DESL

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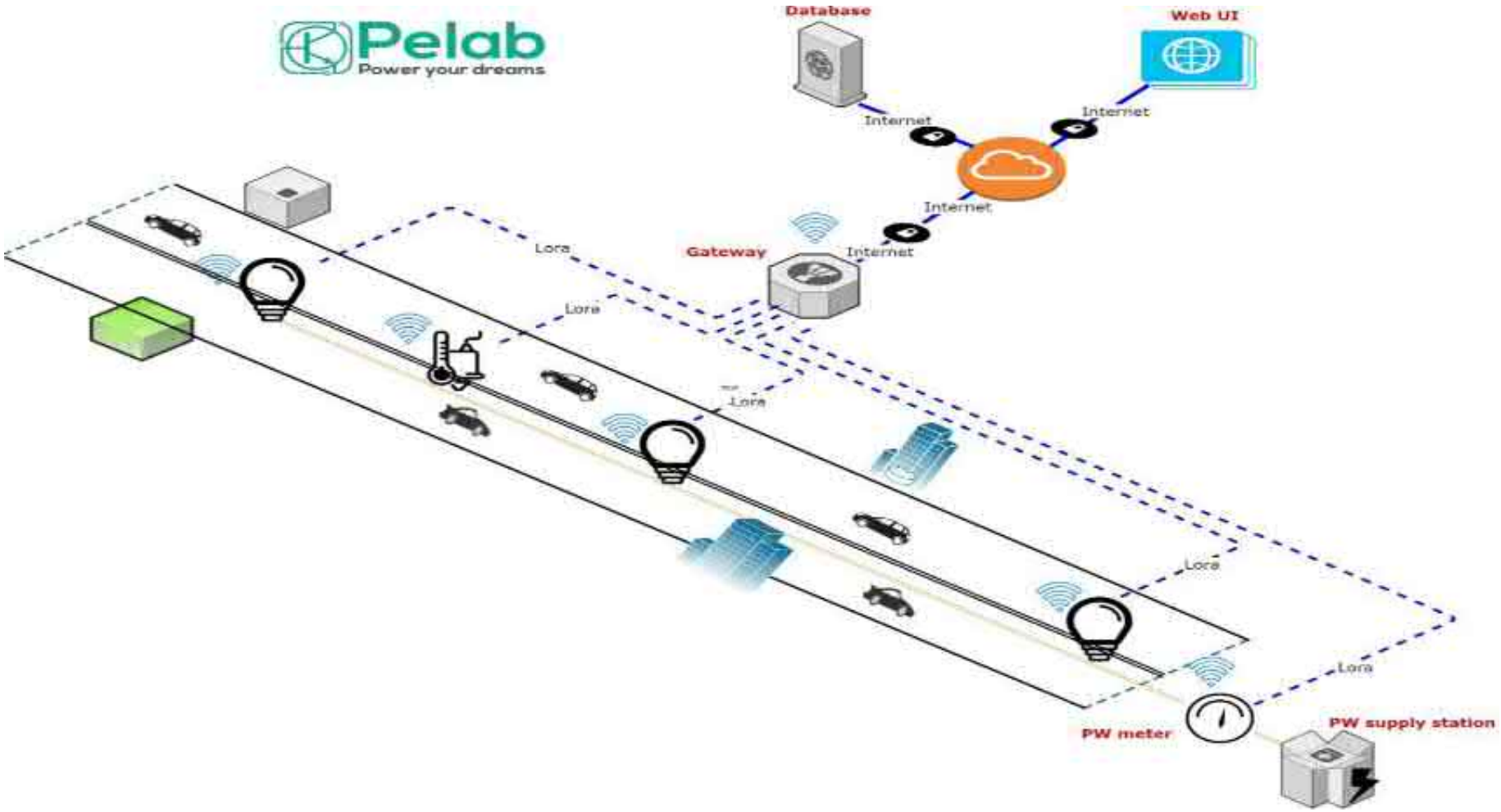
Development of Smart Street lighting technology using LED in Ho Chi Minh City - Viet Nam

Presenter: Le Minh Phuong & Phan Quoc Dung
HCMUT, VNU-HCM

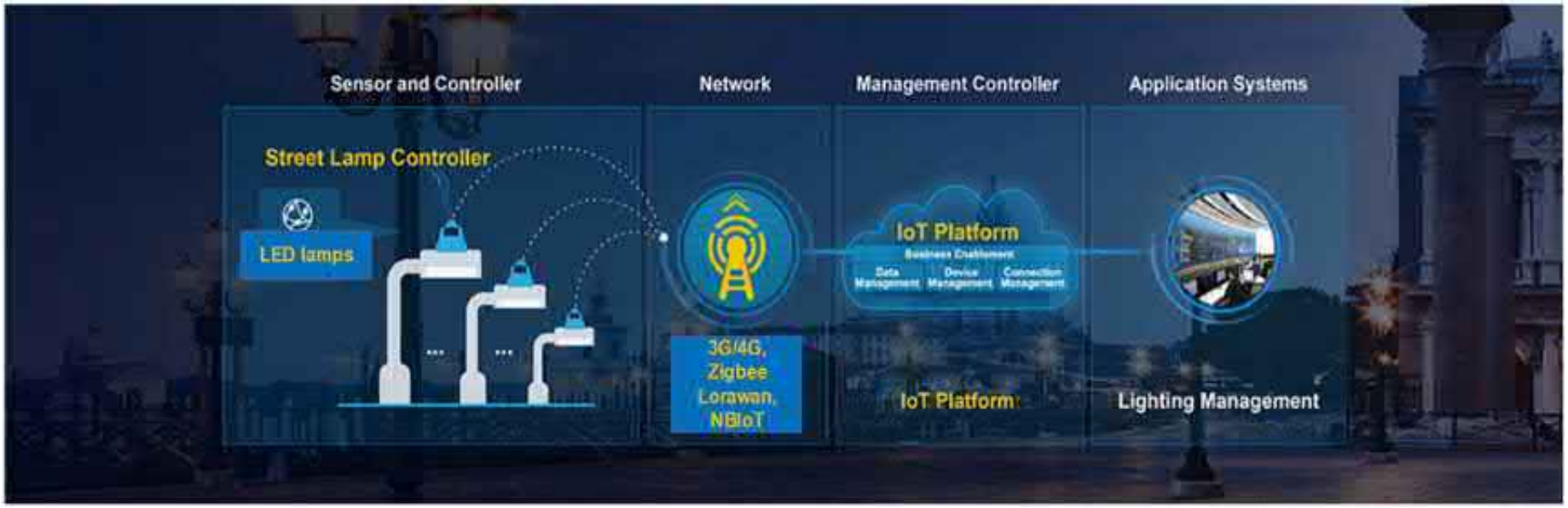
HCMC, March 2020

DEVELOPMENT OF SMART STREET LIGHTING TECHNOLOGY USING LED



SMART STREET LIGHTING SYSTEM

SMART LIGHTING TECHNOLOGY



Communication technology:

- ❑ PLC
- ❑ ZigBee
- ❑ SigFox
- ❑ LoRa
- ❑ NB-IoT

System roles :

- ❑ Urban safety
- ❑ Energy saving
- ❑ Improve the quality of light
- ❑ Effective operation and maintenance
- ❑ Combined with electrical systems and other applications

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ELEMENTS IN THE SMART STREET LIGHTING SYSTEM

- LED Driver
- Lora WAN node module
- Gateways
- Sensor
- CLOUD
- Lighting control software

