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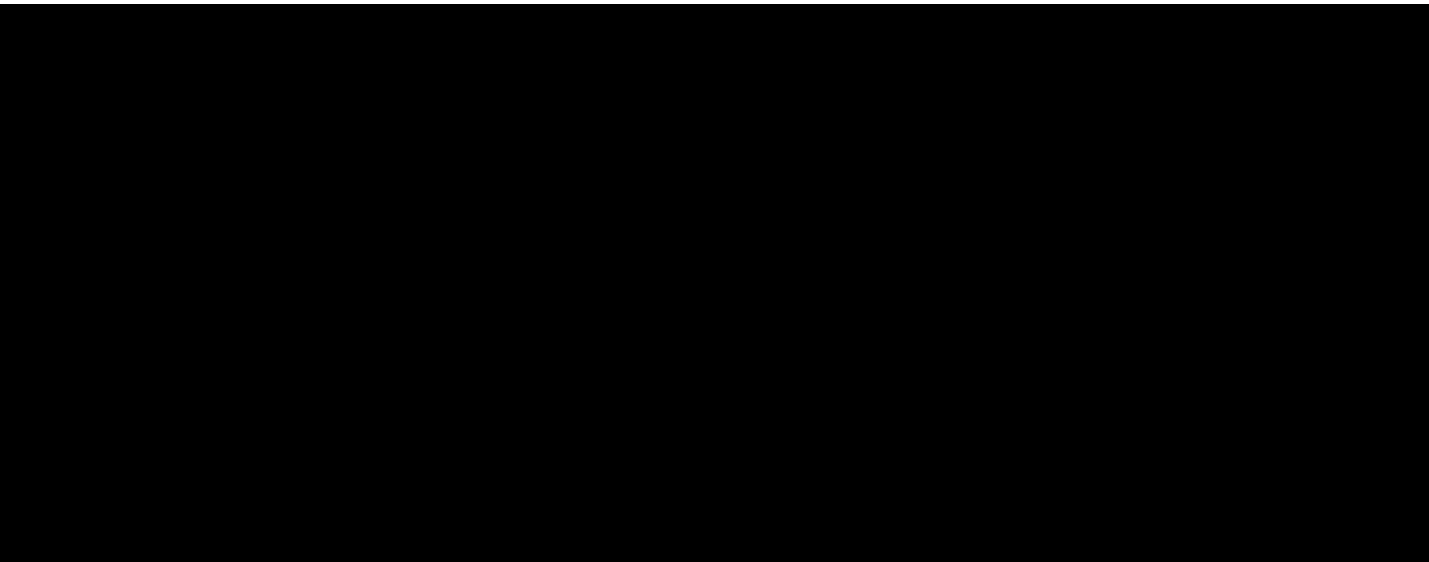
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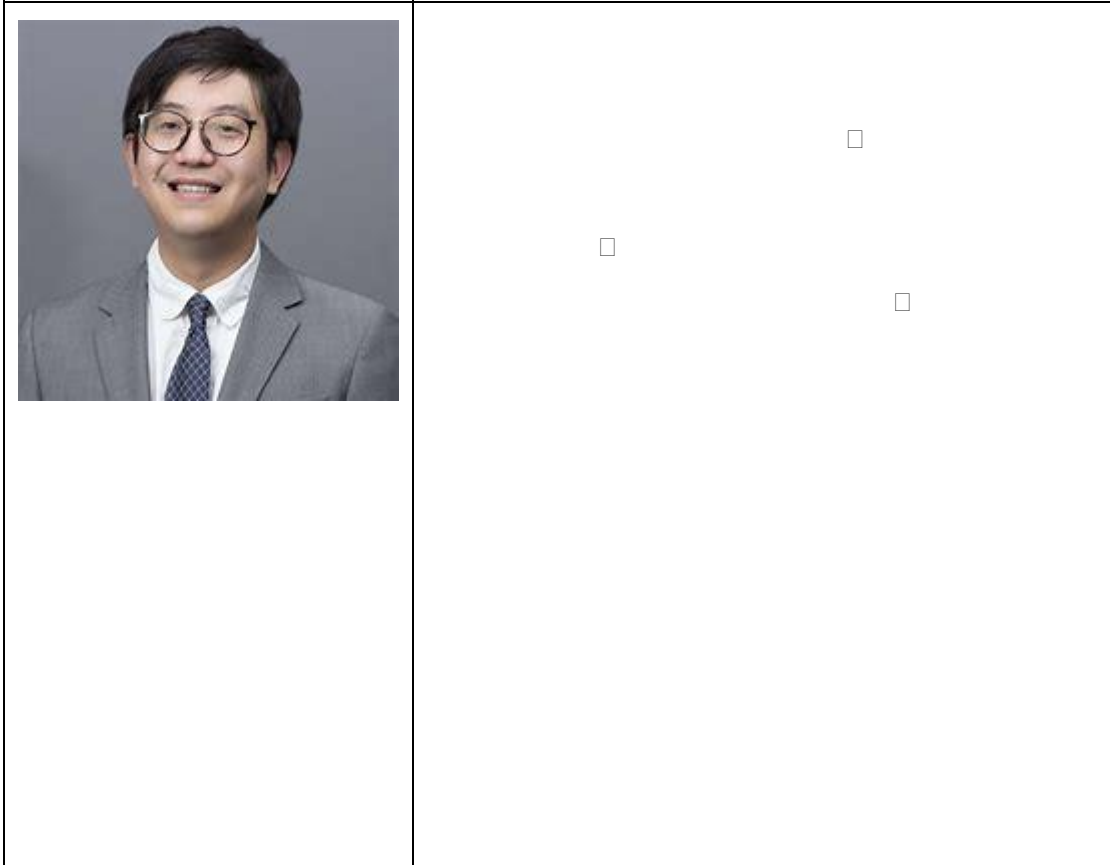
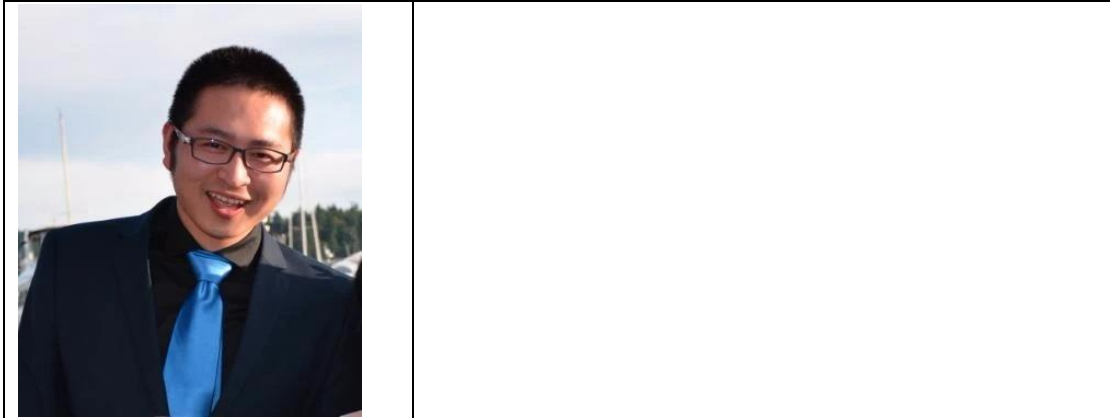
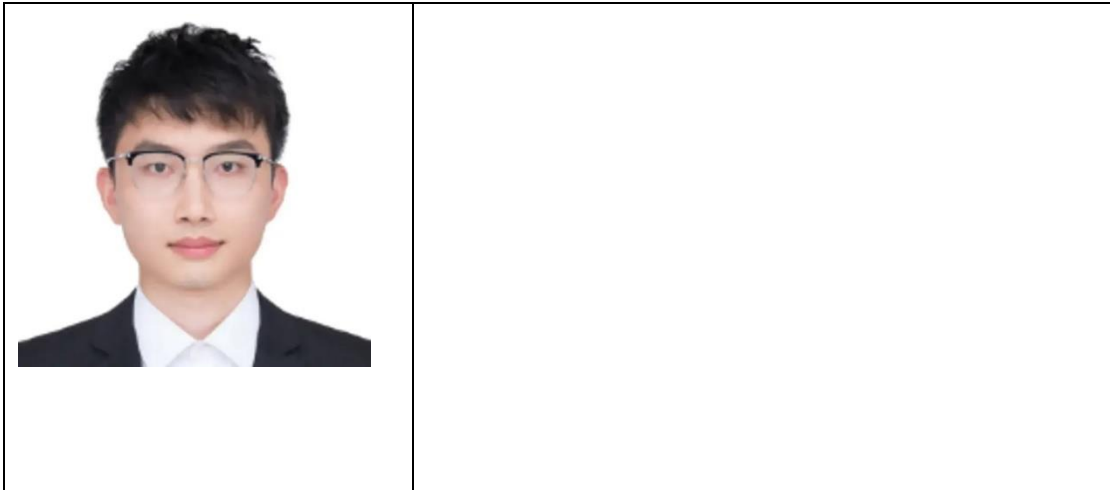
|           |             |              |  |  |
|-----------|-------------|--------------|--|--|
| 2023/7/18 | 09:30-11:00 |              | Roadway Traffic system modeling: techniques                      |  |
| 2023/7/24 | 09:30-11:00 |              | Promoting sustainable mobility: connected automation and sharing |  |
| 2023/7/26 | 09:30-11:00 | Kun Gao      | Roadway Traffic system modeling: future direction                |  |
|           |             |              |  |  |
| 2023/7/3  | 9:00-11:00  |              | Pavement performance evaluation and maintenance                  |  |
| 2023/7/4  | 9:00-11:00  |              | Pavement management system                                       |  |
| 2023/7/5  | 9:00-11:00  | Shenghua Wu  | Pavement materials evaluation                                    | South Alabama University                       |
| 2023/7/6  | 9:00-11:00  | Shenghua Wu  | Pavement structural design                                       | South Alabama University                       |
| 2023/7/7  | 9:00-11:00  | Shenghua Wu  | Practices of pavement maintenance in US                          | South Alabama University                       |
| 2023/7/8  | 9:00-11:00  | Xijun Shi    | Materials and treatments for cement concrete pavement            | Texas State University                         |
| 2023/7/10 | 9:00-11:00  | Jun Zhang    | Full depth pavement recycling                                    | Louisiana Transportation Research Center - LSU |
| 2023/7/12 | 16:00-18:00 | Yue Hou      | AI based pavement evaluation                                     | Swansea University                             |
| 2023/7/14 | 15:00-17:00 | Pengfei Liu  | Pavement materials and treatments in Germany                     | RWTH Aachen university                         |
| 2023/7/17 | 16:00-18:00 | Haopeng Wang | Pavement materials and treatments in Britain                     | University of Nottingham                       |

