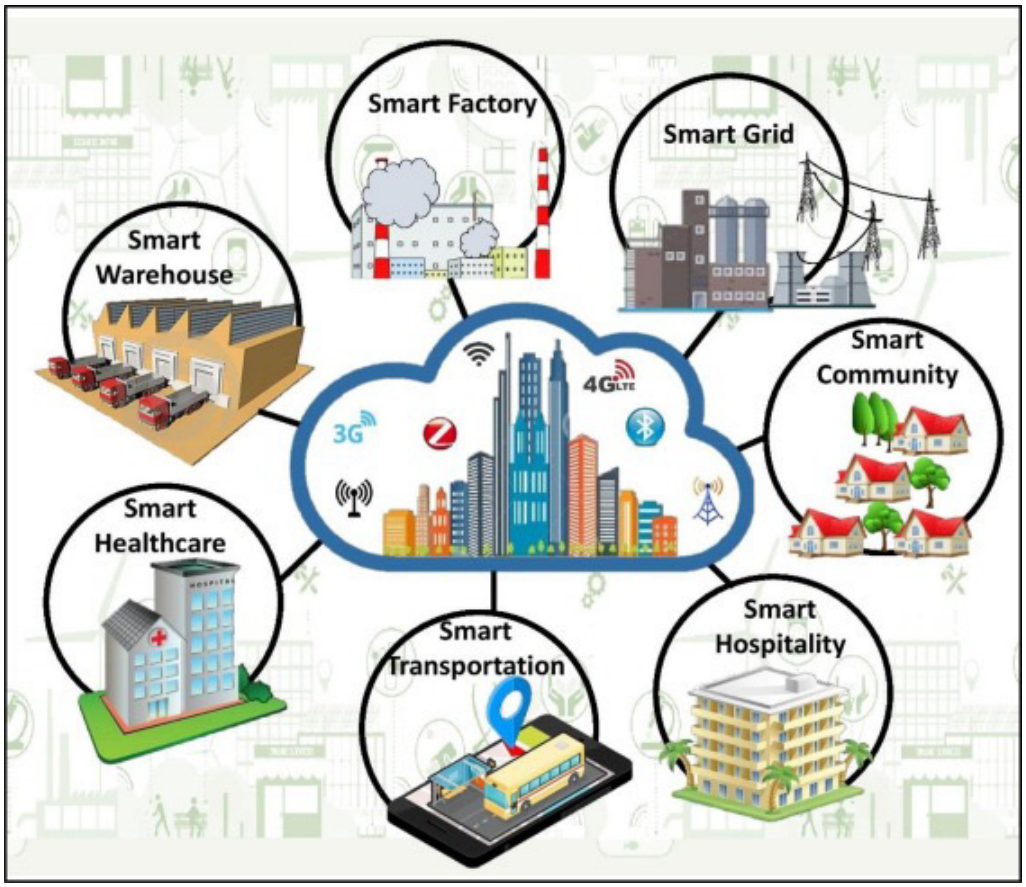
Smart City

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."

Building Blocks of a Smart City

Range of Deployments in a Smart City

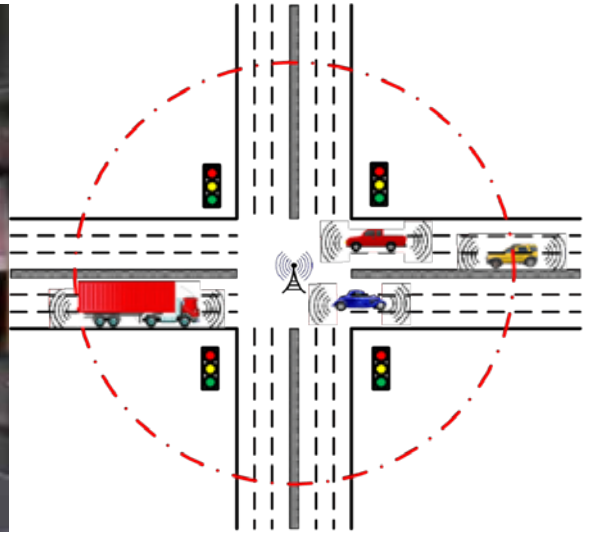


Cities across the world are deploying technology to gather data trying to become cleaner, reduce traffic, and improve urban life. Starting with energy management, to disaster preparedness, to public safety, to parking spot assistance, to paying bills online, to facilitate emergency vehicle movement,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

