SMART STREETLIGHT AUTO DIMMING CONTROL SYSTEM

edge computing technology using Multiple object detection/tracking

SMART STREETLIGHT AUTO DIMMING CONTROL SYSTEM

using Edge Computing Technology, based Multiple Object Detection/Tracking

"Video monitoring method for deep learning-based vehicles and human automatic detection of human body and data transfer method using the same"   (Patent No. 10-2311805)

Get a video from the camera installed on the intersection or road, set the detection area in the corresponding video to detect objects and calculate vehicle traffic, vehicle speed, pedestrian, etc.
By transmitting data to the server using an IoT network that uses LORA communication,
Data collection systems required to build and operate smart cities to overcome urban society and environmental problems

- This system uses a processor equipped with AI software to perform multi-object detection and tracking, and through this, a system that provides controlling smart street lighting.

- The system collect Vehicles and analyze traffic information on a plurality of roads using deep learning and apply them to calculate traffic flow information in real time, and only analyzed data, such as pedestrian traffic, vehicle speed, were transferred through the IoT network to server.

- At night, traffic flow information is used to automatically control the light of smart street lights in the edge stage.
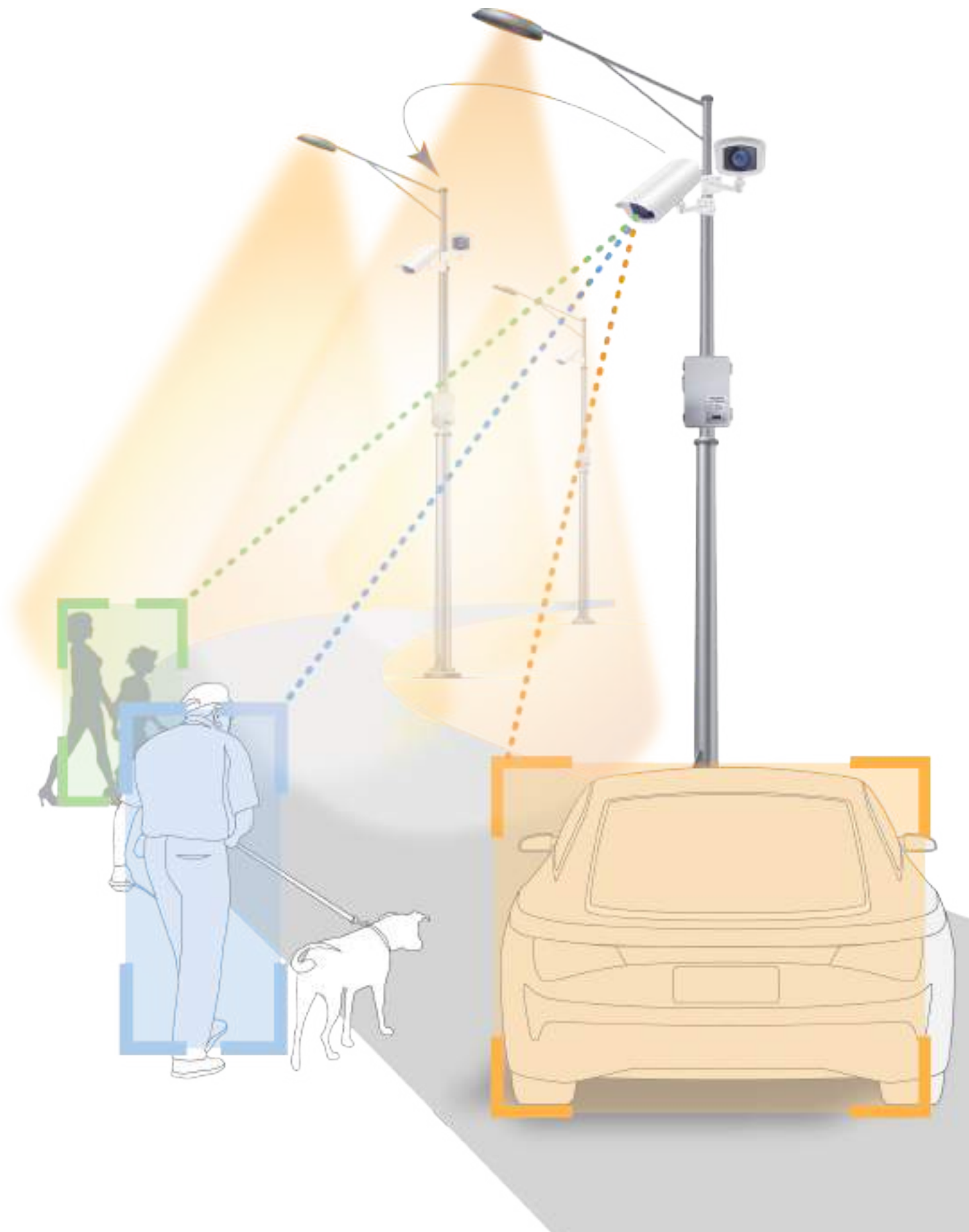