|           |             |               |  |                          |
|-----------|-------------|---------------|--|--------------------------|
| 2023/7/20 | 10:30-12:00 | Guoyang<br>Lu | Pavement radar test                                      | Hongkong City University |
|           |             |               |  |                          |
| 2023/7/11 | 19:00-20:00 |               | Overview of bridge maintenance                           |                          |
| 2023/7/11 | 20:00-22:00 |               | Risk analysis and management I                           |                          |
| 2023/7/12 | 19:00-21:00 |               | Risk analysis and management II                          |                          |
| 2023/7/17 | 19:00-21:00 |               | Brige evaluation based on moving vehicles I              |                          |
| 2023/7/18 | 19:00-21:00 |               | Brige evaluation based on moving vehicles II             |                          |
| 2023/7/19 | 19:00-21:00 |               | Foundamentals of Structural health monitoring of bridges |                          |
| 2023/7/20 | 19:00-21:00 |               | Case Study of Structural health monitoring of bridges    |                          |
|           |             |               |  |                          |
| 2023/7/3  | 9:00-10:35  |               | Overview   |                          |
| 2023/7/4  | 9:00-12:00  |               | Intelligent monitoring of shield tunnels I               |                          |
| 2023/7/5  | 9:00-12:00  |               | Intelligent monitoring of shield tunnels II              |                          |
| 2023/7/6  |             |               |  |                          |
| 2023/7/7  |             |               | engineering II   |                          |



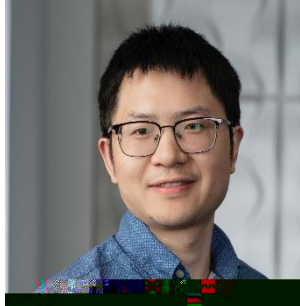
|           |            |  |   |  |
|-----------|------------|--|---|--|
| 2023/7/10 | 9:00-12:00 |  | Optical fiber monitoring in geotechnical engineering I                |  |
| 2023/7/11 | 9:00-12:00 |  | Optical fiber monitoring in geotechnical engineering II               |  |
| 2023/7/12 | 9:00-12:00 |  | Data-driven Construction of Underground Digital Twin from Sparse Data |  |
| 2023/7/13 | 9:00-12:00 |  | Data-driven Construction of Underground Digital Twin from Sparse Data |  |

