

# Basement Environment Duct Cleaning Using Robots and Development of Integrated Management System

## 1. Summary

### ■ Purpose of and Need for Research

- Develop an integrated management system for reducing real time energy and interior air quality optimization for the basement space
- Competing advanced countries such as OECD member countries, etc. are reacting quickly such as by selecting a strategy to utilize the green growth as a new growth momentum.
- Accordingly, by enacting the Basic Act on Low Carbon Green Growth (amended on January 13, 2010), Korea is responding and from 2013, we will be highly possibly included in the mandatory countries to reduce greenhouse gas.
- As such, as an executive strategy of green growth, which is one of important paradigms worldwide, the government decided to reduce greenhouse gas emission forecast (BAU) by 30% by 2020 and following up on subsequent measures.
- Moreover, the Ministry of Knowledge and Economy announced that it entered into collaboration agreements for energy target management system sample projects with large companies, etc. from 2009 and that the companies announced energy targets selected internally.
- Simultaneously satisfying national requirement of green growth, we can propose the basement environment integrated system of this assignment as a role model for the demands to manage energy usage by companies and basement spaces and developing technology to improve pleasant life environment quality.
- By establishing measures to quantify the correlation of carbon reduction from establishing environmentally friendly basement spaces such as improving basement space environment and increasing energy management efficiency, minimize occurrence of greenhouse gas.
- By acquiring, processing and accumulating energy information and developing low carbon type energy diagnosis management process linked to environmental management factors which support energy management, facility operation and process are optimized, energy loss and function decrease are detected early to be managed and policy decision relating to energy use and costs re supported.

- By linking the air quality monitoring system to the integrated management system, developed low carbon type energy management and energy saving integrated system combined with environmental management elements.
- By utilizing air quality monitoring system and tracing the contamination level of the basement space and connected space on a real time basis, a program improving environment which adopts process of improving contamination when the air quality goes down is developed.

#### ■ Contents and Scope of the Research

- Establish lane and wireless integrated data logger system/ environment integration database
  - Develop basement space energy monitoring module
  - Develop lane and wireless integration data logger
  - Establish database integrating energy/environment through integrating basement energy usage and air quality monitoring materials
- Develop an environment improvement management program based on real time optimization
  - Among the basement space through shared system operation which minimizes energy usage, develop algorithms for optimizing the interior air quality real time
  - Among energy saving basement space, develop an indoor air quality management algorithm
  - Incorporate the basement space environment improvement logic of the first sub division
- Develop a low carbon type basement space energy/indoor air quality integrated environment management system
  - Operate a sharing system which uses energy efficiently and an air quality environment management system
  - Low carbon type energy/environment integrated management system
  - Site evaluation and improvement of the integrated management system

## 2. Research Results

#### ■ Results of Research and Development

- First year
  - Develop a low carbon type energy and environment diagnostic management process

- Develop a wireless and lane integrated logging and gateway system
- Develop a basement space energy and environment monitoring system
- Second year
  - Develop a real-time optimization based environment improvement simulation program
  - Develop an energy saving air quality integrated management system
  - Develop an energy reduction monitoring system
- Third year
  - Develop an integrated energy and environment management system of space linked to the basement space
  - Analysis of energy use trend and use reduction management system
  - Selecting carbon emission volume and emission reduction management system
- Final evaluation
  - Develop a lane and wireless integrated data logging and gateway system
  - System for optimizing energy use
  - Develop an energy and environment integrated management system of space connected to the basement space based on real time optimization
- Basement space energy usage reduction by 35%
- Establish a basement space energy/indoor air quality integrated environment management system which satisfies the indoor air quality level selected by the user/manager and maintains and manages minimum use of energy by shared system
- The basement space energy/interior air quality integrated environment management system is developed as key technology and includes the technology which manages energy usage by evaluating the indoor air quality of the basement space.

■ **Plans to Utilize the Results of Research and Development**

- Able to expand as a land and wireless monitoring data logger system utilizing lane and wireless data transmission modules
- Based on indoor air quality, expand to different spaces and buildings of the integrated environment management system which can save energy by 35% or more
- Increase low carbon emission space usage through securing pleasant indoor air quality in the basement space and connected spaces
  - The system energy usage which uses lots of energy in basement spaces like subway

stations and basement shops, etc. can be maintained and by linking this to the indoor air quality of the basement space, suitable operation management measures can be proposed.

Source: National Digital Science Library