

# Smart IoT Clean Cooling System

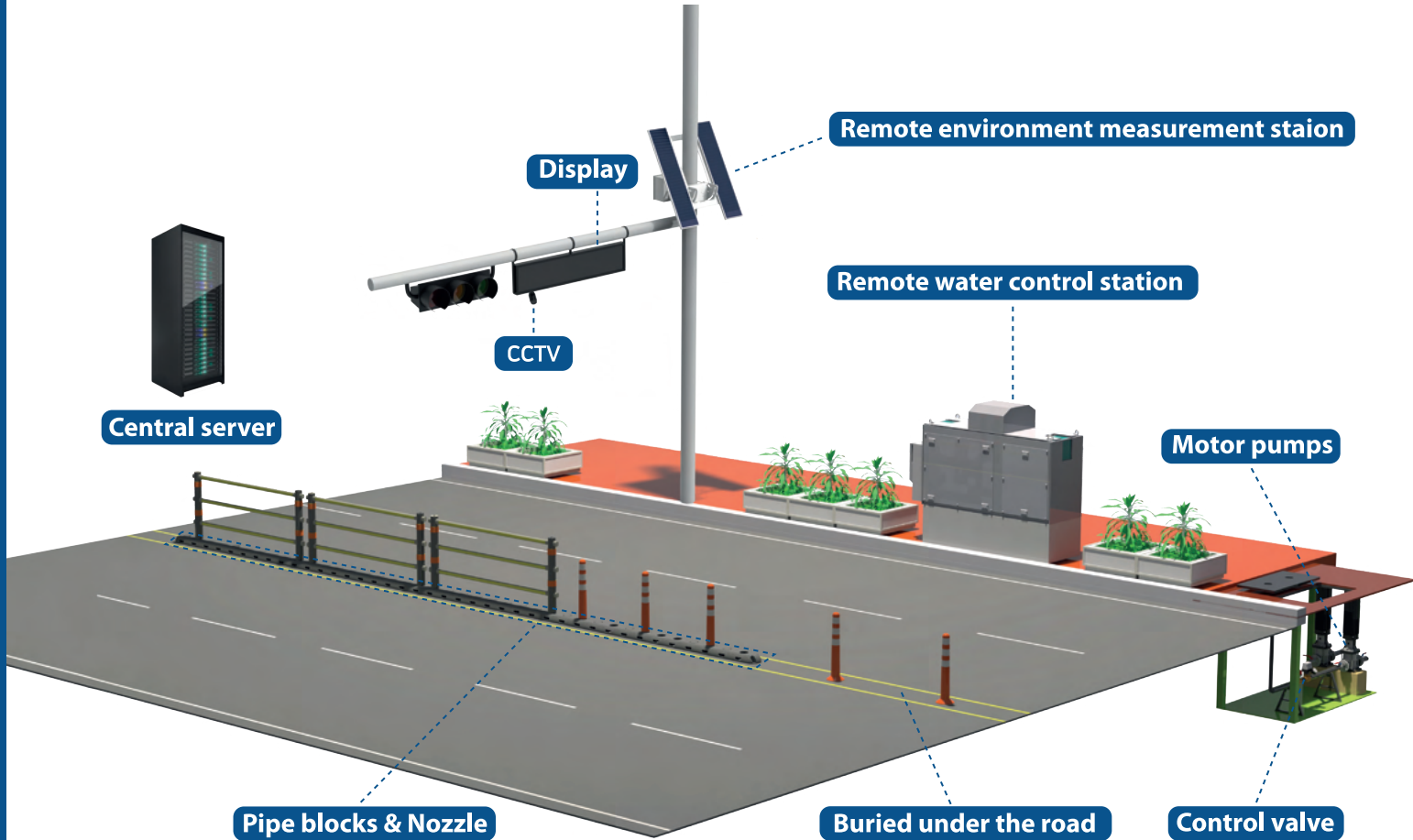
A clean cooling road system with the application of IoT low-power automatic water spray system that improves urban environment by reducing road dust scattering and by mitigating urban heat island.