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

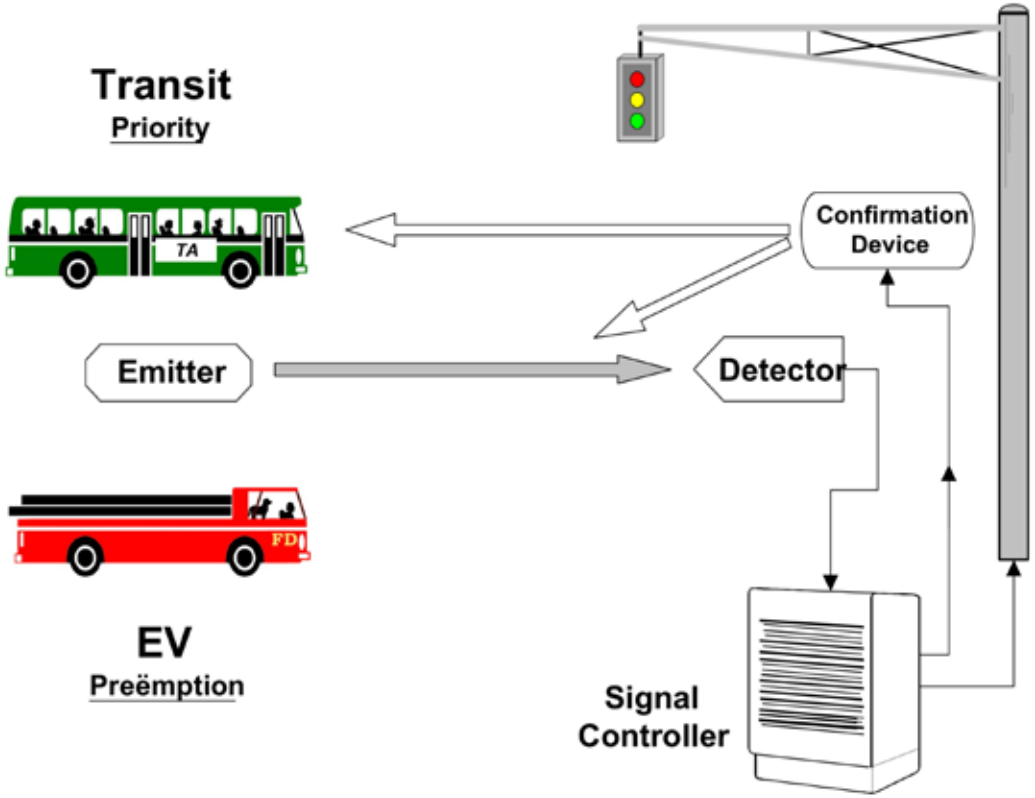
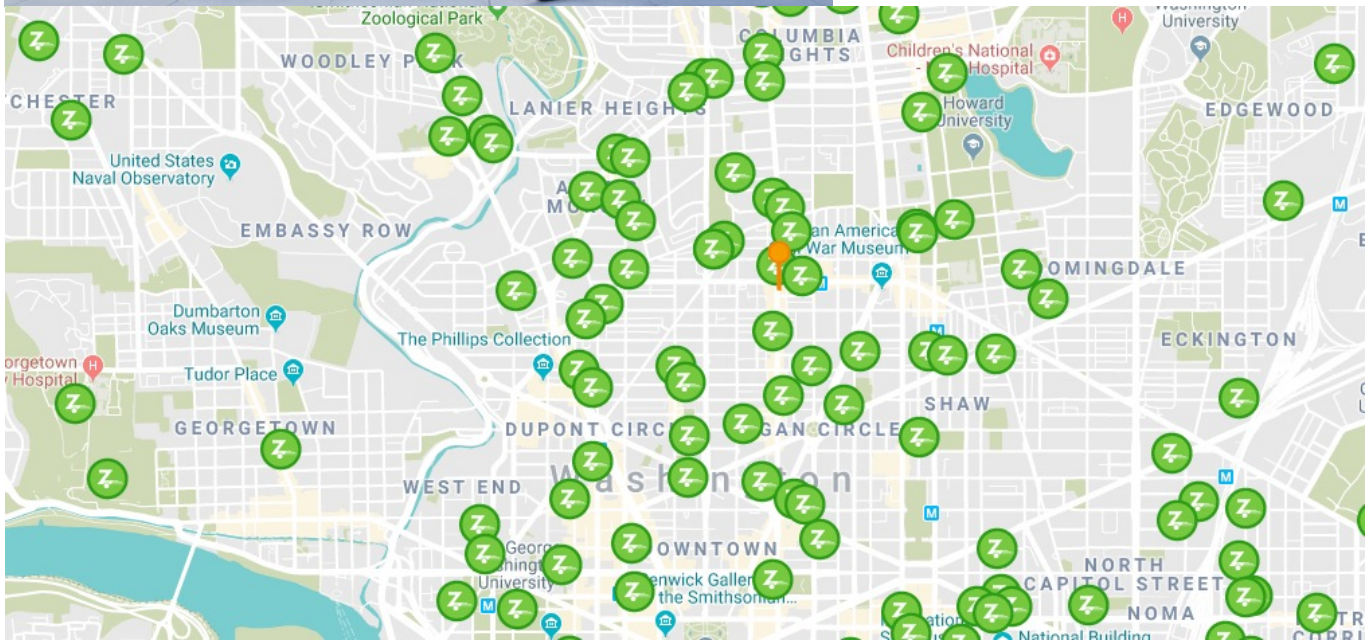


