Robotics in Future Cities

- Kevin Naik
kevinnaik.info

What is Robotics

Robotics

- Where AI meets Real World

What's new ?

- Robotics is growing very fast.
  - Intelligence
  - Processing power.
- Self-reconfiguring modular robot (ModBots).
- Nano Robotics (Nanobots).

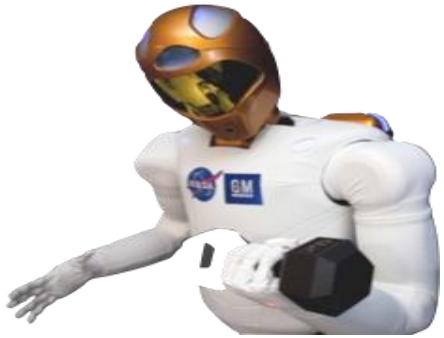
Intelligence in robots

- **Can a Robot Lie ???**

In an experiment performed in a Swiss laboratory, 10 robots with downward-facing sensors competed for "food" - a light-colored ring on the floor. At the other end of the space, a darker ring - "poison" - was placed. The robots earned points for how much time they spent near food as opposed to poison.

Robots Learn to Lie !

Intelligence in Humanoid robots



- NASA trains its Humanoid robots for space missions.

- Speech and facial recognitions. (ASIMO)
  - A humanoid robot called asimo has undergone various advance development during past decade. Now it can recognize speech and face.

Technology behind ASIMO

- Recognition technology.
  - Recognition of moving objects.
  - Recognition of postures and gestures.
  - Environment recognition.
  - Distinguishing sounds.
  - Facial Recognition.

Network Integration

- Integration with user’s network system.
- Internet connectivity.

Processing Power

- To think faster.
- Processing the tasks through Artificial neural networks.
- Speech and facial textures processing.
- Fast Image processing.

Self-reconfiguring modular robot

- Autonomous kinematic machines with variable morphology.
- Self-reconfigurable mechanism utilizes two types segment articulation
  - Lattice reconfiguration
  - Chain reconfiguration.

What is Future Cities?

Future Cities

I. Adequate water supply,
II. Assured electricity supply,
III. Sanitation, including solid waste management,
IV. Efficient urban mobility and public transport,
V. Affordable housing, especially for the poor,
VI. Robust IT connectivity and digitalization,
VII. Good governance, especially e-Governance and citizen participation,
VIII. Sustainable environment,
IX. Safety and security of citizens, particularly women, children and the elderly, and x. health and education.