Multi-object detection/tracking device with edge computing technology applied

LoRa
LoRa module
Ethernet
4G/5G

Data Flow

IoT Device ⇔ IoT Gateway ⇔ IoT Platform ⇔ Back End ⇔ Control Center
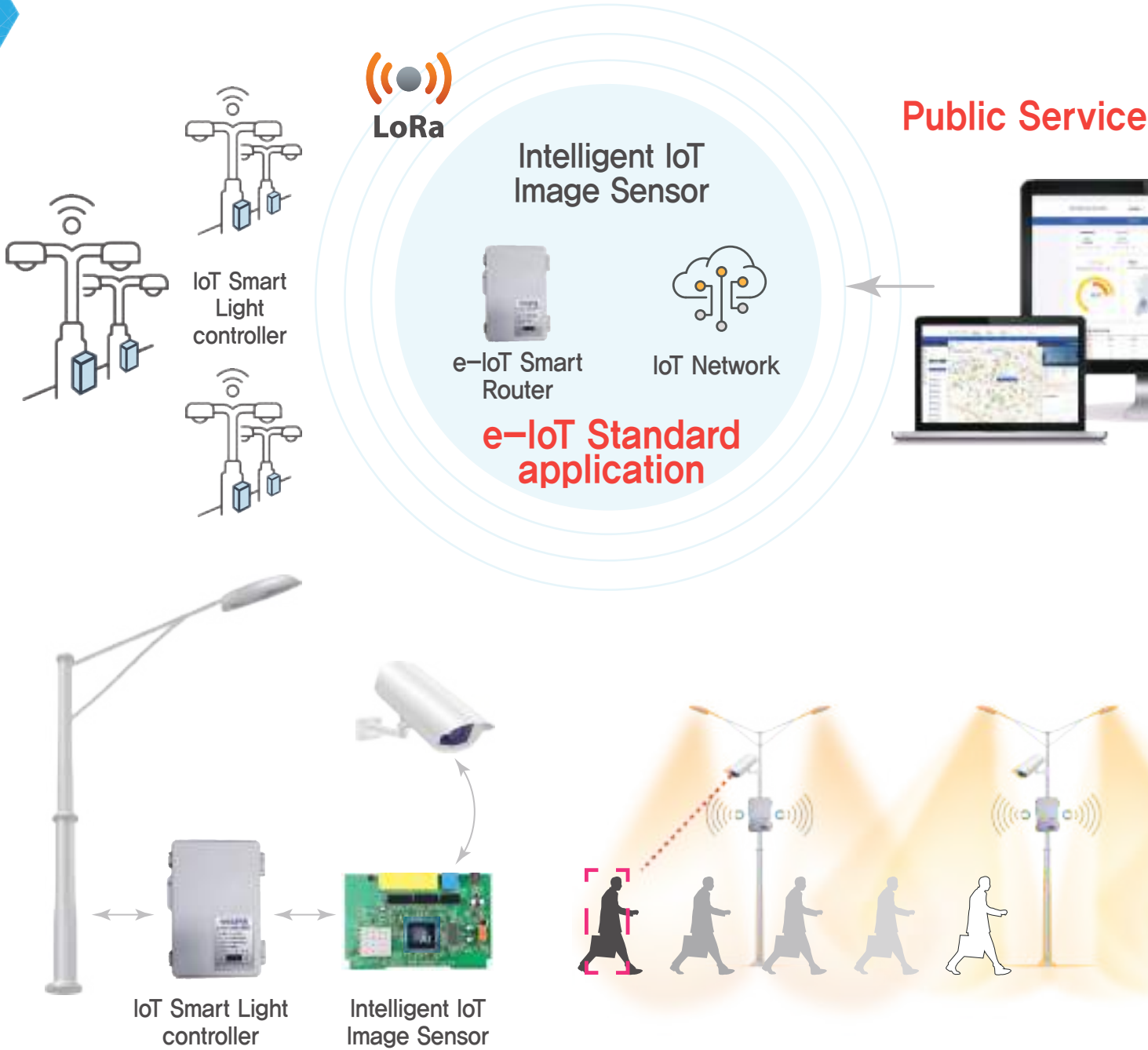
LoRa LTE

Edge Computing Technology

It is a technology that transmits the data analyzed through a multi-object detection technology using deep learning to the cloud or server using the IoT communication network.

Since only the analyzed information is transmitted and transmitted, the delay time and the bandwidth requirements can be minimized.