### 3.

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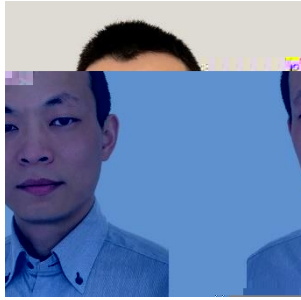




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**4.**

**4.1**

South East University Seminar  
Nanjing, China, 1 July 2023

## Willingness to Risk Compensation



South East University Seminar  
Nanjing, China, 9 July 2023

## Influence of Engagement and Multiple-Choice Heuristics in the Value of a Statistical Life

Juan de Dios Ortúzar

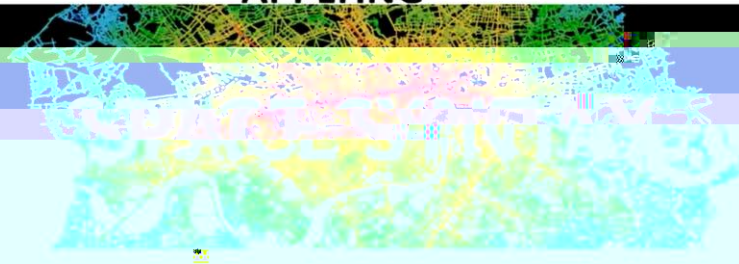


## HOW TO BE MORE SUCCESSFUL IN PUBLISHING



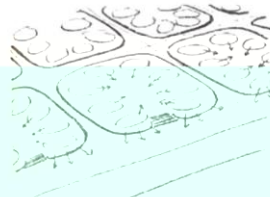
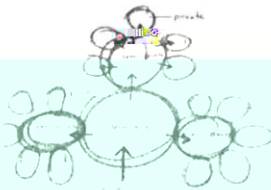
Southeast University, Nanjing. July 7<sup>th</sup>, 2023

## APPLYING



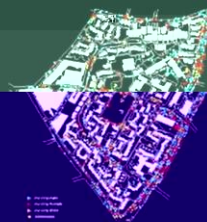
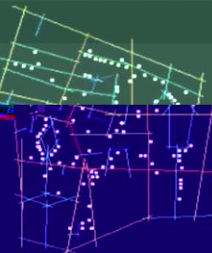
From Jane Jacobs in the 60s to:

**Defensible Space:**  
based on territoriality  
Newman, 1972



**Virtual Community:**  
based on the use of public  
space as a probability  
of encounter and co-  
presence

Hillier, 1994



Southeast University, Nanjing, July 11<sup>th</sup>, 2023

Mixed methods in  
**URBAN RESEARCH**



Margarita Greene, **CEDEUS**  
Escuela de Arquitectura, Pontificia Universidad Católica de Chile



2023/07/11 09:31

## Dynamic Traffic Assignment

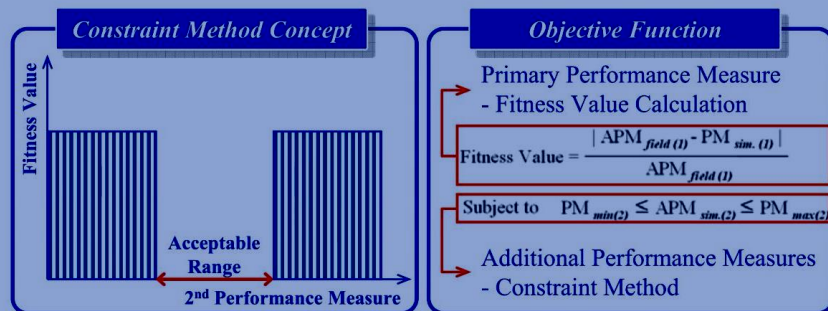
- Inputs
  - Time-dependent Zonal trips (OD matrices)
  - An abstract network (link-node graph)
- Outputs
  - Time-dependent Path
  - Time-dependent route choice (time/mode/route)

3

## System Performance Calibration

$$\text{Fitness Value} = \frac{|\text{APM}_{\text{Field}} - \text{APM}_{\text{Simulation}}|}{\text{APM}_{\text{Field}}}$$