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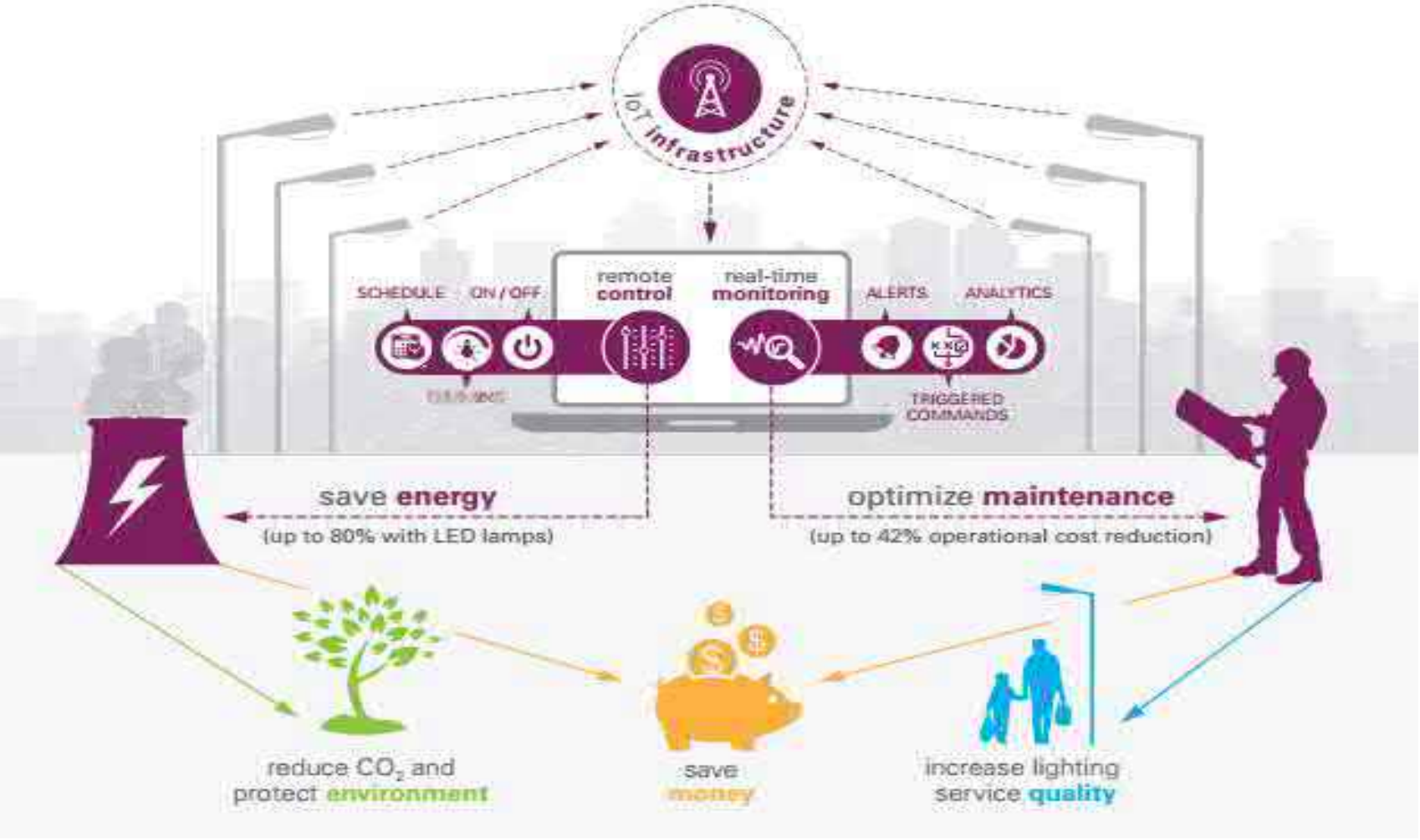
SMART STREET LIGHTING SYSTEM

OPTIMAL LIGHTING CONTROL

SMART STREET LIGHTING SYSTEM

CHARACTERISTICS OF THE PROPOSED STREET LIGHTING SYSTEM



SMART STREET LIGHTING SYSTEM

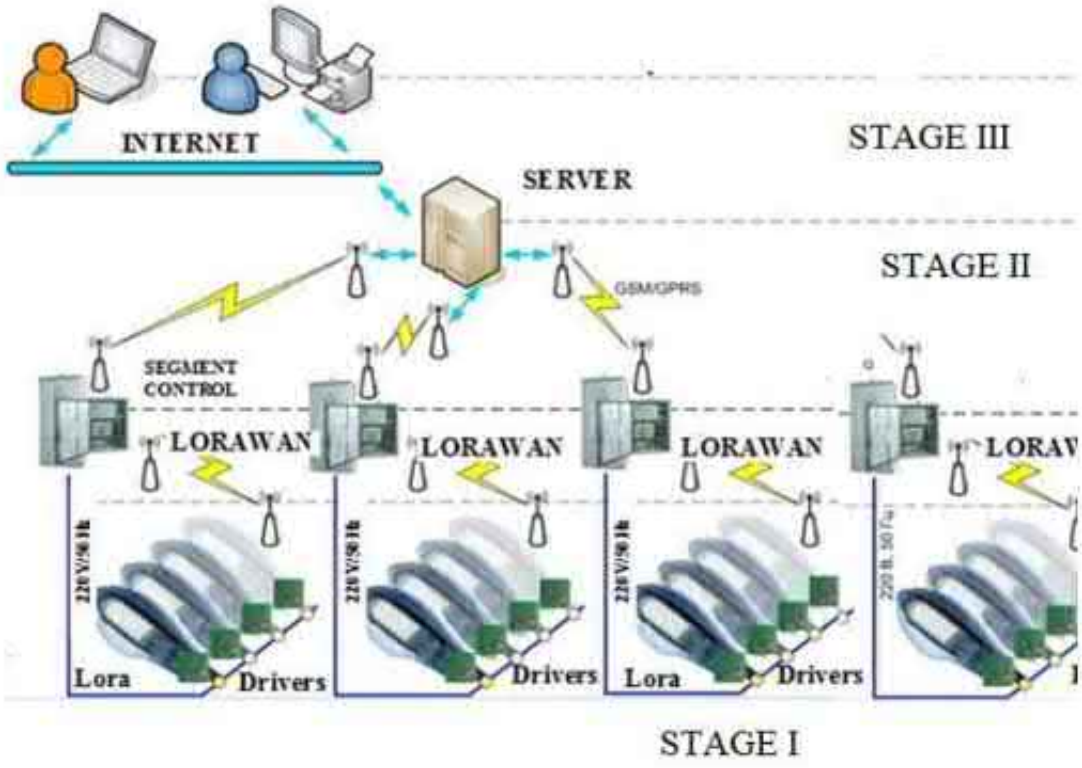
STRUCTURE OF SMART LIGHTING SYSTEM

Control center - software for managing and controlling streetlights

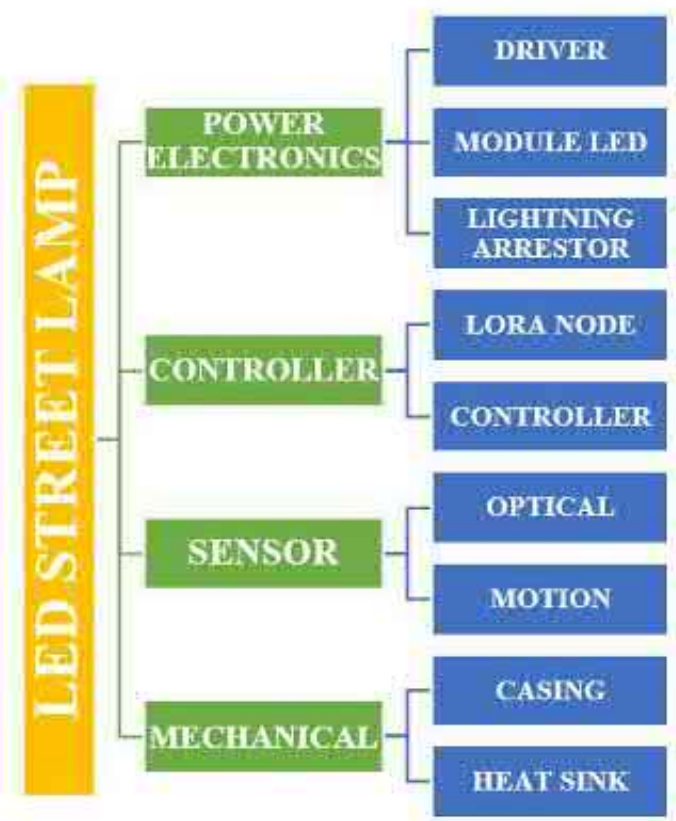
Data transmission system based on LORAWAN - lighting control cabinet and Gateway

