URBAN SYSTEMS DESIGN -
A MODEL OF SMART CITY

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Outline

1. Urban Design as an academic and professional tradition
2. Urban Systems Design as a model of smart city

The emerging technologies including IoT are changing architecture, urban design and urban engineering professions in the post-cyber space era. Unlike cyberspace and internet, a tabula rasa of virtual reality, the IoT and pervasive computing create a new paradigm of place making by integrating the physical and digital world, in which proximity, urban context and physical form of cities are crucial. The design of smart city consists of smart home, smart spaces and smart infrastructure systems that are situational, responsive and resilient for future changes.

https://cdait.gatech.edu/people/perry-yang
1. Urban Design as a tradition

Cities as Perceived Structure

- Urban design is about how sensuous quality is structured, organized and then experienced

Donald Appleyard, Berkeley, 1960s-1980s

Kevin Lynch, MIT, 1950s-1980s

Kevin Lynch: The Image of the City, K Lynch, 1964

The View from the Road, D Appleyard and K Lynch, 1966
Differences between City Structure and Music or other form of Arts

The city is a perceived environment. Unlike other forms of art such as music, movies and dance, which are strictly controlled by a time period of performance, the urban sensing environment is more indeterminate, loose and uncontrollable.

Although urban space is not frozen music, the temporal continuity of music and movies is comparable to the sequential experience of urban space, even if an audience or viewer’s attention is deliberately more focused on music and film than walking in a city (Lynch, 1972).
Urban Simulation Lab of U.C. Berkeley, from 1970s

29 An environmental simulator allows one to “walk” or “drive” through a model, watching the view as it would appear on such a trip projected on a television screen.
Georgia Tech’s Eco Urban Lab in Atlanta & Shanghai:

Integrating performance modeling and experiential modeling into Smart Urban Systems Design
2. Urban Systems Design as a model of smart city

Cities as Intelligent & Responsive Environments

From 2011-2018 - 1 book, 7 book chapters, 25 refereed journal articles were published on this subject and related issues based on Eco Urban Lab.
Simulating and measuring human perception and movement in cities


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VSI = \frac{B}{A + B + C + D} = \frac{VoS_i}{volume(HS_{ij})}
\]
3D Gis-based visibility analysis and Interactive Urban Façade – Shanghai Lujiazui Experiment

The project aims to design urban Façades LED layout, which depends on both the long distance view from vantage points to landmark, and smaller scale street view to media boards at a shorter distance.

Source: Eco Urban Lab, in collaboration with Tongji’s Urban Lighting Lab, 2017
Walter Benjamin’s argument in the Arcade project was that the glass and steel design of the shopping arcades and shop windows of 19th-century Paris reflected the anticipation and imaginative expression of a new world and offered the passer-by images of a dream-world beyond the confines of existing society (Buck-Morss, 1991). The application of new technology and new materials such as glass to the building facade and roof brought in a new relation of social space by extending the streetscape to the interior.

(Yang, Perry P J, 2008, Review article of “Digital Ground” in Environment and Planning B: Planning and Design)
2. Complex Urban Form - Shinjuku of Tokyo

What constitutes the contemporary image of the city, in which information and media technology play critical roles in bringing the process of new city image-making that occurs to the foreground of human attention? Does the legible structure of a city still achievable as in Lynch’s theory of good city form?

Inspired by Raskin’s notion of the `locus of attention’: “when the foreground is full, it has become a problem, because `making everything visible is great when you only have twenty things. When you have twenty thousand, it only adds to the confusion'' (Norman, 1998). As a result of a full foreground, the Lynch concept of urban design has reached its limits. The creation of a legible urban structure seems an impossible mission in the informational age.

(Yang, Perry P J, 2008, Review article of “Digital Ground” in Environment and Planning B: Planning and Design)
Changes of Human Sensing in IoT era

3. Google glass: Infinite perception of streetscapes

Facing the digital-physical augmented world, what happens to the environmental knowing or human perceptions of the city, when the media frontage (e.g. Google glass) is extending the depth of streetscapes to infinite?

http://adage.com/article/digital/google-futre-ads/293347/
http://www.cultofandroid.com/61562/google-glass-sells-first-ever-one-day-sale/
Future Smart City -- From Facebook to Spacebook

What’s our urban design strategy in the `post-cyberspace' context? -- Maybe we should bring **the periphery** back to the center as the `locus of attention', a **contextual design approach** to design the city both digitally and physically using pervasive computing, interactive design and the Internet of Things based on big data analytics.
Dr. Perry Yang (Georgia Institute of Technology)
Dr. Yoshiki Yamagata 山形与志樹 (NIES; Global Carbon Project)
Dr. Akito Murayama 村山顕人 (University of Tokyo)
Dr. Hiroaki Nishi 西 宏章 and Dr. Kanae Matsui 松井 加奈絵 (Keio University)
課題1 – 超高齢化社会にどう備えるか？

Issue 1 –
How do we plan for aging society?
Issue 2 - How do we plan a smart city that can adapt to changes – 35,000 at regular time, 100,000 for 2020 Olympics Games and other events?

SINGLE-USE PARKING LOTS TO MULTIPLE USES DURING OFF-HOURS?
Smart Parking
Turning Parking Into Public Space
Issue 3 - How do we change from “Suburban” lifestyle by driving to “Smart City” living style?
中期間開発 (3-5年間)
転送開発権

MID TERM DEVELOPMENT (3-5 YEARS)

PROJECT: TRANSFER DEVELOPMENT RIGHTS

2つのオプション
TWO ALTERNATIVES FOR FUTURE SHOPPING

T.D.R. OPTION 1 | 伝統的商店街  TRADITIONAL SHOPPING DISTRICT

T.D.R. OPTION 2 | 駅周辺型商店街  TRANSIT SHOPPING STREET
T.D.R. OPTION 1  |  TRADITIONAL SHOPPING DISTRICT
T.D.R. OPTION 2 | TRANSIT SHOPPING STREET
A framework of IoT (internet of Things) infrastructure at Tokyo’s Urawa-Misono

(Hiroaki Nishi, 2016)
People flow in a day, Tokyo

- It captures daily variations of car users, pedestrians, ...

**Weekday** (2016/10/28, Fri.)

**Holiday** (2016/10/29, Sat.)

(Yamagata, et al., 2016)
Person Flows by Traffic Mode
(2017 Georgia Tech –NIES- University of of Tokyo Studio at Urawa-Misono)

- Walk
- Bike
- Auto
- Transit
- No Movement

(At the time point)
Tracking human movement as sensors
GIS simulation of real time movement in the city
(P. Zeile, 2013)
Smart Lighting System

Urawa Misono
Misono Smart City: A Model to Integrate Urban Design, Performance, Certification and Green Finance

Urban design alternatives

Eco performance and certification

Green Bond
Urban Systems Design: from “Science for Design” to “Design in Science” - call for papers

The editors of this themed issue invite articles that bridge urban design, system thinking and emerging technology and are looking for scientific papers that explore how urban design connects performance measures, system thinking and digital technologies at the community and neighborhood-scale urban settings. Submit your extended abstract by 15 December 2017.

More

http://journals.sagepub.com/pb-assets/cmscontent/EPB/EPB_callforpapers_extension.pdf/