### (1) Constraint Method



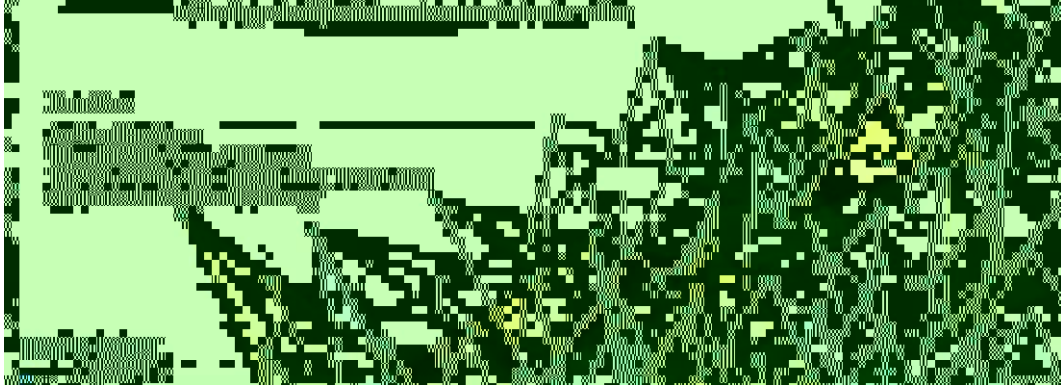
21

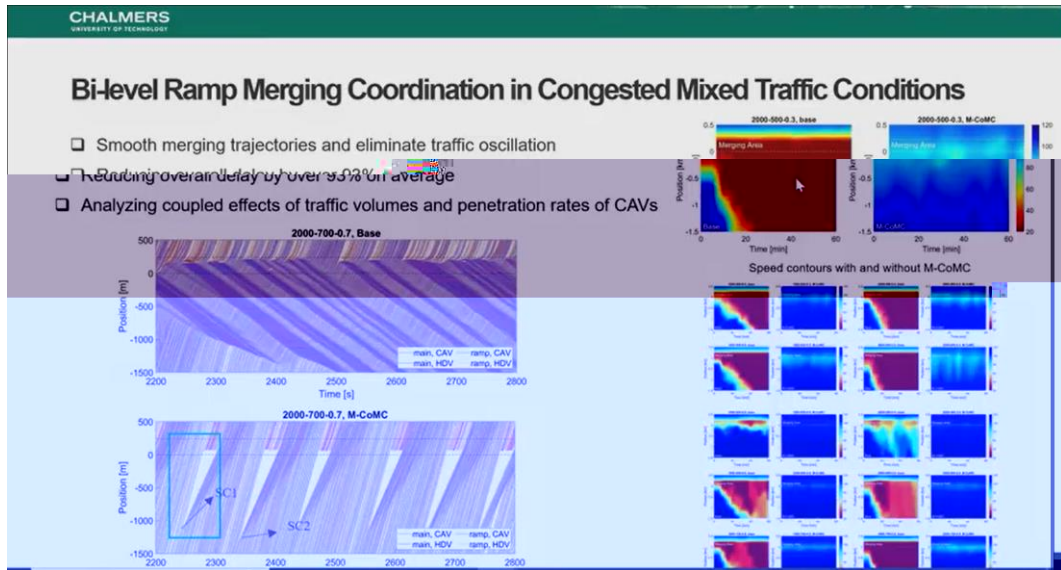
## Transport simulation models – from static to dynamic



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY

Promoting sustainable mobility





4.2

## Deflection

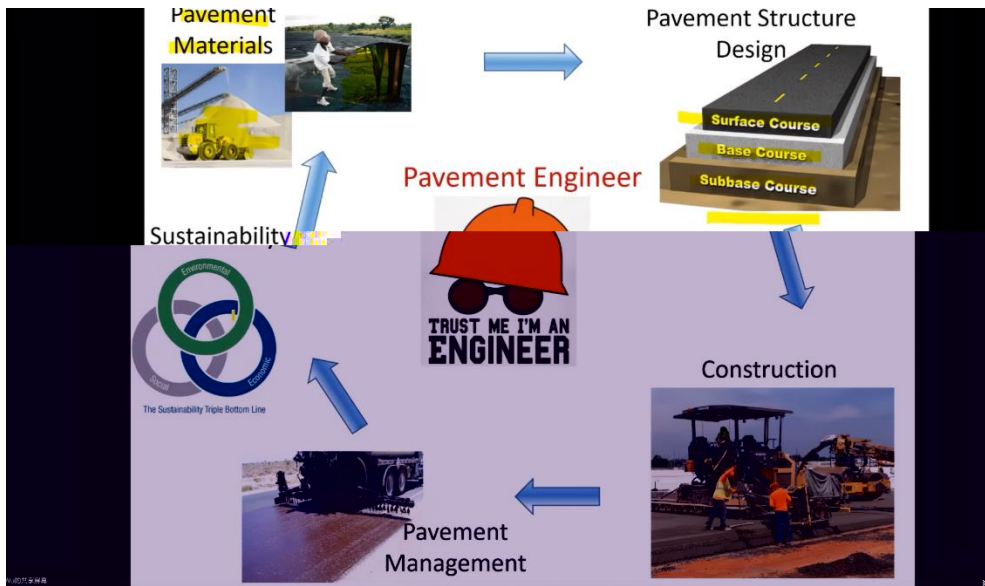
- Static deflection
  - Benkelman Beam
    - developed at the Western Association of State Highway Organizations (WASHO) Road Test in 1952
    - typically 80 kN (18,000 lb) on a single axle with dual tires inflated to 480 to 550 kPa (70 to 80 psi)

photo courtesy of John Harvey





Pavement materials evaluation, Pavement structural design, Practices of pavement maintenance in US



49

For the Roman road below, the major construction material is \_\_\_\_.

Cross-section of a Roman road

Drainage trench 1 2 3 4

2 Answers

▲ Asphalt

◆ Portland Cement

● Clay

● Soil

Results screen from a Kahoot! game. It shows a podium with three avatars representing the top performers. The first place (1st) is a yellow avatar with a score of 348. The second place (2nd) is a blue avatar with a score of 348. The third place (3rd) is a brown avatar with a score of 348. The background is a virtual classroom with a yellow wall and colorful bunting.

香港城市大學  
City University of Hong Kong

## Future road infrastructure for resilient and smart city

Dr.-Ing Guoyang LU  
Assistant Professor  
Department of Architecture and Civil Engineering  
City University of Hong Kong

專業 創新 國際全球  
Professional-Creative  
For The World

CityU LU



University of  
Nottingham  
UK | CHINA | MALAYSIA



# Pavement Maintenance and Management - UK experience

Dr. Haopeng Wang

haopeng.wang@nottingham.ac.uk

Marie Skłodowska-Curie Individual Fellow

Nottingham Transportation Engineering Centre (NTEC)

University of Nottingham

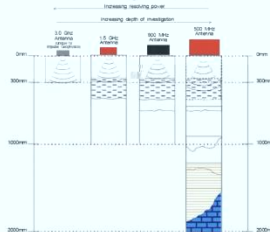


## Ground Penetrating Radar (GPR)

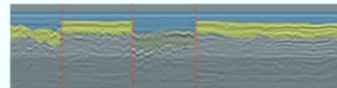
- **Construction**
  - Material Layer thickness
  - Construction Changes
- **Condition**
  - Debonding
  - Degradation
  - Void
  - Moisture