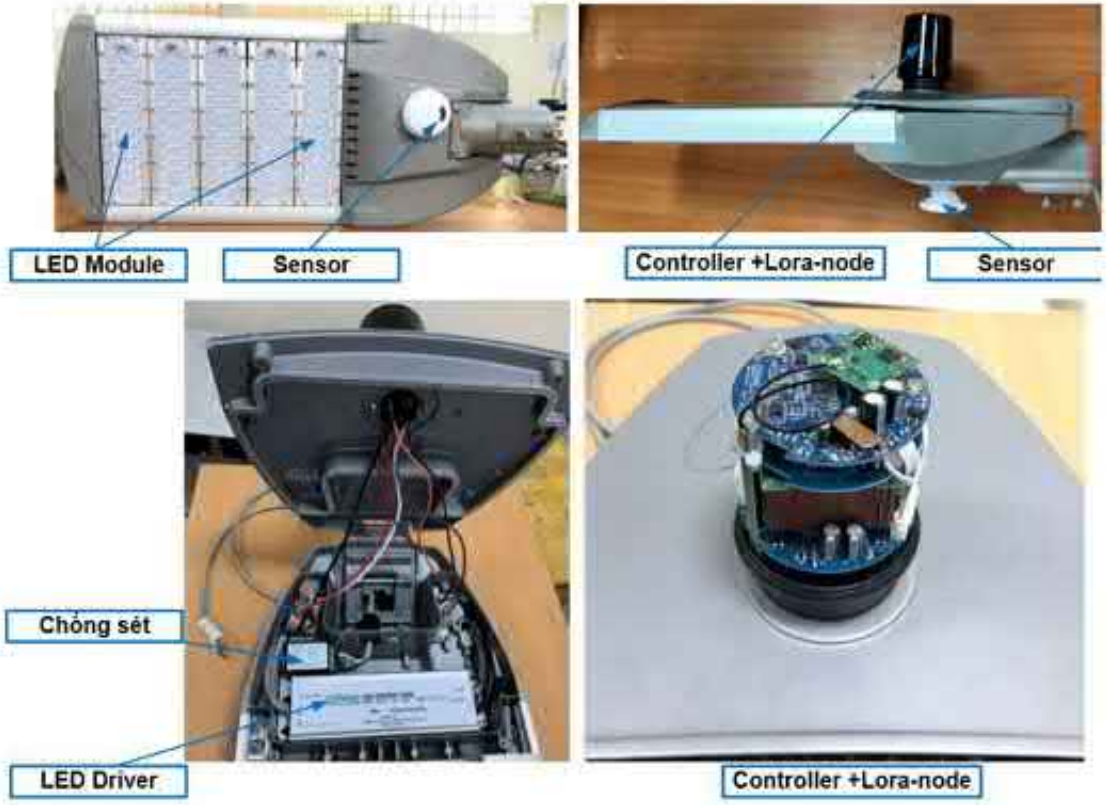
Smart controller + Lora node

LED Driver + LED Module



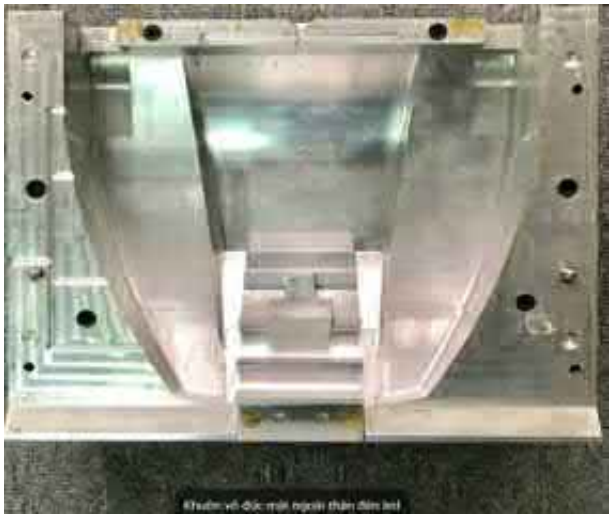
STRUCTURE OF THE STREET LIGHTING LED LAMP