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System Diagram

LoRa

Intelligent IoT Image Sensor

e-IoT Smart Router

IoT Network

e-IoT Standard application

IoT Smart Light controller

Public Service

IoT Smart Light controller

Intelligent IoT Image Sensor

- Deep learning –based multi –object detection/tracking (vehicle and pedestrian detection)
- Automatic individual lighting dimming control through multiple object detection
- Traffic/pedestrian measurement and analysis by detecting/tracking multiple objects
- Reduced power consumption through automatic lighting dimming control
  - Apply the LWM2M communication technology, an IoT international standard,
    - lighting control and monitoring using Lightweight Machine to Machine (LWM2M) IPSO system
      - Securing interoperability according to the international standard IoT standard communication system

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Platform (SaaS)

LoRa

e–IoT Smart Router

IoT Network

IoT Smart Light controller
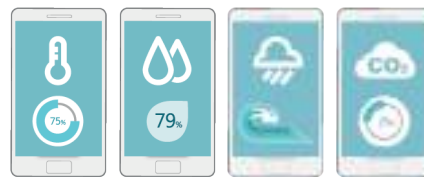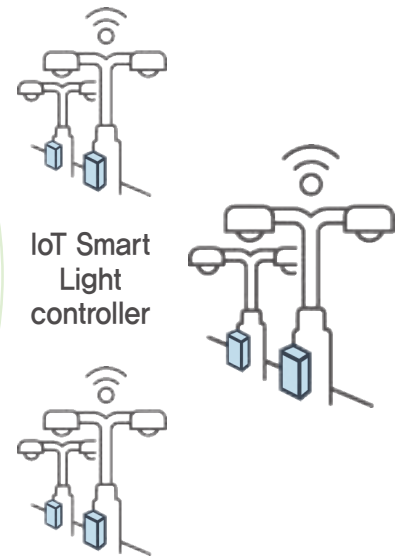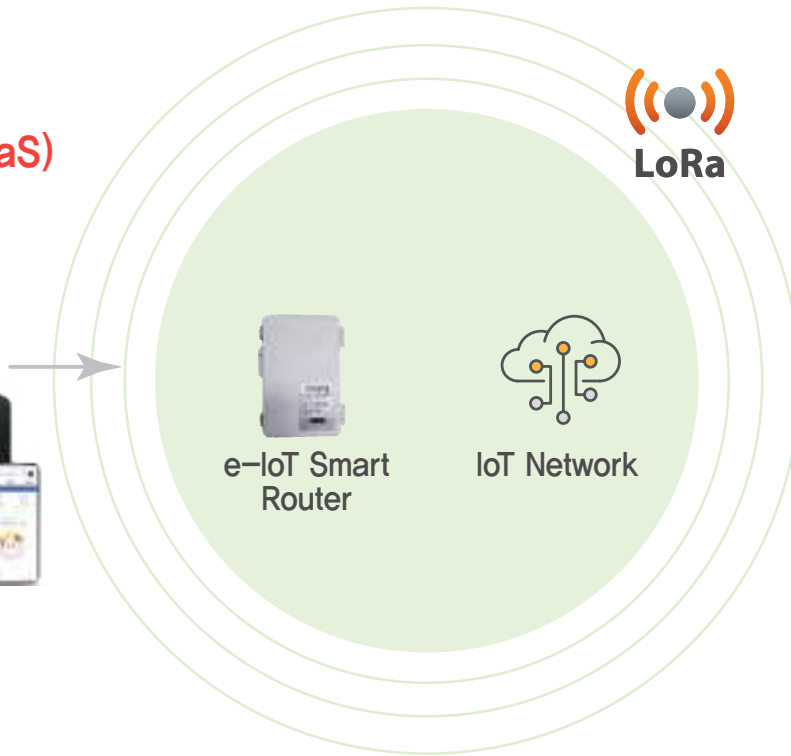
Environmental information collection device

IoT Smart Light controller

Hardware Spec

Classification	Hardware Spec
IoT smart controller	- Rf Freq : 915.00MHz ～ 928.00MHz - Rf : LoRa - Rf Output : 7dBm ～ 20dBm - Rf Sensitivity : −124dBm @LoRa Mode - MAC : Mesh - Security : CoAP - OS : Mbed - Microcontroller : 32bit Cortex−M3
Intelligent IoT Image Sensor	- CPU : Quad−core ARM A57@1.43GHz - GPU : 128−core Maxwell - GPU : 472 GFLOPsCPU - Memory : 4GB 64−bit LPDDR4 25.6 GB/s - OS : Linux
Camera	- 13M pixel - 5−50mm Varifocal lens - 1/3 " IMX214 Image sensor - Maximum Resolution 3840(H) x 2880(V) - Sensitivity 1,000mV/Lux−sec - S/N ratio 33dB - FOV 75°

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LWM2M standard and open source

COAP —based LWM2M International IoT standard is secured by using an open standard interface

CoAP protocol application

Optimized for a limited communication environment with a limited bandwidth, the REST —based lightweight message protocol, which is developed, can be applied to reduce overhead in environments such as the Internet of Things and M2M devices.

Reliable unicasts and multicasts are supported using UDP protocols.

Energy savings through automatic dimming control

In the area or time zone with low traffic volume, automatic individual lighting through multi —object detection/tracking, reducing more than 30%compared to conventional power consumption.

Smart City foundation is established

By applying traffic/pedestrian measurement and analysis by detecting/tracking multiple objects, it is possible to collect prompt and reliable traffic information and establish a big data —based traffic policy.

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