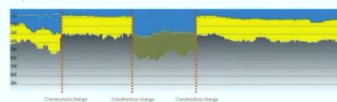
Pavement Investigation Antennae



Radargram + interpretation



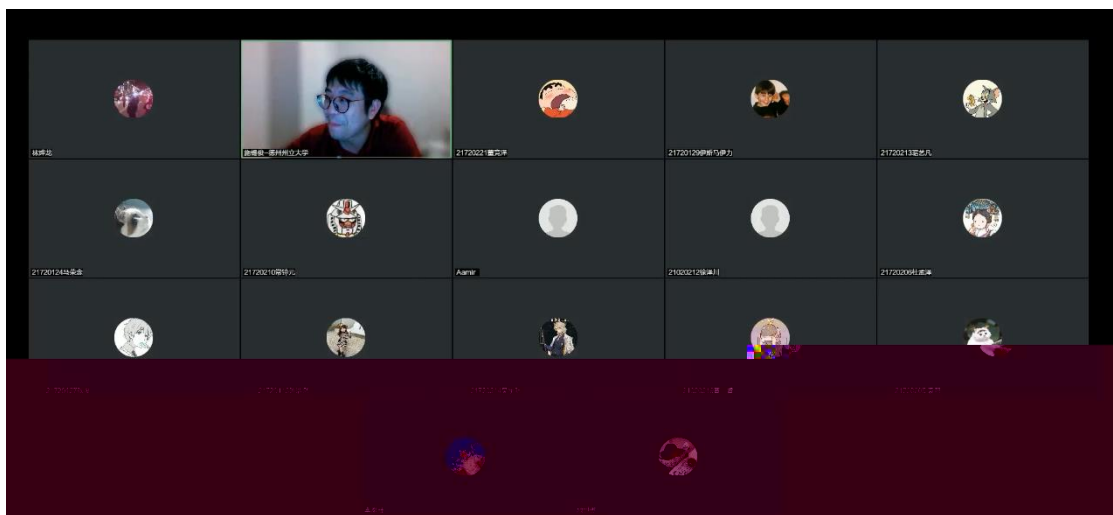
Depth Cross-section



17 July 2023

Haopeng Wang | NTEC

33






**1. Mechanical Performance of Full Depth Reclamation with Asphalt-based Stabilizers for the Energy Development Areas with Heavy Loads**

**2. Development of Default Load Spectra Inputs for the Texas Mechanistic-Empirical Flexible Pavement Design System (TxME)**


Jun Zhang, Ph.D.

Funded by Texas Department of Transportation ( TxDOT)






Jun Zhang的共享屏

## Introduction



- Weigh-in-motion (WIM) Stations
  - Collecting and analyzing traffic data for axle load spectra are also expensive and time-consuming.
  - It is not feasible to collect the traffic data for each road project.

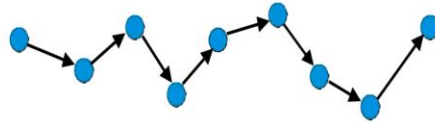
Jun Zhang的共享屏

# Risk Analysis & Management



*Bin Liu  
Department of Management Science  
University of Strathclyde*

*So, risk needs to be thought  
as chain of uncertain  
interdependent events*

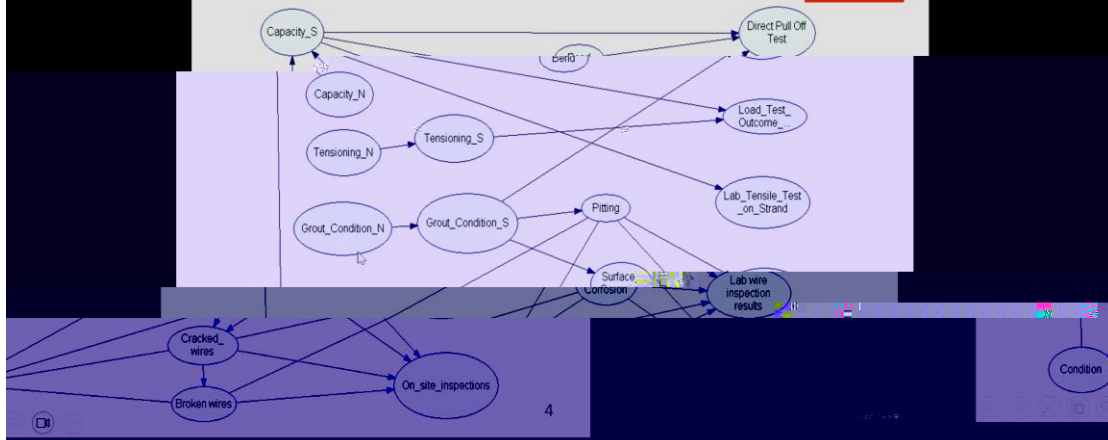


We identify an uncertain event within this and consider the likelihood that this occurs (probability) and the chain of uncertain consequences if it does occur

For example, the distributors in the supply chain are likely to experience the consequences to a risk event hits the origin of the supply.



## Example 1 - Modelling State of Anchorages of Forth Road Bridge



## A sample of expert judgement approaches

- Ask the nearest expert
- Listen to a pundit (the loudest expert)
- Assemble a committee of experts
- Delphi
- Stanford Research Institute Process
- Cooke's Classical Model
- Sheffield Elicitation Framework (SHELF)
- IDEA (Investigate Discuss Estimate Aggregate)
- ...





QUEEN'S  
UNIVERSITY  
BELFAST

## Drive-by Based Structural Health Monitoring of Intelligent Infrastructure

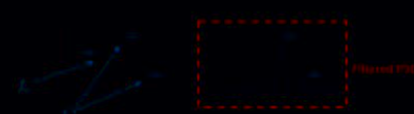
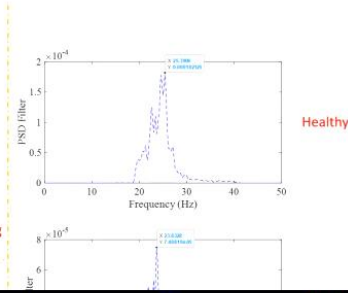
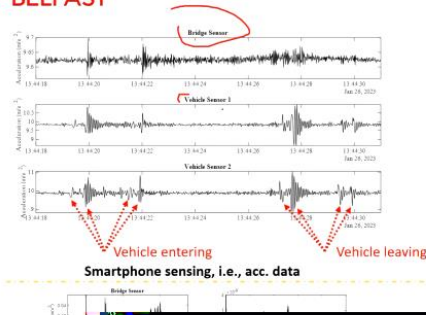
Kun Feng (冯坤), PhD, Research Fellow,  
School of Natural and Built Environment, &  
School of Mechanical and Aerospace Engineering,  
Queen's University Belfast, Belfast, Northern Ireland, United Kingdom.

17/June/2023

The screenshot shows a presentation slide titled "Drive-by Bridge SHM" with the subtitle "Traditional bridge SHM methods, the direct methods:". The slide features a diagram of a bridge with sensors and a truck. The presentation is displayed in a software window titled "Part 1 - Drive-by monito..." with a search bar and various menu options like File, Home, Insert, Draw, Design, Transitions, Animations, Slide Show, Record, Review, View, and Help. The Windows taskbar at the bottom shows the time as 1:00 PM on 1/17/2023.