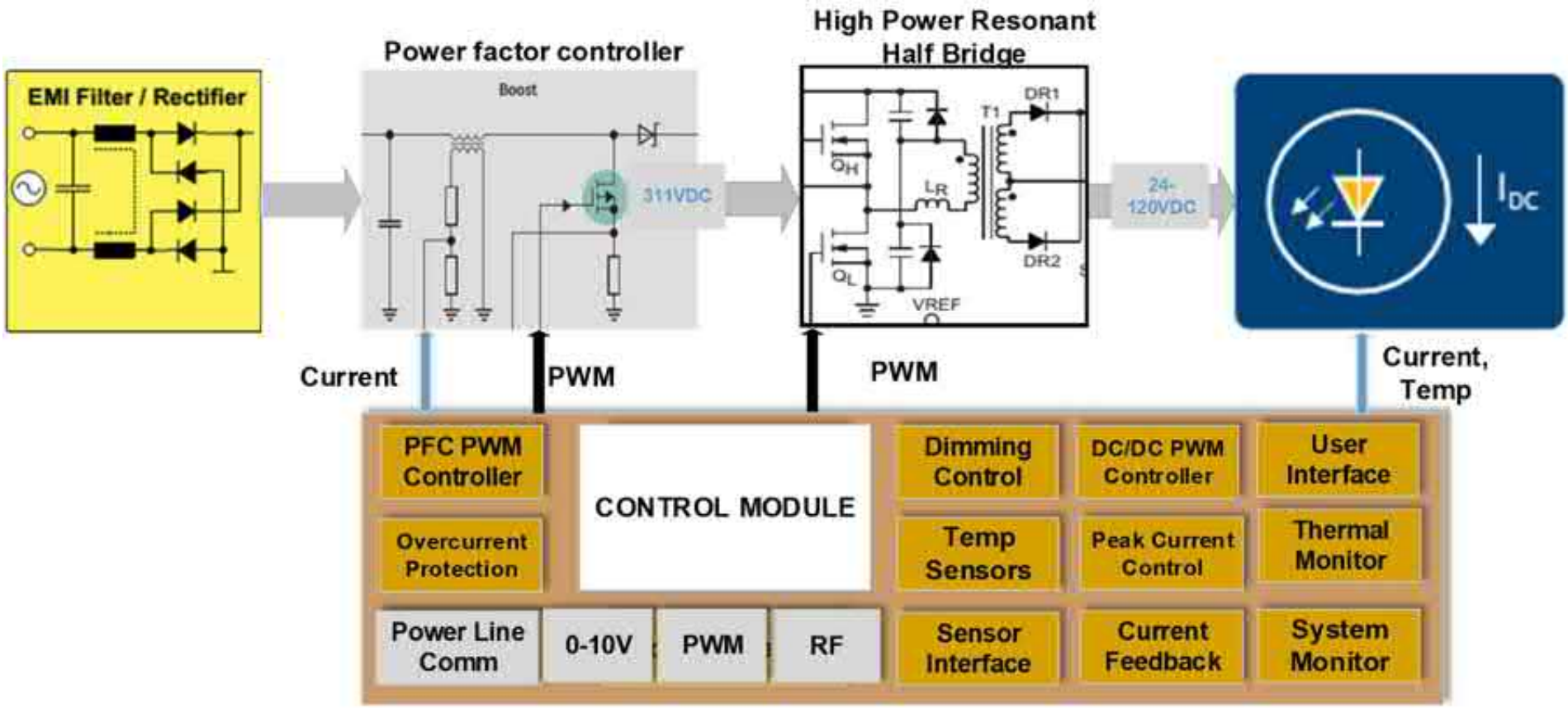


SMART STREET LIGHTING SYSTEM

MOLD DESIGN



LED DRIVER CIRCUIT TOPOLOGY



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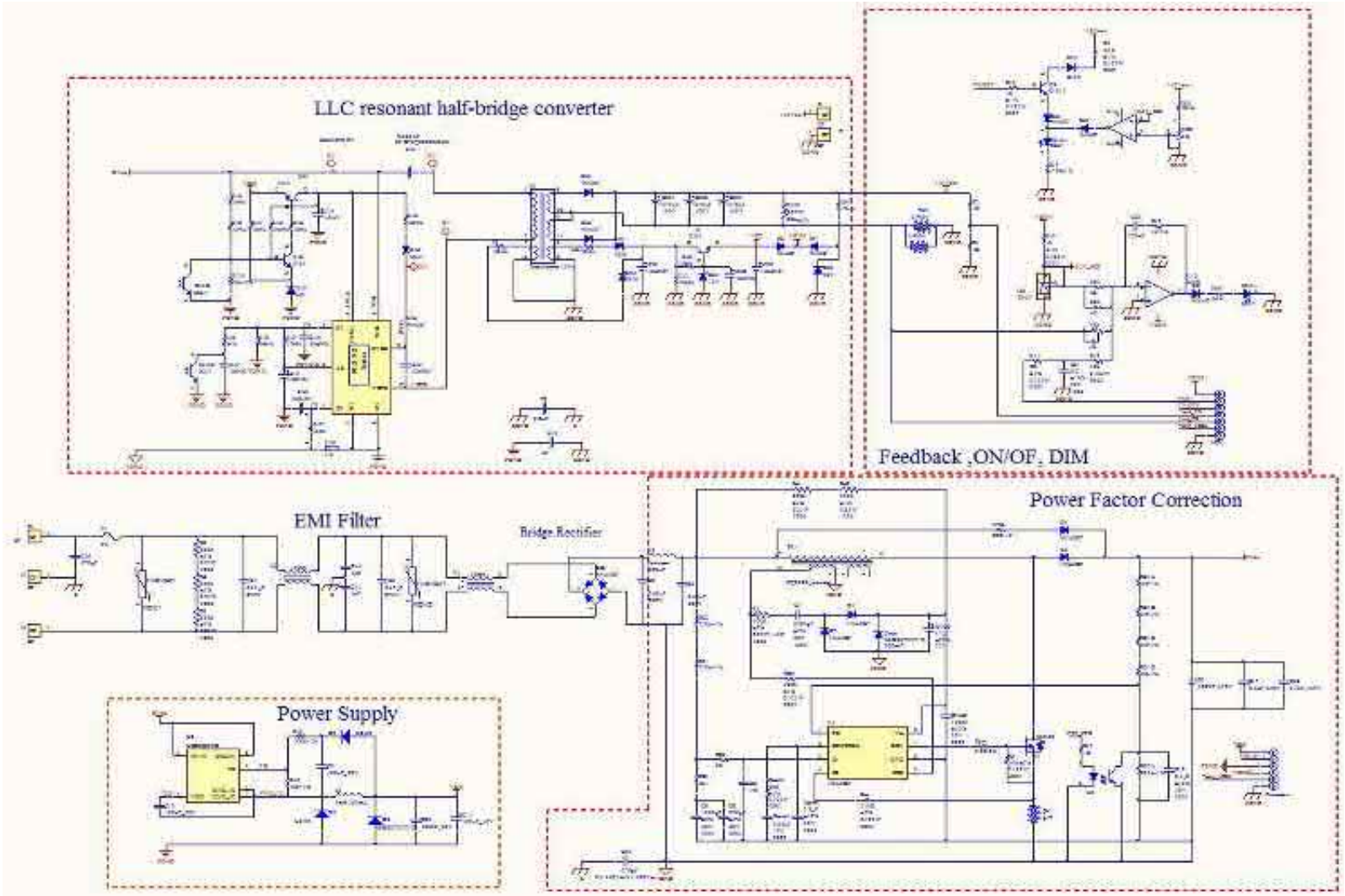
SMART STREET LIGHTING SYSTEM

THREE STAGE LED DRIVER SCHEMATIC

EMI STAGE:
- DM Filter
- CM Filter

PFC STAGE:
- CRM Mode
- NCP1608 Controller

DC/DC STAGE:
- LLC Half-Bridge
- FLS2100XS Controller



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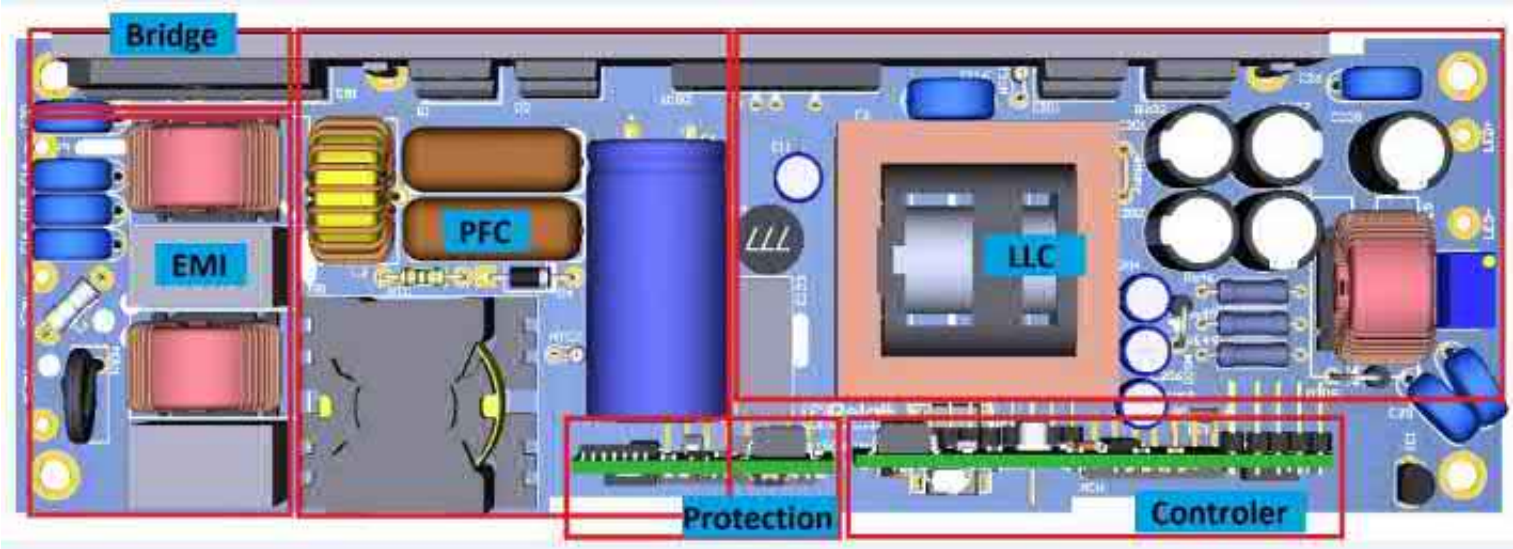
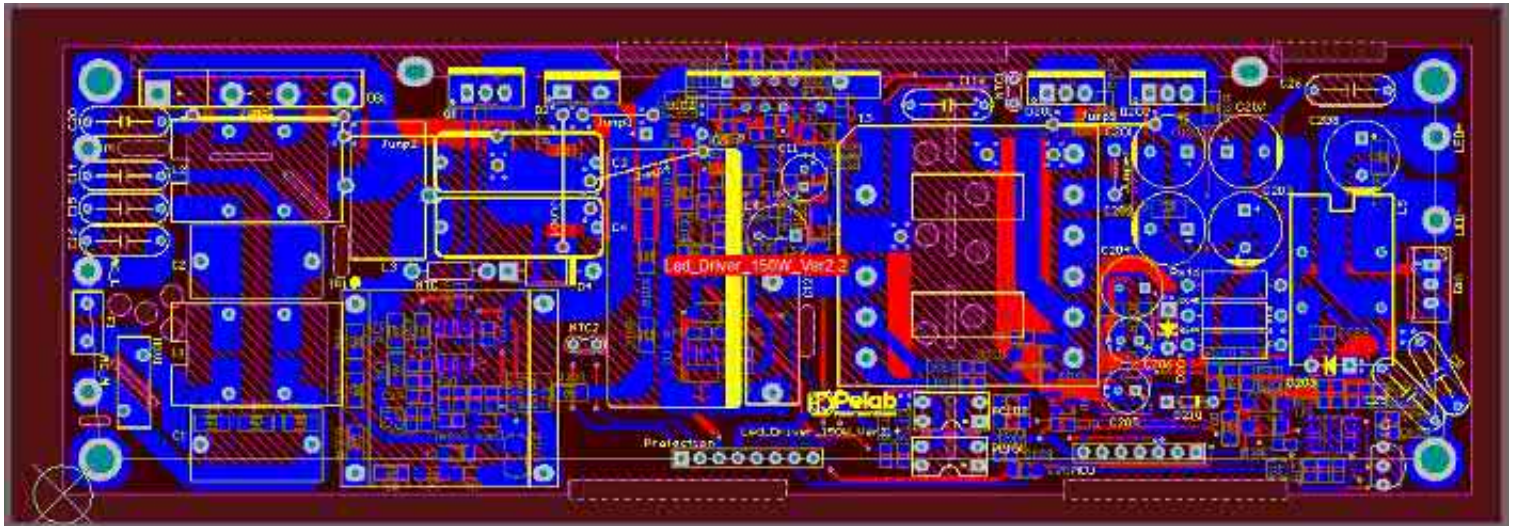
SMART STREET LIGHTING SYSTEM