Figure 12 : System Architecture for 3M Opticom Emitter Detection System

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

Connected
Transportation

Connected Transportation



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

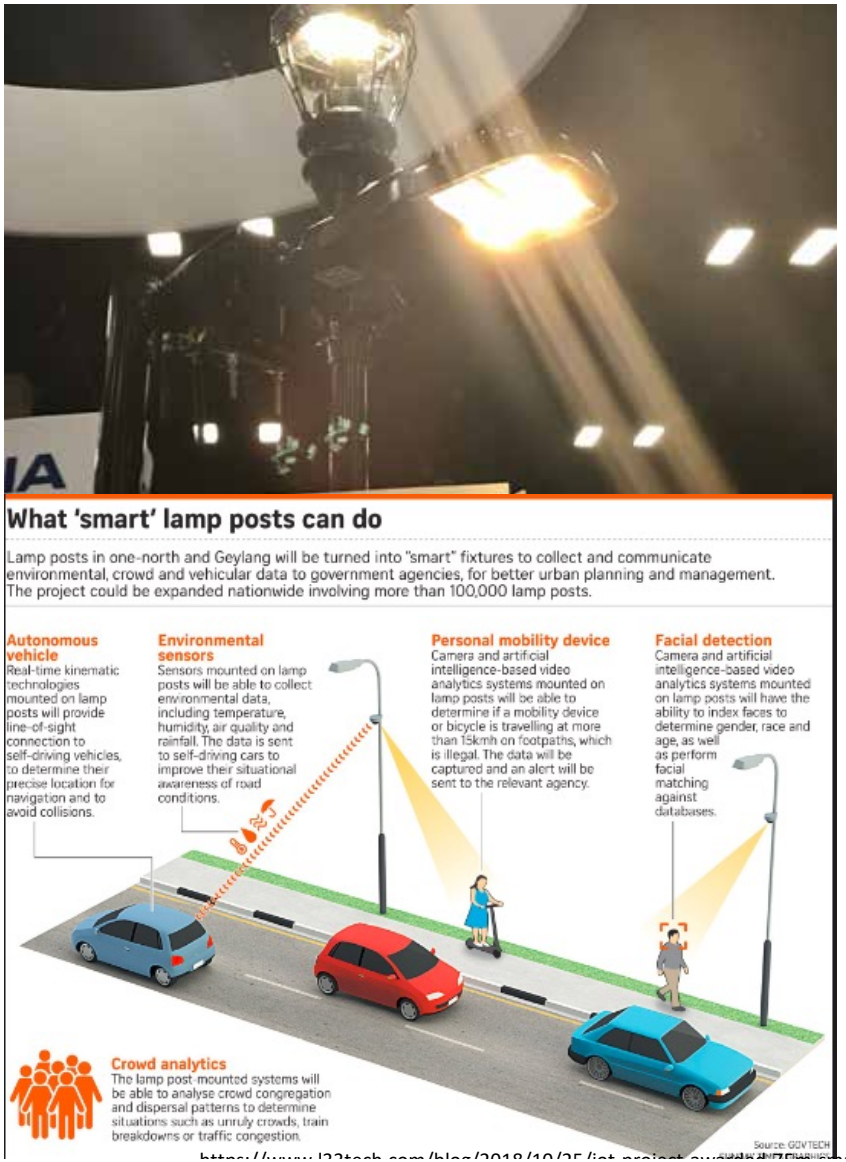
Stockholm

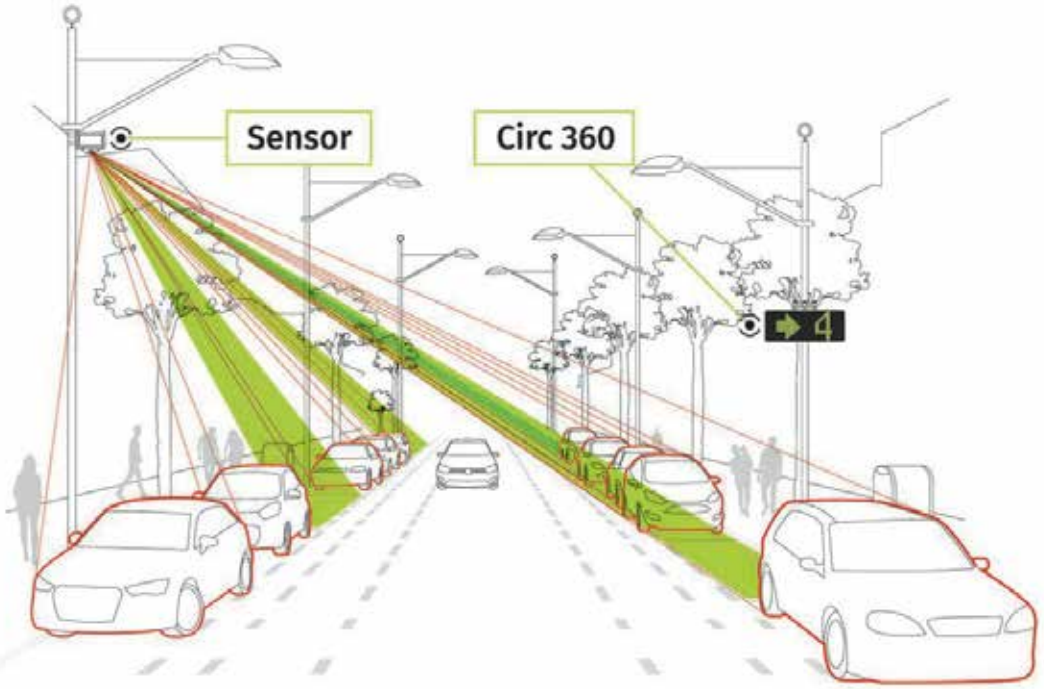
The system allows buses that are more than a minute behind schedule to automatically receive priority at traffic lights