QUEEN'S UNIVERSITY BELFAST



QUEEN'S UNIVERSITY BELFAST

### Research & Applications at Xiamen Uni

The Li-Zi-Wan bridge is in the Fuling section of the G319 national highway in Chongqing, China. The structure is a simply supported six-span prestressed concrete girder.



# Structural health monitoring – basic theory

Summer Talk SEU  
19 Jul 2023

Zuo ZHU  
University of Exeter



- ☐ Concepts & context of SHM
- ☐ Sensors for SHM
- ☐ Structural dynamics – SDOF structures
- ☐ Structural dynamics – MDOF structures

## Structural Health monitoring – component

Automated, on-line elements  
(long term monitoring)

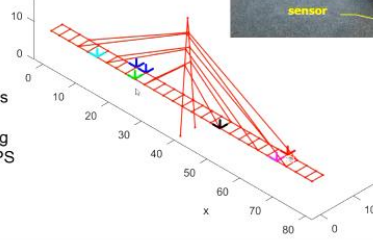
User-driven, usually off-line elements (Condition assessment)



### Field Application – Footbridge (80+ m)

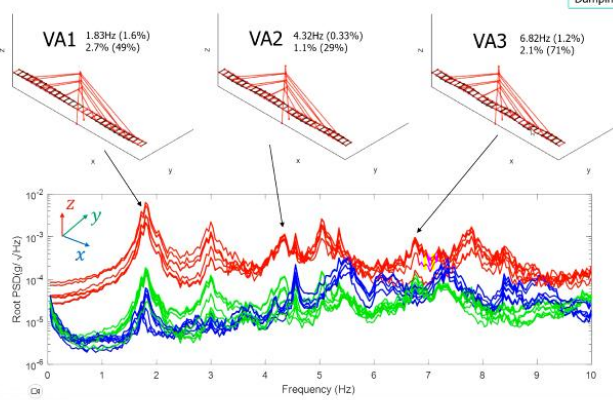


- 7 sensors = 3 ref. + 4 rovers
- 15 setups @ 15 min (one morning), covering 56 locations
- Distributed sensing & recording using high precision clocks/GPS



© 2013 Intel Inside Company

### Vertical Asymmetric (VS) modes



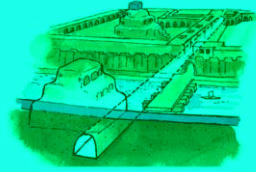
© 2013 Intel Inside Company

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## Introduction of Shield Tunneling Method

### ○ Tunneling

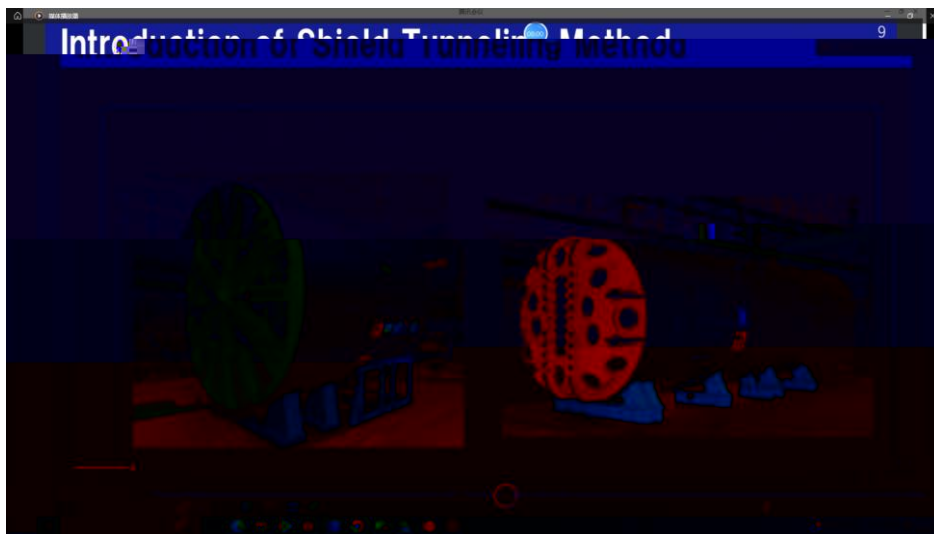
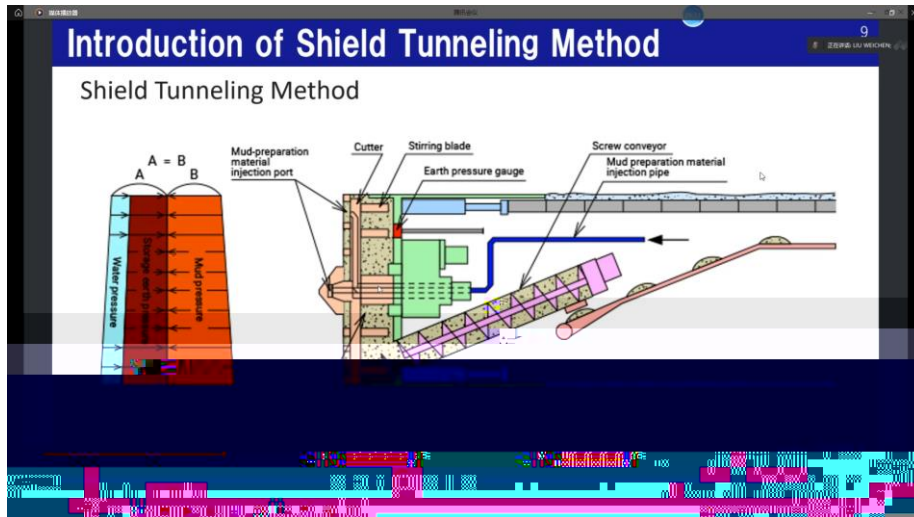
Euphrates Tunnel



- Cut and cover method
- Shield tunnel method
- Clay kicking method
- Shaft method
- Pipe jacking method
- Box jacking method
- Underwater tunnels
- Etc..

- New Austrian Tunneling Method
- Shield Tunneling Method
- Cut and Cover Method

KaTRI 20132



# Background

## ❖ Why choose the artificial intelligence?

### • Increasing volume of data:

in-situ data, experimental data, high-resolution simulation ...