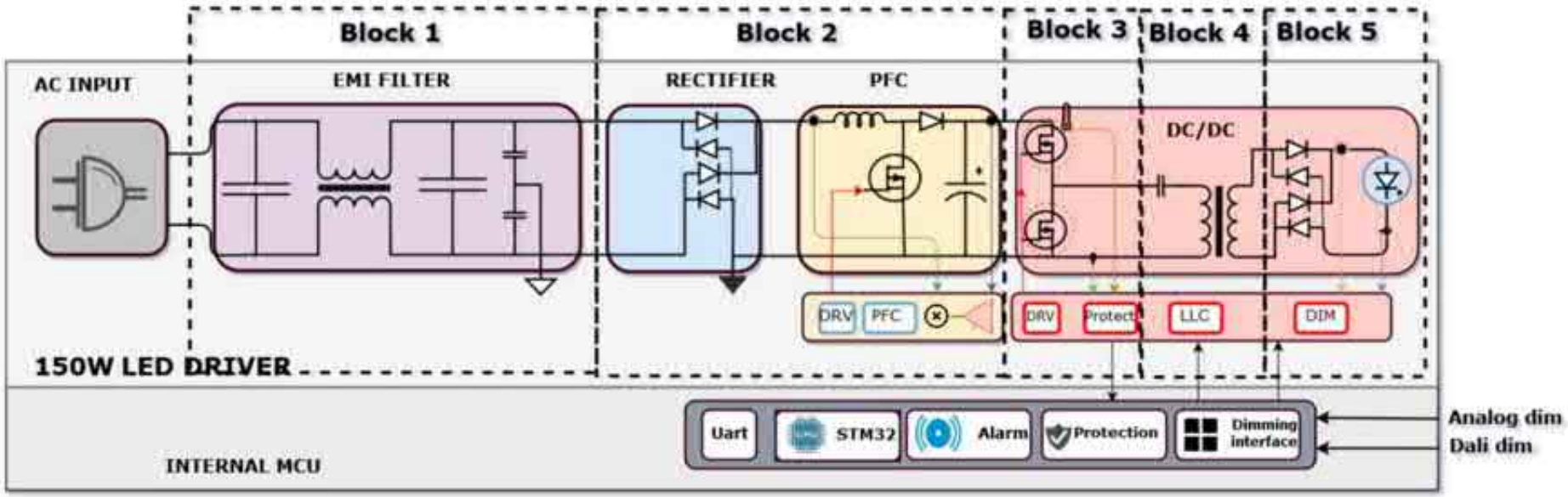
LED DRIVER 3D MODEL



LED DRIVER PCB LAYOUT



DIMMABLE LED CONTROLLER



INTERFACE PROTOCOL

- DALI
- PWM
- ANALOG
- RS485

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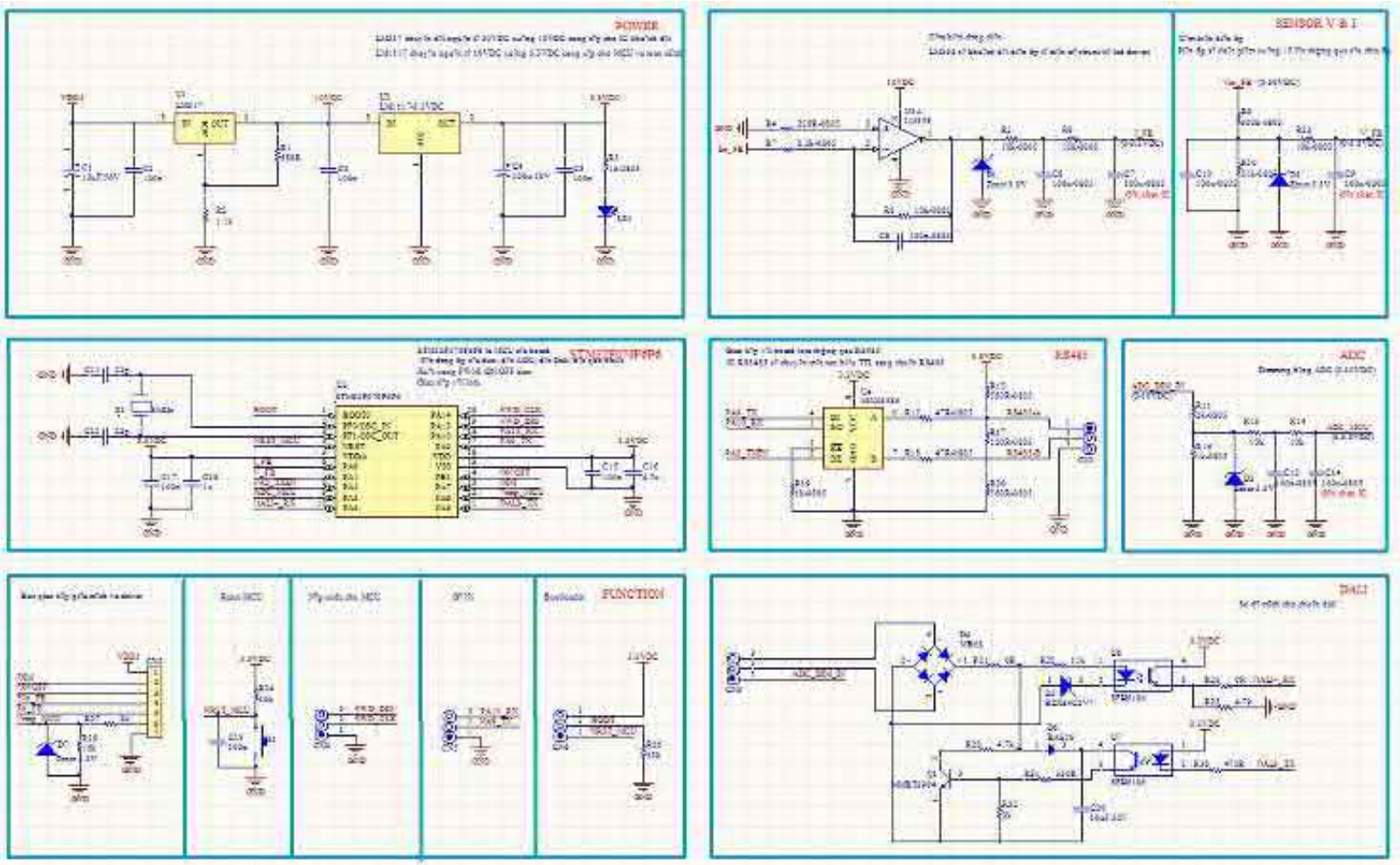
DIMMABLE LED CONTROLLER SCHEMATIC