US Deployment:

Smart Lamppost with Camera

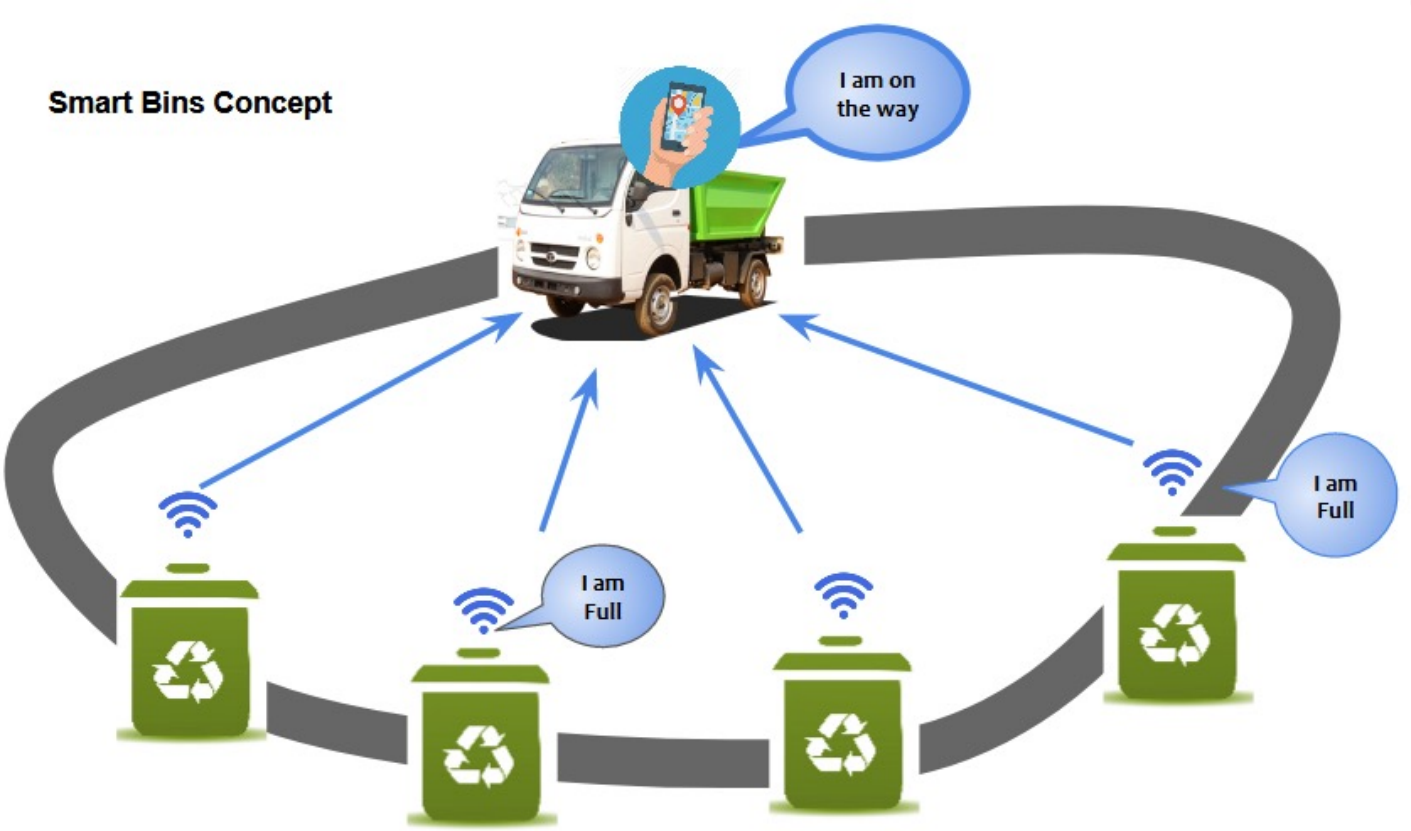
Camera provides surveillance and



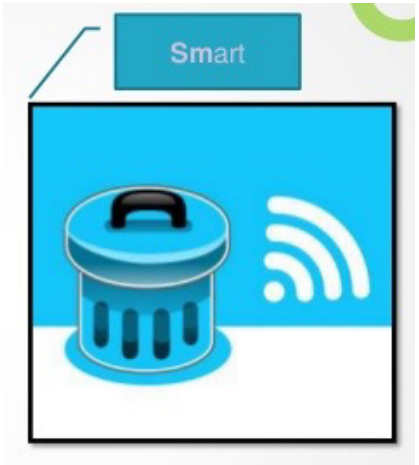


https://www.i22tech.com/blog/2018/10/25/iot-project-awarded-in-singapore-smart-lamp-post-sensors-and-cameras-that-collect-a-wide-range-of-data