## Smart IoT Clean Cooling System

### Special Features of The Clean Road System of BLAKSTONE

- Measurement of road environment and automatic water spray with the application of patented technology of IoT low-power road water spray system
- User's remote control and management
- Customized installation for road condition with block assembly type, reduction of construction period and cost
- Reduction of road dust scattering and fine dust, mitigation of urban heat island in summer time, and removal of snow and ice in winter time



### Clean Cooling server system

A central server controlled by user  
(User can check and manage water use, sensor collection record, valve control and spray time with computer in real time.)  
Remote control with smart phone app

### Road Environment Measurement Station

Measuring fine dust, temperature-humidity, sulfur oxides, nitrogen oxides and noise sensor on the surface of the road (sensor installed that meets the Fine Dust Act).  
The measured values are sent to the remote water control station, and PR words and water spray situations are displayed on the signboard.  
Using electricity generated by solar power.

### Clean Road's pipe blocks and nozzle

Installed at the center of road, and automatically spraying water according to measured fine dust or temperature-humidity index.

### Remote water control station

Using electricity generated by solar power, water spray valve control, data communication.

### Technology-related patent IoT low-power road water spray system(Patent No. 10-1961416)

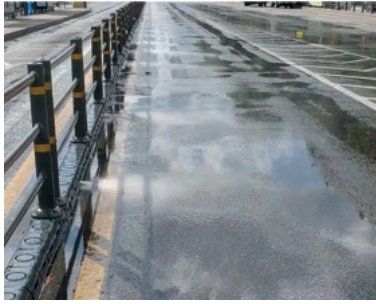
An industrial asynchronous mesh network operation method in the low speed RF communication environment (Patent No.10-1175147)

U-City Change Prediction System(Patent No.10- 21369764)





## Installation performances



Jongno 3ga, Eulji-ro main line  
- Completed in 2020



Jungwha station  
- Completed in 2021

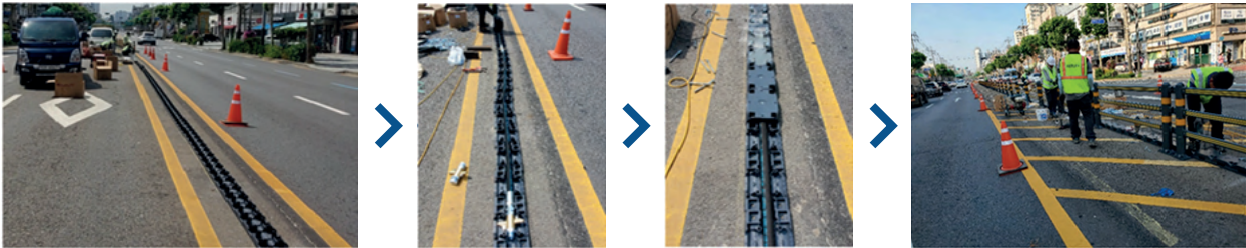


Isu station  
- Completed in 2021



Gusan station  
- Completed in 2021

## Process of road pipe installation



Completed in June, 2021

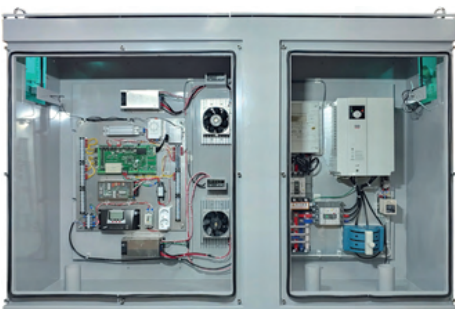
## Remote Water Control Station

### Functions of system

1. Operates and controls pump.
2. Detects water flow sensor and protects pump with automatic water level control of collecting well.
3. Measures electricity and water use amounts in real time.
4. Delivers data about water spray to the server.



### Remote control panel



Composition: Embedded MCU Controller, LTE Communication among Firmware-based servers, Pump inverter control, Water level detection, Water flow detection in pipe, Feedback control, Primary 380V distributing board, Pump inverter

Functions: Wireless communication with server through LTE router (integrated electricity amount, water meter collection, water flow sensing in pipe), remote control and management of pump

# Road Environment Measurement Station

## Photos of stations



## Server management program

- Basic information of road environment, water control
- Setting sensor value, Controlling valve
- View information of road environment measurement station
- Message transfer of road environment measurement station
- View water use, View spray time
- View alarm message information
- Check camera images



## User(administrator)'s mobile screen