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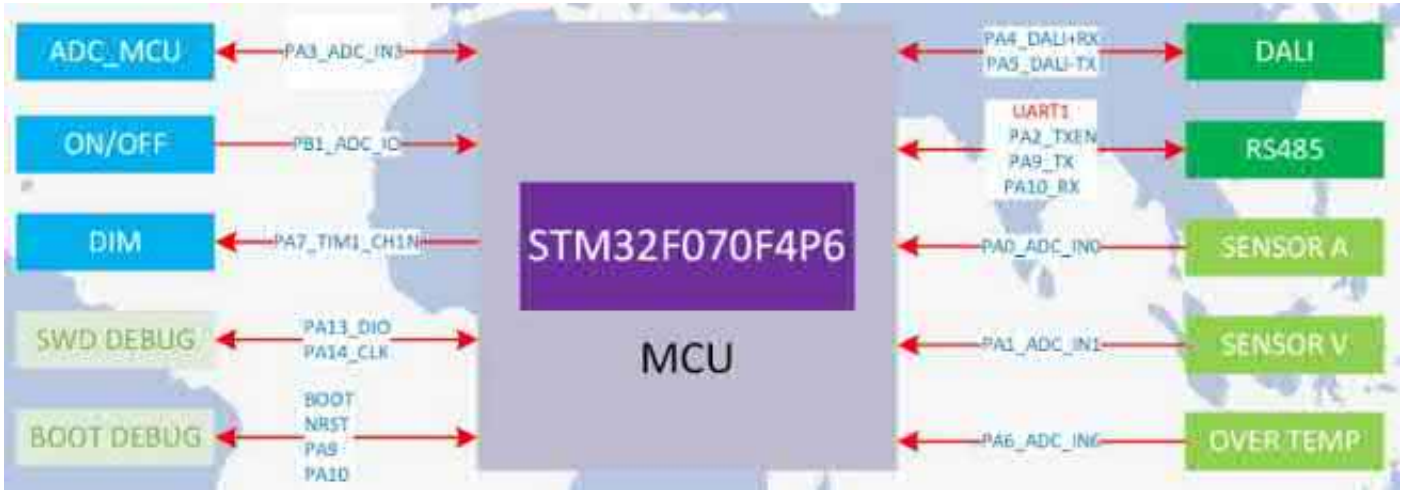
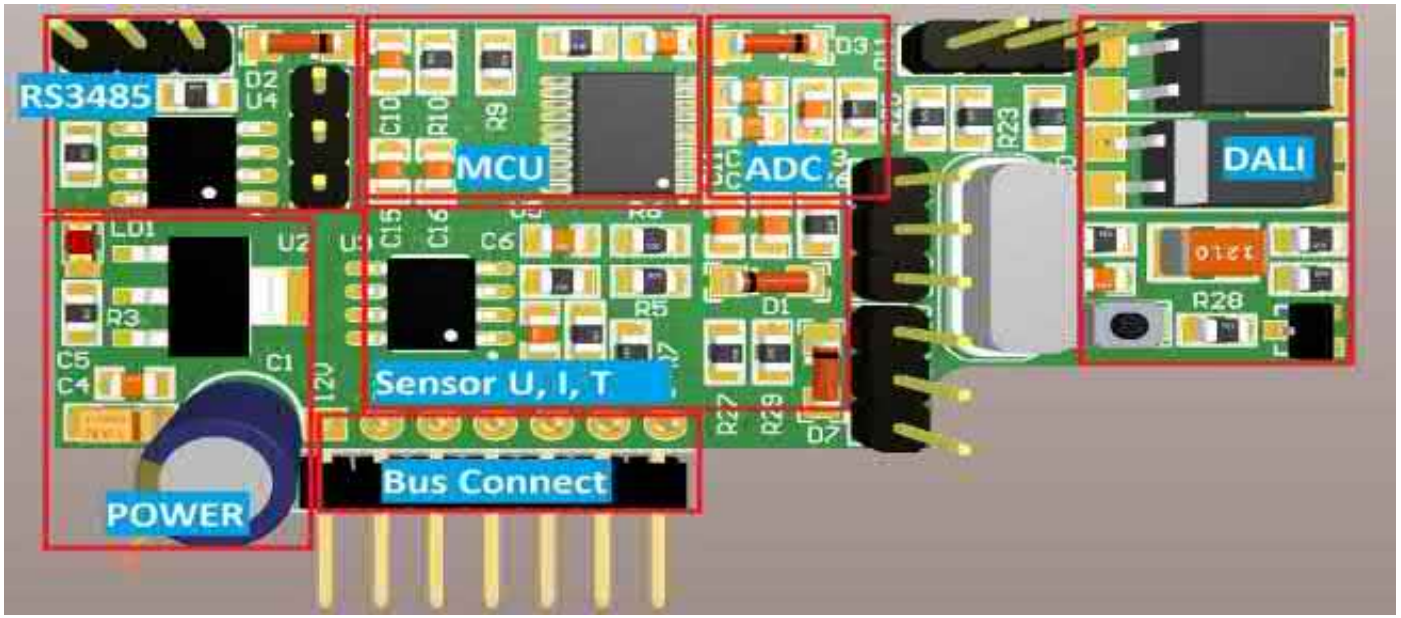
DIMMABLE LED CONTROLLER BASE ON MCU