Smart City

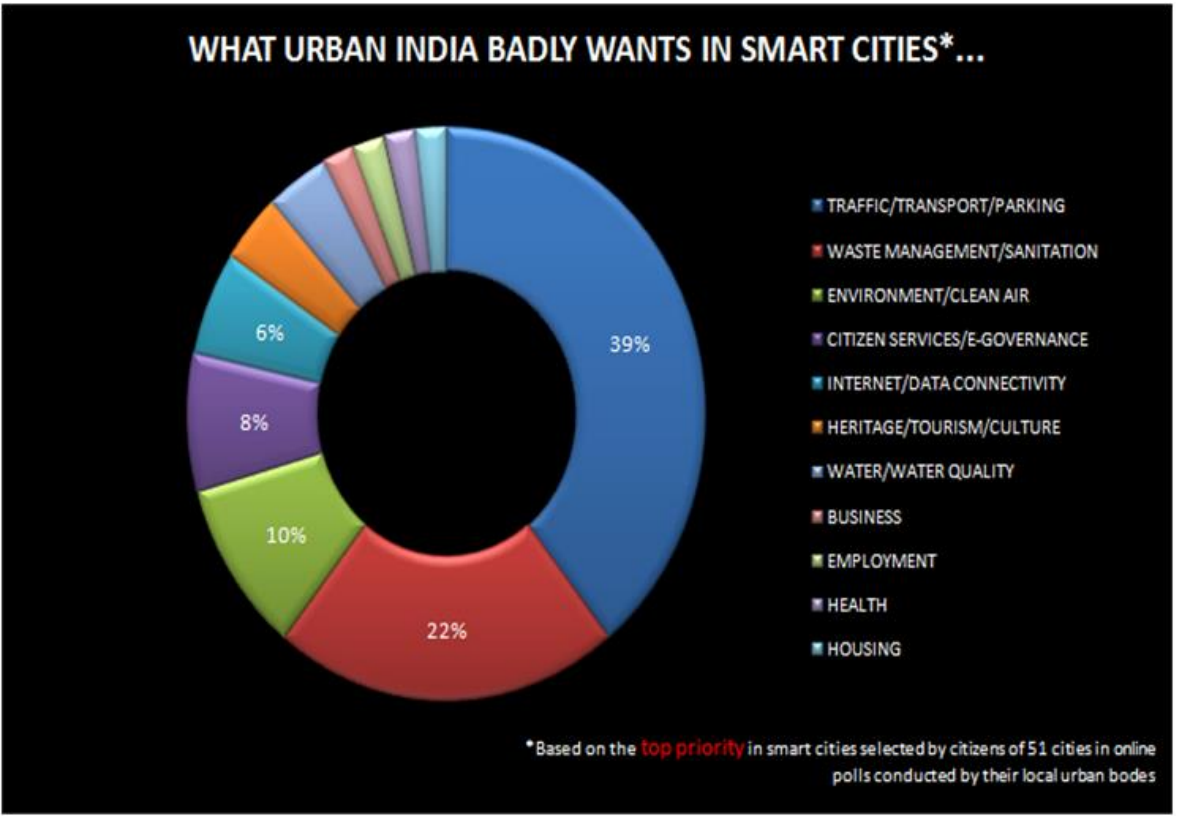
When talked about Future cities

SMART ENVIRONMENT

SMART HEALTH

SMART GOVERNANCE

100 SMART CITY MISSION



Traffic Management

Water

Housing

Clean Air

Clean Environment

Health Care

Basic Amenities

Maybe a slide or two on this

Terminologies - VR, AI, …

Sensors -

Kitchen Handling

- Moley has created the world's first robotic kitchen. Featuring an advanced, fully functional robot integrated into a beautifully designed, professional kitchen, it cooks with the skill and flair of a master chef. The prototype was premiered to widespread acclaim at Hanover Messe, the international robotics show.
- https://youtu.be/BSBTCOEdLkA

Robotic Parking

- In today's world when vehicles are increasing day by day.
- Basic problem of parking those vehicles is to be solved in future cities.
- Robots are connecting the parking, the drivers, the building and their environment via an advanced traffic management software that understands and adapts to each user's habits via Machine Learning
- System monitors each robots including their maintenance level and electricity consumptions and share this data with the overall building management as well as maintenance teams.

Advantage

- Minimum HVAC
- Double the car numbers in given footprint
- Works with any layout
- Lifts cars up to 3,000 kg
- Can retrofit existing garages
- No single points of failure: multiple robots working together
- No dangerous steel structure

Robotic sewer rats

The world’s only unmanned condition assessment tool designed to deliver unmatched daily quantities of high quality inspection data in your most abundant pipe sizes.

Talking Trash Cans

“Smart city” is a hot concept that is hard to identify in our everyday lives. Broadly, smart city is the idea of using connected technologies and data collection (aka Internet of Things) to make city and municipal operations more efficient [1]. Promising areas for development are electricity and water distribution, transportation, buildings, and city services.

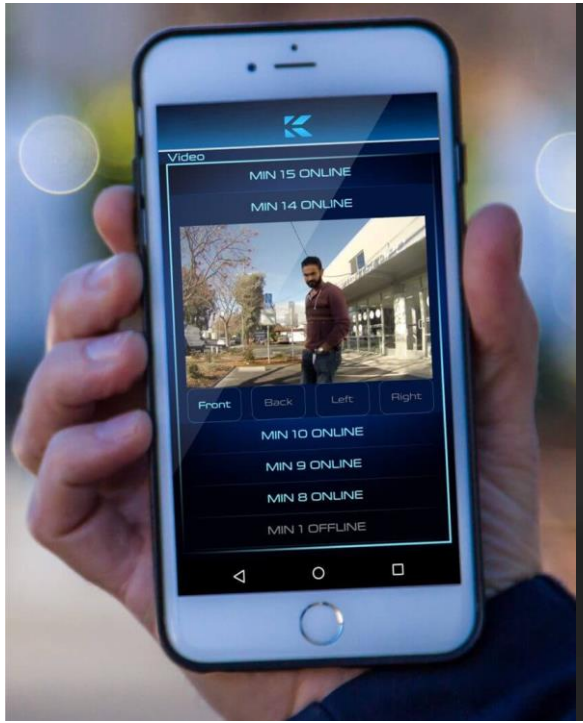
- Solar-powered waste stations.
- Sensor that measures fill levels
- Communicates this information to city/facility managers.
- Built-in compactor that allows to hold up to eight times the waste of a standard bin
- Municipalities are able to vastly increase the efficiency of their waste operations
- Less running time of garbage trucks and crews
- Less emission of CO_2 and other tailpipe pollutants

Healthcare Industry

- Da Vinci® Surgical System
  - Cardiac Surgery
  - Colorectal Surgery
  - General Surgery
  - Gynecologic Surgery
  - Head & Neck Surgery
  - Thoracic Surgery
  - Urologic Surgery
- ZEUS Robotic Surgical System
  - https://www.youtube.com/watch?v=8yglGIKZcWc

Security Guard

https://www.youtube.com/watch?v=UtuLB2duq2E



Help Desk

Robots are the latest retail "disrupter" as they head to a shopping centre near you to offer advice, assistance and some entertainment.

Goods Delivery

- https://www.wsj.com/articles/when-robots-take-to-city-sidewalks-1491970141
- https://www.youtube.com/watch?v=4q0NFGXYSEs

Public Transport

Logistic

https://www.youtube.com/watch?v=cLVCGEmkJs0

Shopping

https://www.youtube.com/watch?v=NrmMk1Myrxc

Serving

https://www.youtube.com/watch?v=JdiDKrh2_i8

Fire Fighting

Cleaning

https://www.youtube.com/watch?v=sZ_-yb-TN9M


Thank You