

# **The International Specialized Exhibition “INFOINVENT”**

**An early warning method and its system of  
industrial emission pollution in smart cities**

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**Organization: Central South University, China  
Hunan Agricultural University, China**

# Background -> Project -> Innovative technologies

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According to the data from WHO, nearly half of European cities exceed WHO's annual PM2.5 pollution target. **Eastern and Southern Europe have the most severe PM2.5 pollution level.** It will have an important impact on people's health and economic development of Moldova and other Eastern European cities.

The average AQI of Europe have also been increasing for recent 30 days. **It is urgent to control urban air pollution.** In response to the international call for energy conservation and emission reduction, **this project has realized the visual warning of intelligent urban industrial emissions of air pollution.**

# Background -> **Project** -> Innovative technologies

**The project proposes a visual warning method and system for industrial emission pollution of smart cities.**

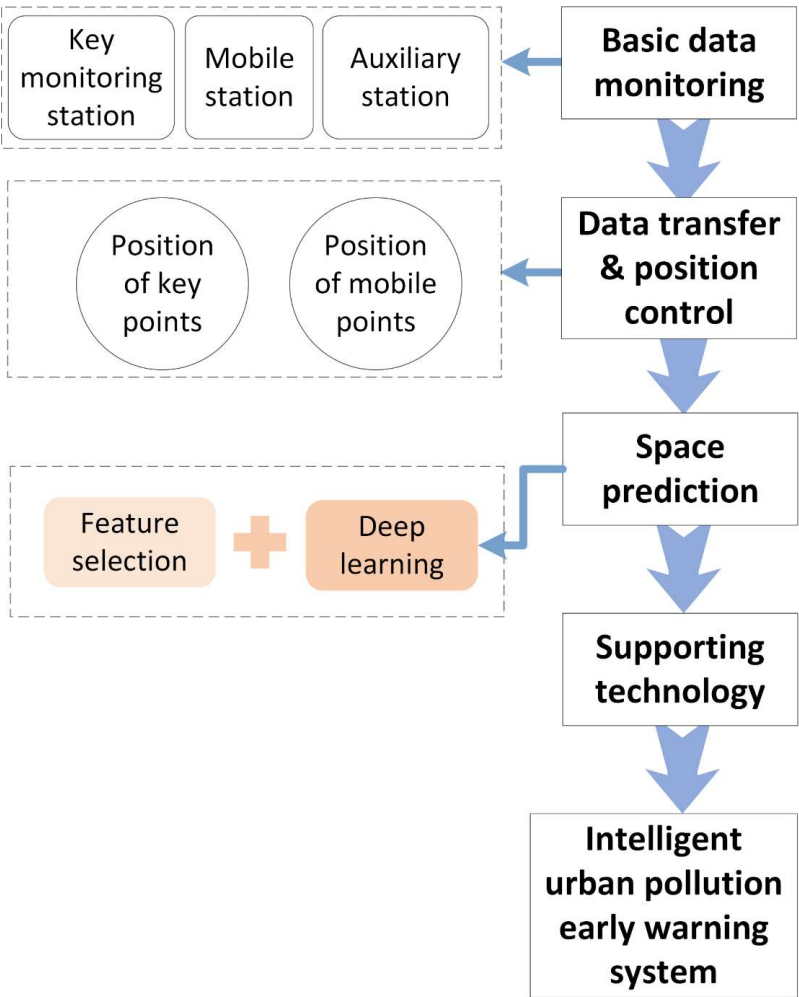
## ● **Original technologies**

- Multi-resolution ensemble structure
- Hybrid filter-wrapper feature selection
- Multiple model ensemble and metaheuristic optimization to guarantee robustness
- ...

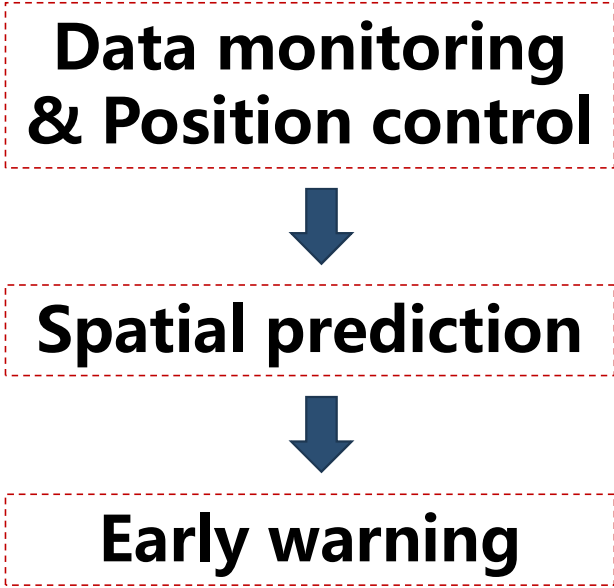
## ● **Significance and applications**

- Assisting departments to make decisions
- Improving environmental protection efficiency
- Controlling the diffusion of pollutants
- Achieving industrial regulation
- ...
- Instantaneous air pollution prediction
- Real-time air pollution space prediction
- ...