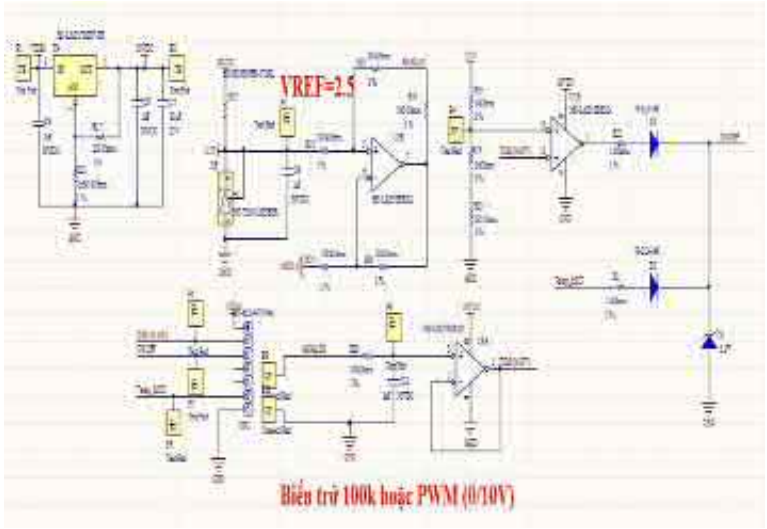


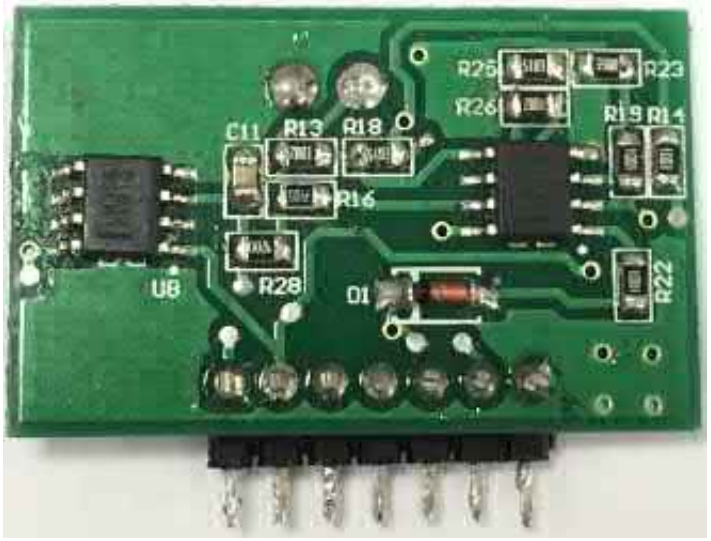
DIMMABLE LED CONTROLLER LAYOUT PCB



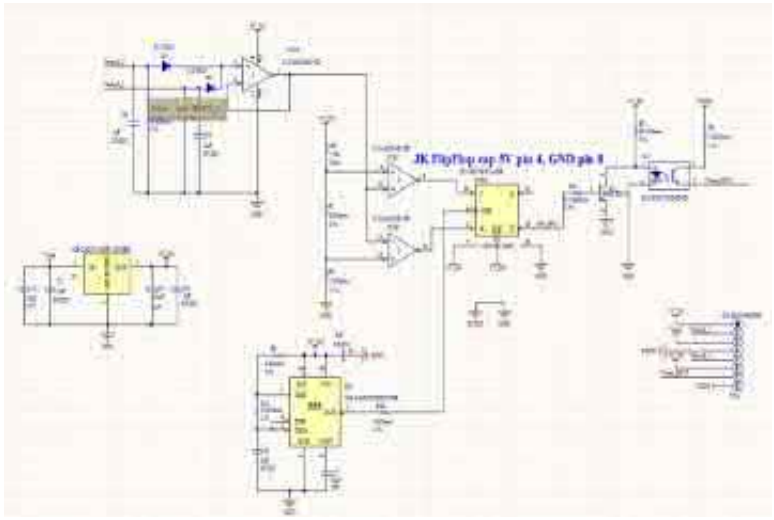
SMART STREET LIGHTING SYSTEM

ANALOG DIMMING MODULE





OVER TEMPERATURE PROTECTION MODULE



SMART STREET LIGHTING SYSTEM

REMOTE CONTROL STREETLIGHT MODULE

LORA NODE

- SX1278 Lora IC
- ATSAMD20E18

ELECTRICAL METROLOGY

- U/I/P/E/f…monitoring
- STPM33 IC

POWER SUPPLY

RELAY

SMART STREET LIGHTING SYSTEM

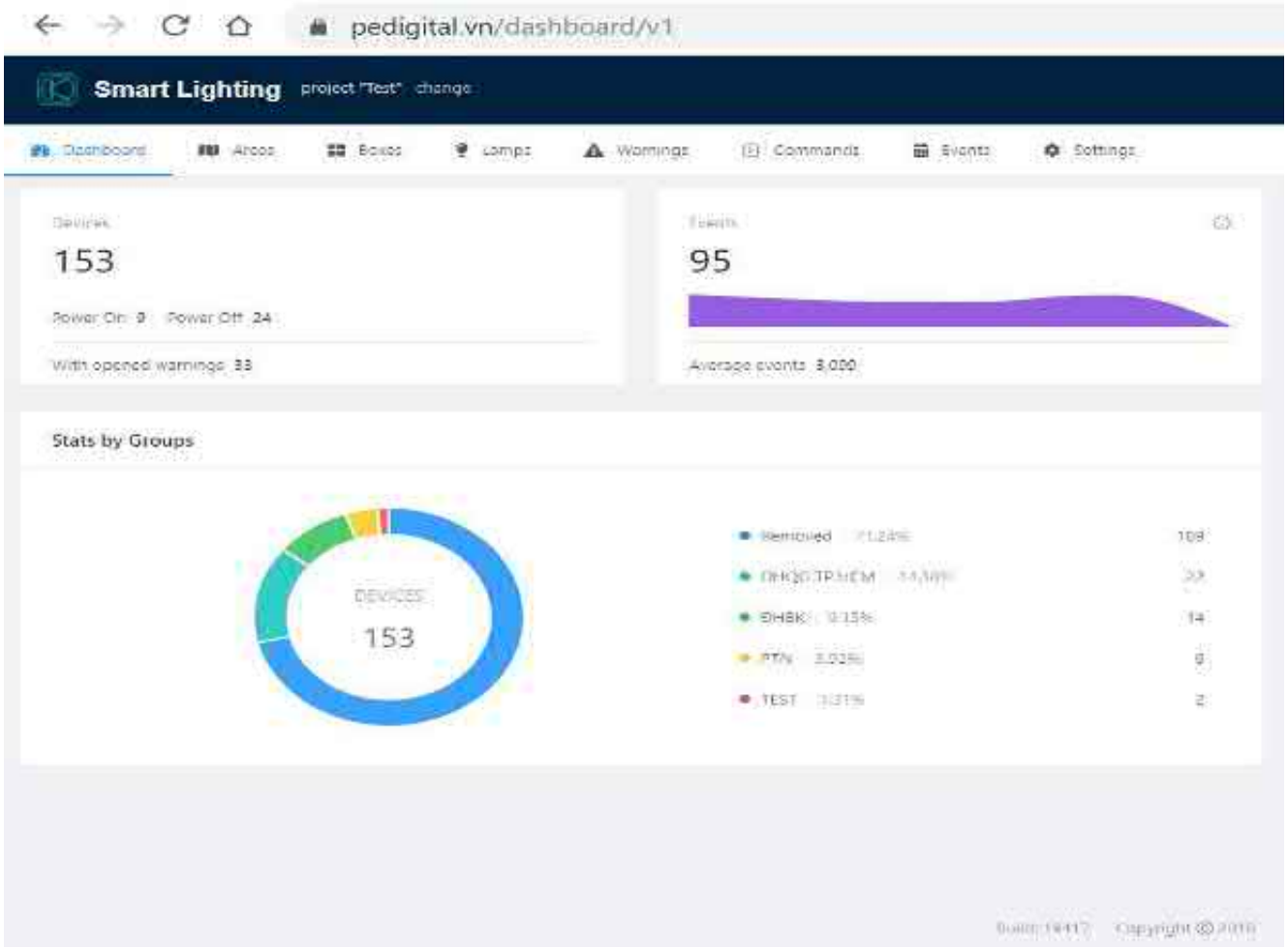
TESTING - OPTIMIZE DESIGN

SMART STREET LIGHTING SYSTEM

CENTRAL CONTROL AND DATA MANAGEMENT

FUNCTIONS

- ❑ Manage many streetlight projects
- ❑ User access control to manage street lights at District / Ward level.
- ❑ Group control (control cabinet) and individually controlled lamp
- ❑ Directly monitor faults for each lamp / cabinet in each area
- ❑ Create groups and projects.
- ❑ Parameter storage and data provisioning
- ❑ State control and lighting control system
- ❑ Scheduling dimming control from software
- ❑ Maintenance and alarm system status