Smart Garbage Bin’s



https://futuretechtalks.wordpress.com/2019/09/15/smart-garbage-bins/



Smart Trash Can in Baltimore, USA

Baltimore

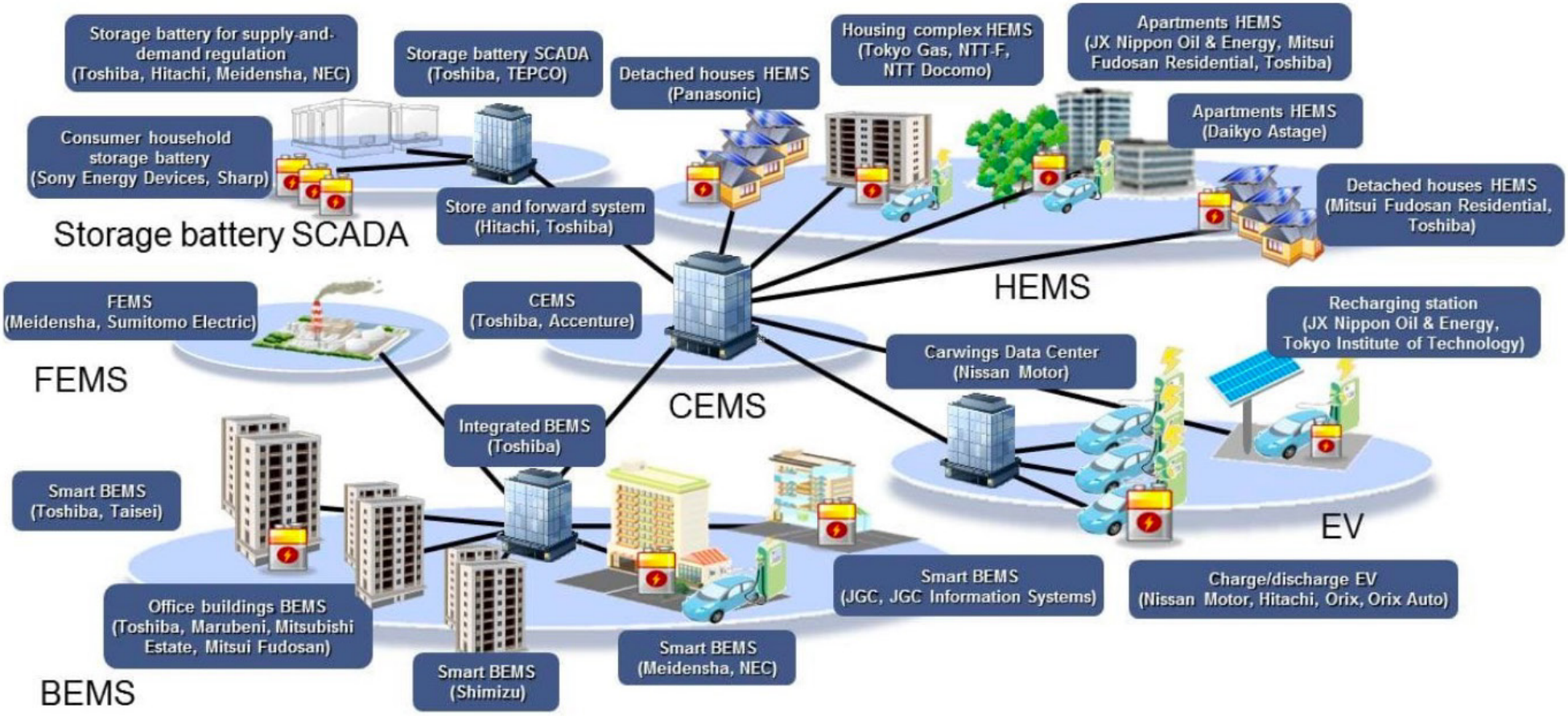
Reduces the number of times a trash can needs to be emptied.