# Background -> **Project** -> Innovative technologies



## Key points



# Background -> Project -> Innovative technologies

## Data monitoring & Position control

### Traditional monitoring station

**Methods:** Grid monitoring

**Weaknesses:**

- Fixed
- Too many stations

### Monitoring technology in the project

Mobile monitoring station

Key monitoring station

#### Methods

Monitoring data

Relative position  
and wind angle and  
velocity features

Spatial prediction

#### Metrics

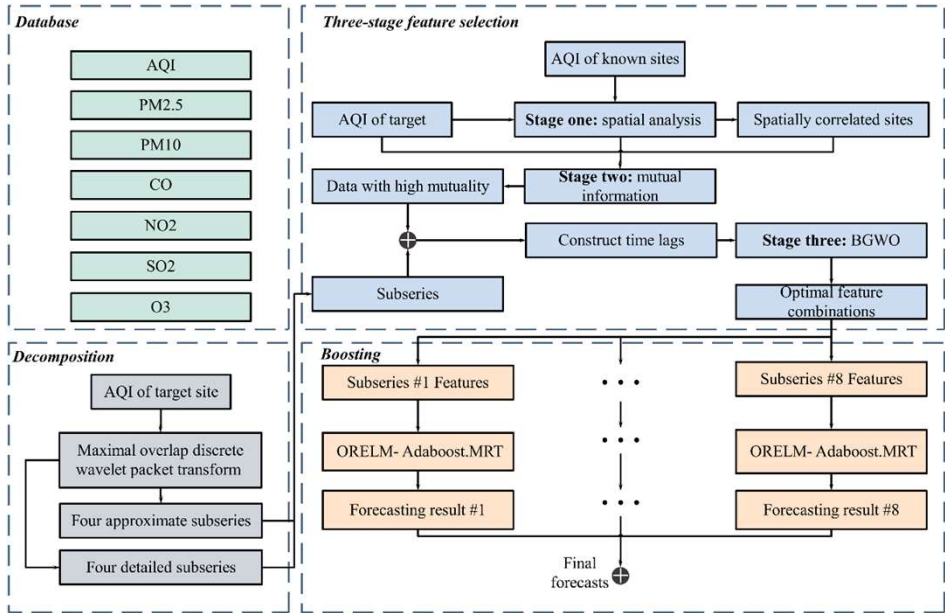
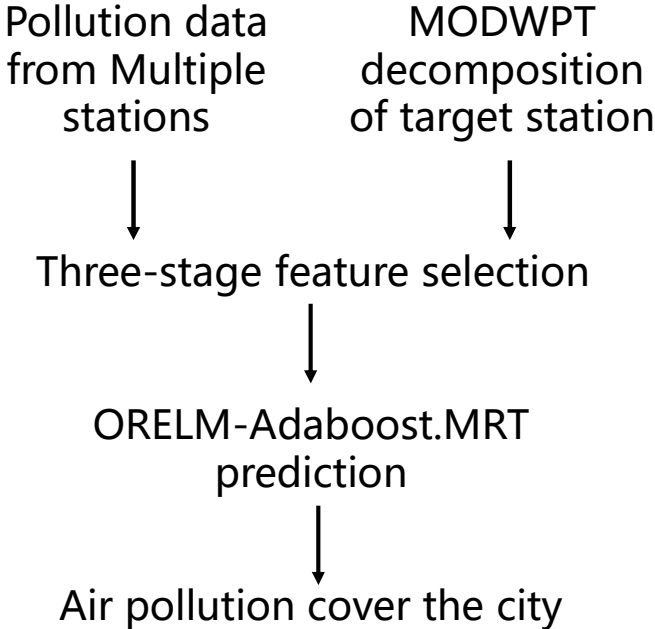
- **Economic**
- **Fewer stations needed**
- **More accurate**

# Background -> Project -> Innovative technologies

## Spatial air pollution prediction

Compared with CEEMD-PSO-SVR, Wavelet-ENN, and other cutting-edge methods, **MAPE is reduced by 18.3%~25.6%.**

Advanced technologies	MAPE
CEEMD-GWO-SVR	33.03%
Wavelet-ANN	28.79%
WPD-PSO-BP-Adaboost	25.71%
<b>Our technology</b>	<b>7.41%</b>



# Patents and advantages

The project has been authorized several China Invention Patents.

List of the China Invention Patents	
ZL 201910677429.7	The invention relates to a visual early warning method and system for industrial air pollution of the smart city
ZL 201910676747.1	A 3D measurement method of intelligent agricultural all-weather pollutants by UAV
ZL 201910615743.2	A hierarchical early warning method for intelligent agricultural air pollution concentration
ZL 201910616614.5	The invention relates to a health warning system and a method for train occupants in an air pollution environment outside the train

## Breakthroughs:

- Full coverage
- High precision
- Real-time monitoring.



**Thanks!**