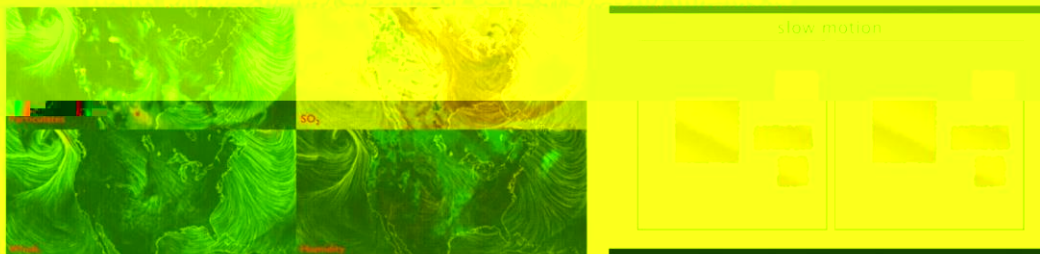
- **Stronger computational power:**  
graphics processing unit (GPU) ...



175 billion parameters  
V100 GPU (by Google)

- **Lacking knowledge of unknown complex systems:**

multi-physics fields, electricity control system ...

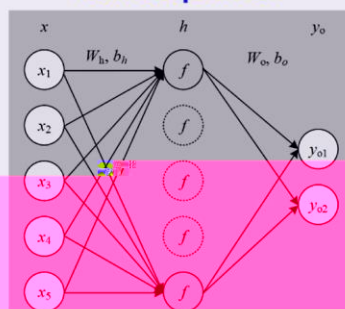


11

## 1. Framework of data-driven constitutive modelling

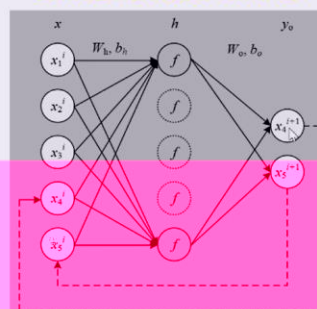
### ❑ Challenge 1: traditional ML-models unsuitable for path-dependent soil behaviour modelling