Smart Trash Can in Stockholm, Sweden

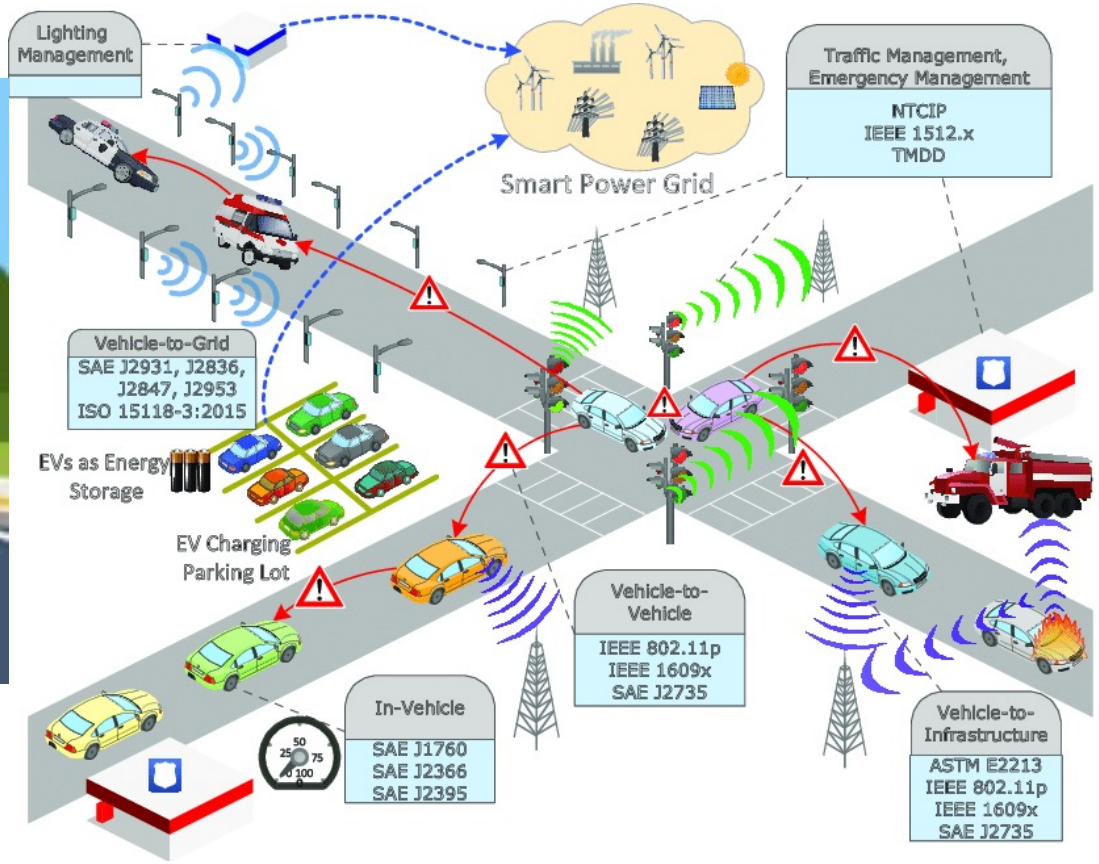
Stockholm

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

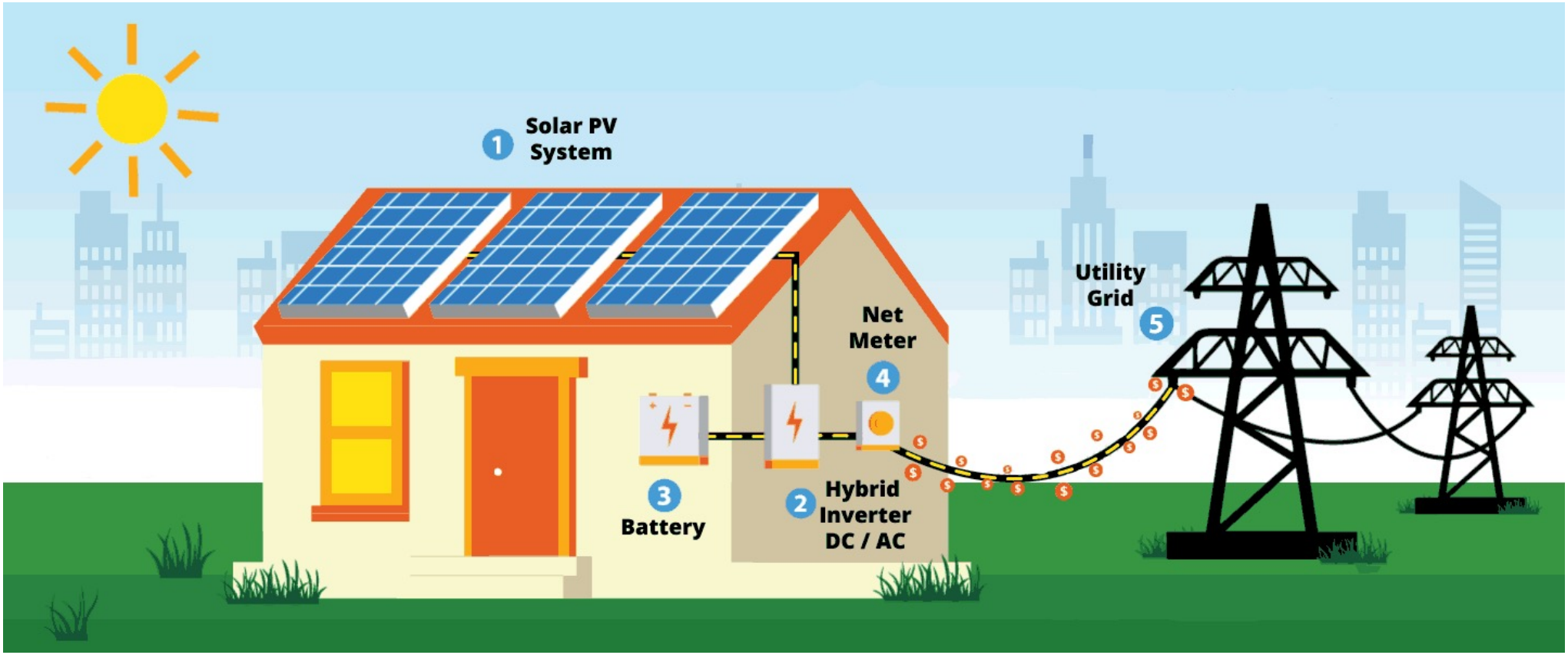
IEEE Smart Cities

Synergy

IEEE smart village™

Power a Village, Empower Community

Solar Home System



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

IEEE smart village℠
Power a Village, Empower Community

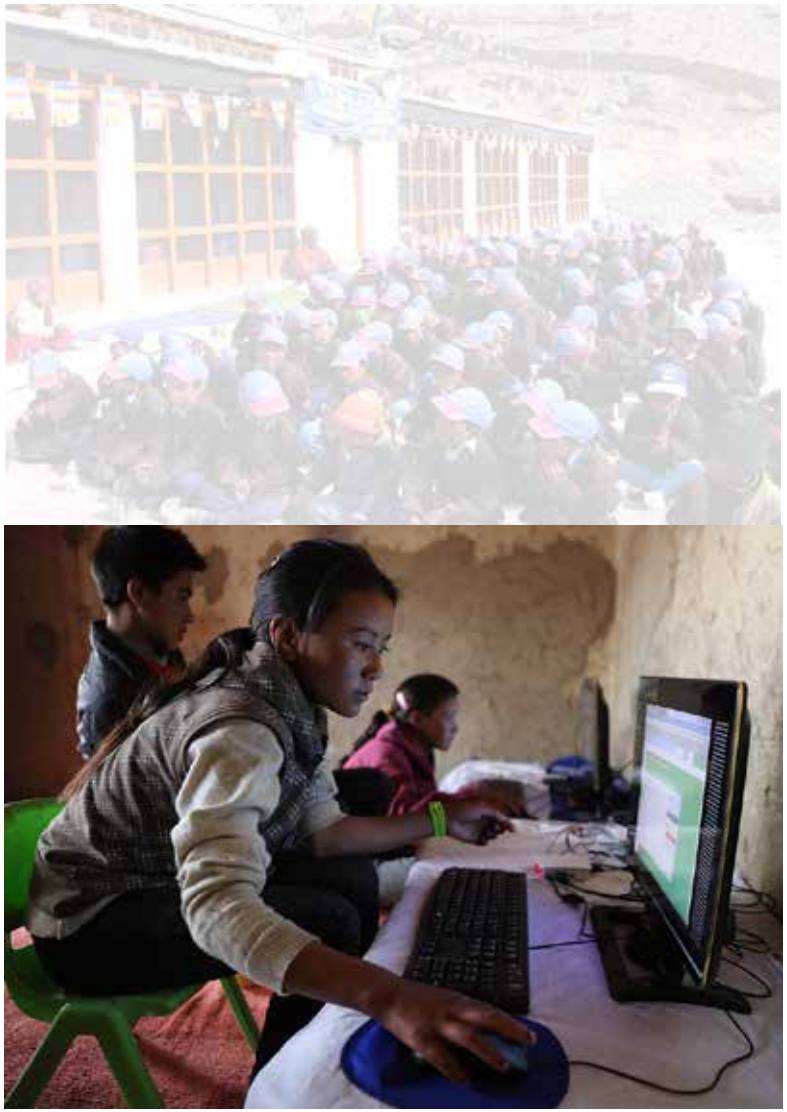


Photo by Paula Bronstein

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

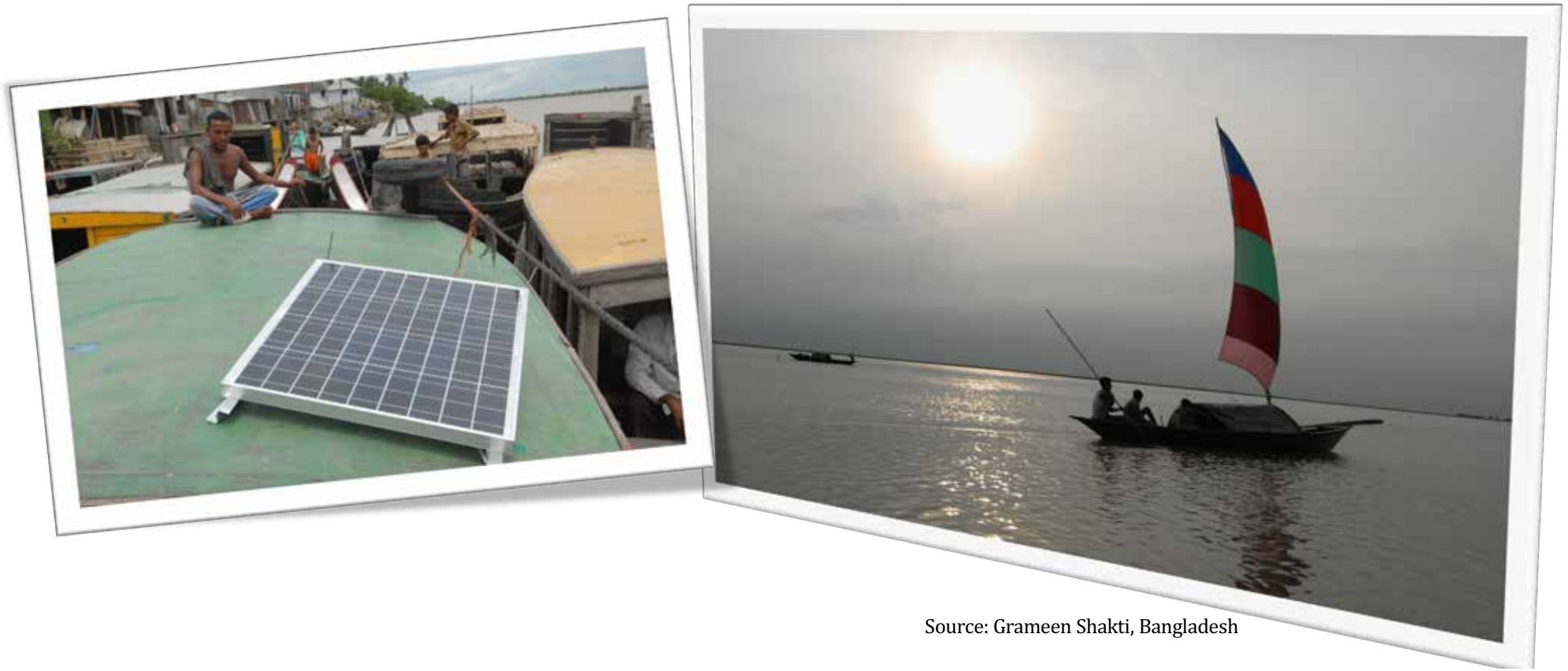
IEEE smart village℠
Power a Village, Empower Community

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

Life Changing Experience

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