#### Non-sequential



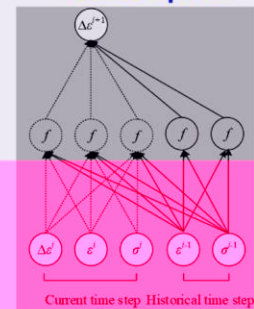
Feedforward Neural Network

#### Accumulated errors



Feedback Neural Network

#### Limited path

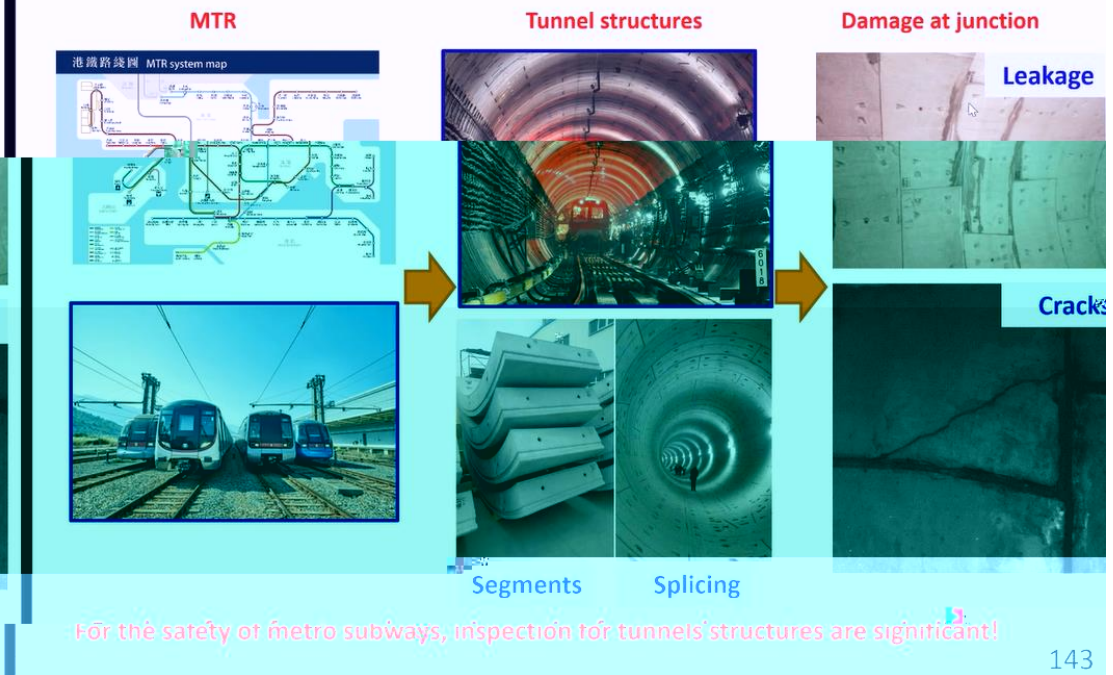


Nested Neural Network

Demand in optimal topology of ML models for soil behaviour

## 2. Damage identification and segmentation of tunnel structures

### □ Inspection and maintenance of tunnels

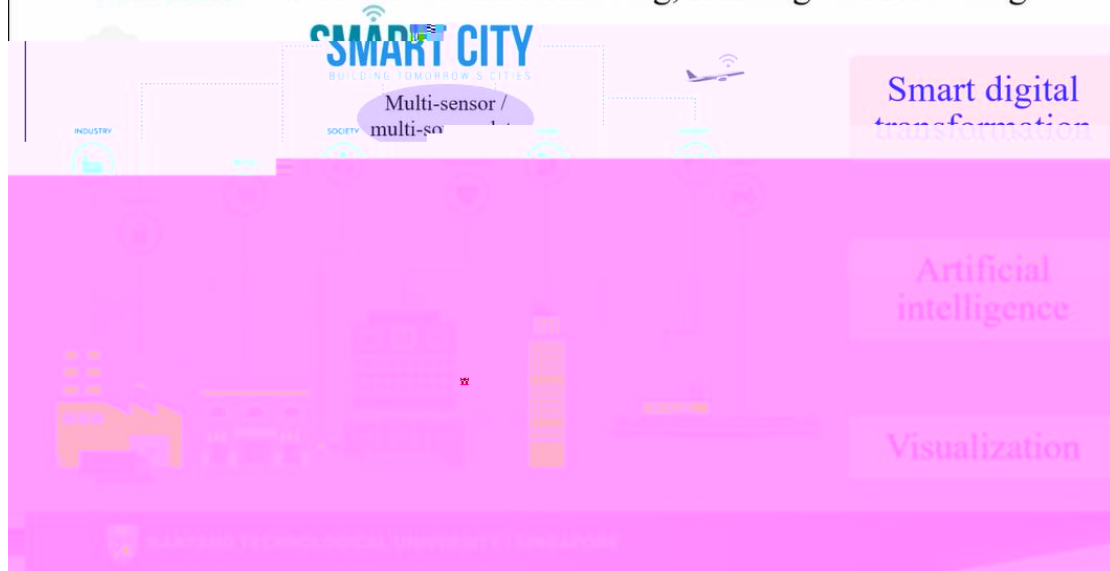






# Smart city

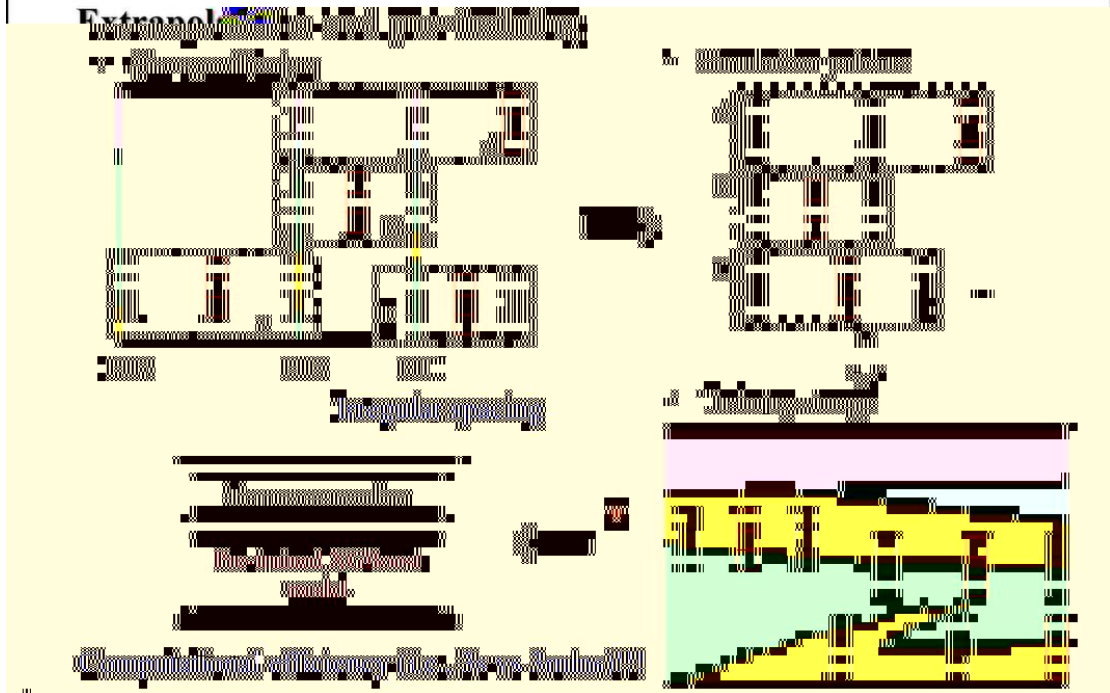
- **Smart cities built by digital twins**
- A digital twin is a **virtual representation** of physical objects, using **real-time** data to enable understanding, learning and reasoning



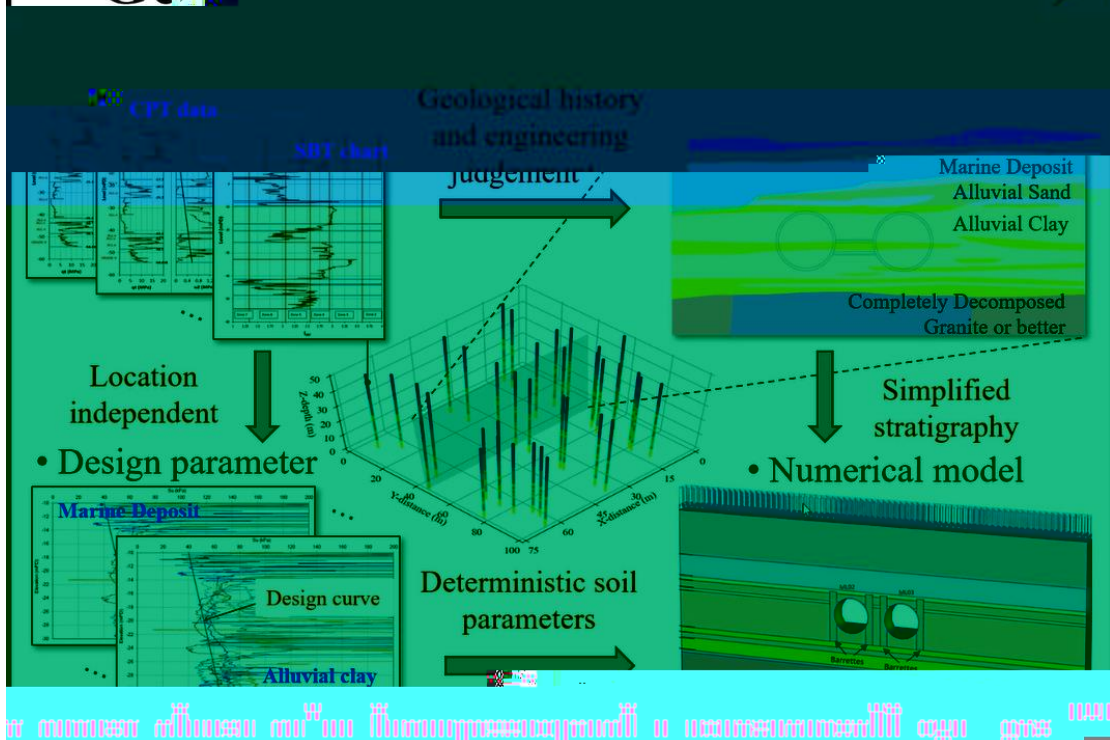
# Geotechnical City Investigation



# Enhanced Iterative Convolution XGBoost



# Geotechnical design and analysis



5.

5.1