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

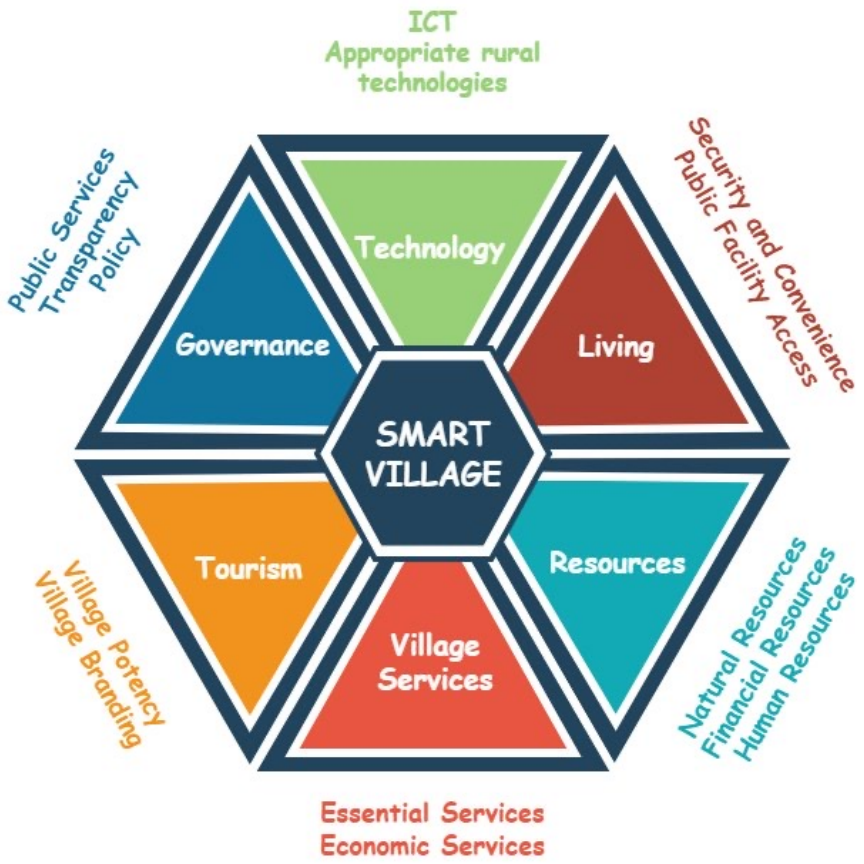
Impact

- 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

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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PROF. SAIFUR RAHMAN

IEEE PRESIDENT-ELECT 2022

THANK YOU

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