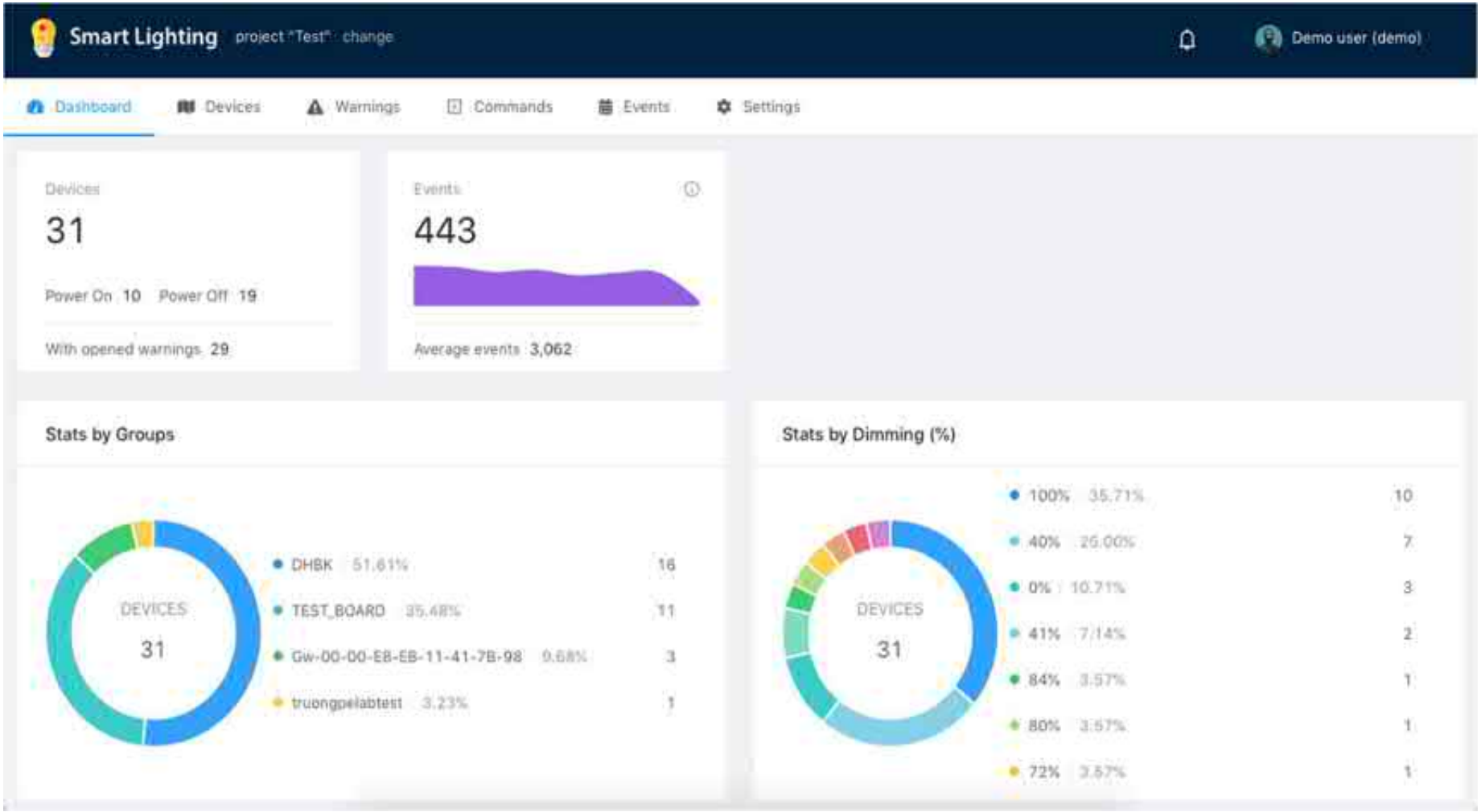


SMART STREET LIGHTING SYSTEM

LOGIN INTERFACE - MANAGEMENT AND CONTROL SYSTEM

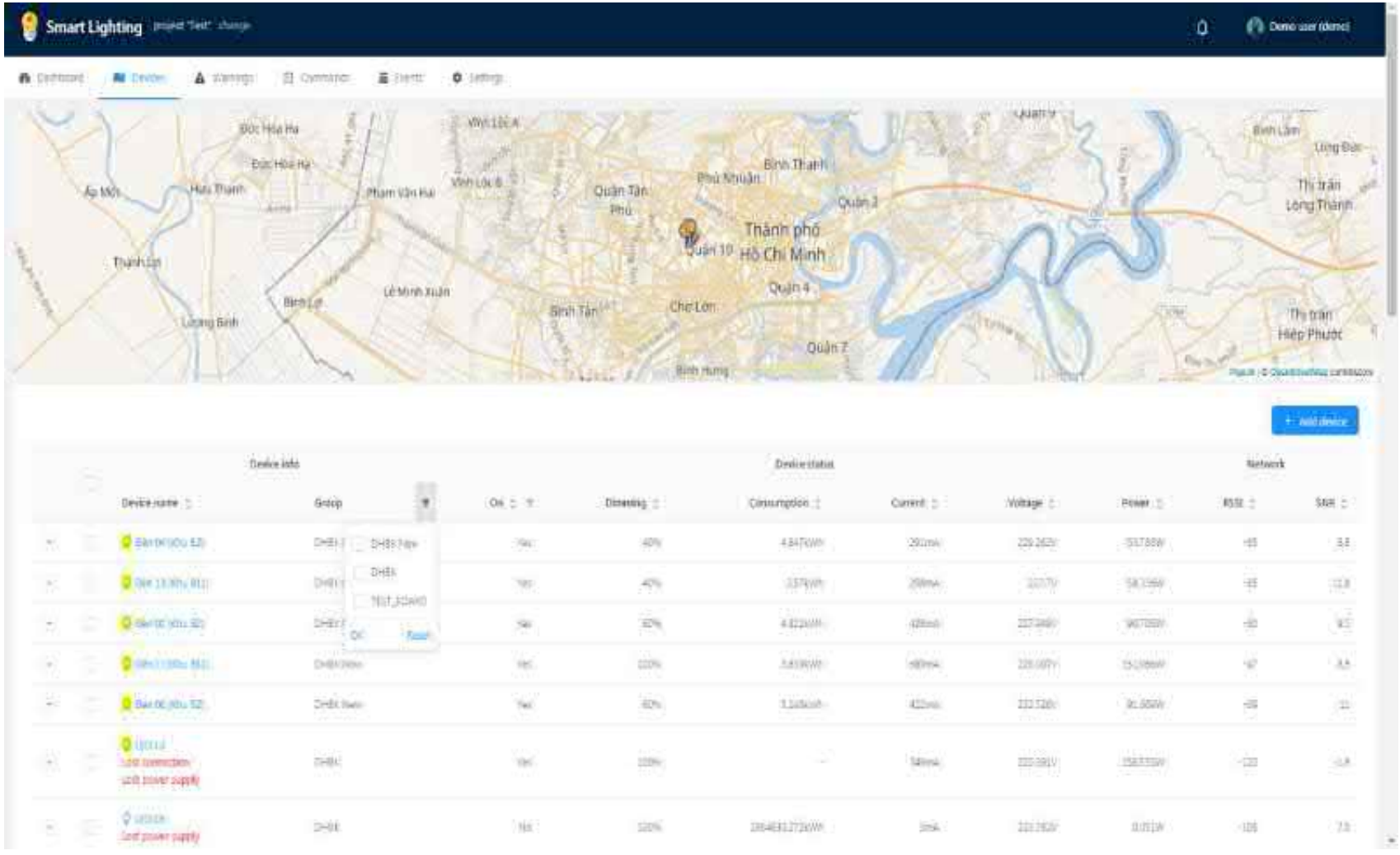
SMART STREET LIGHTING SYSTEM

FUNCTION MANAGEMENT FOR CABINET & LAMP



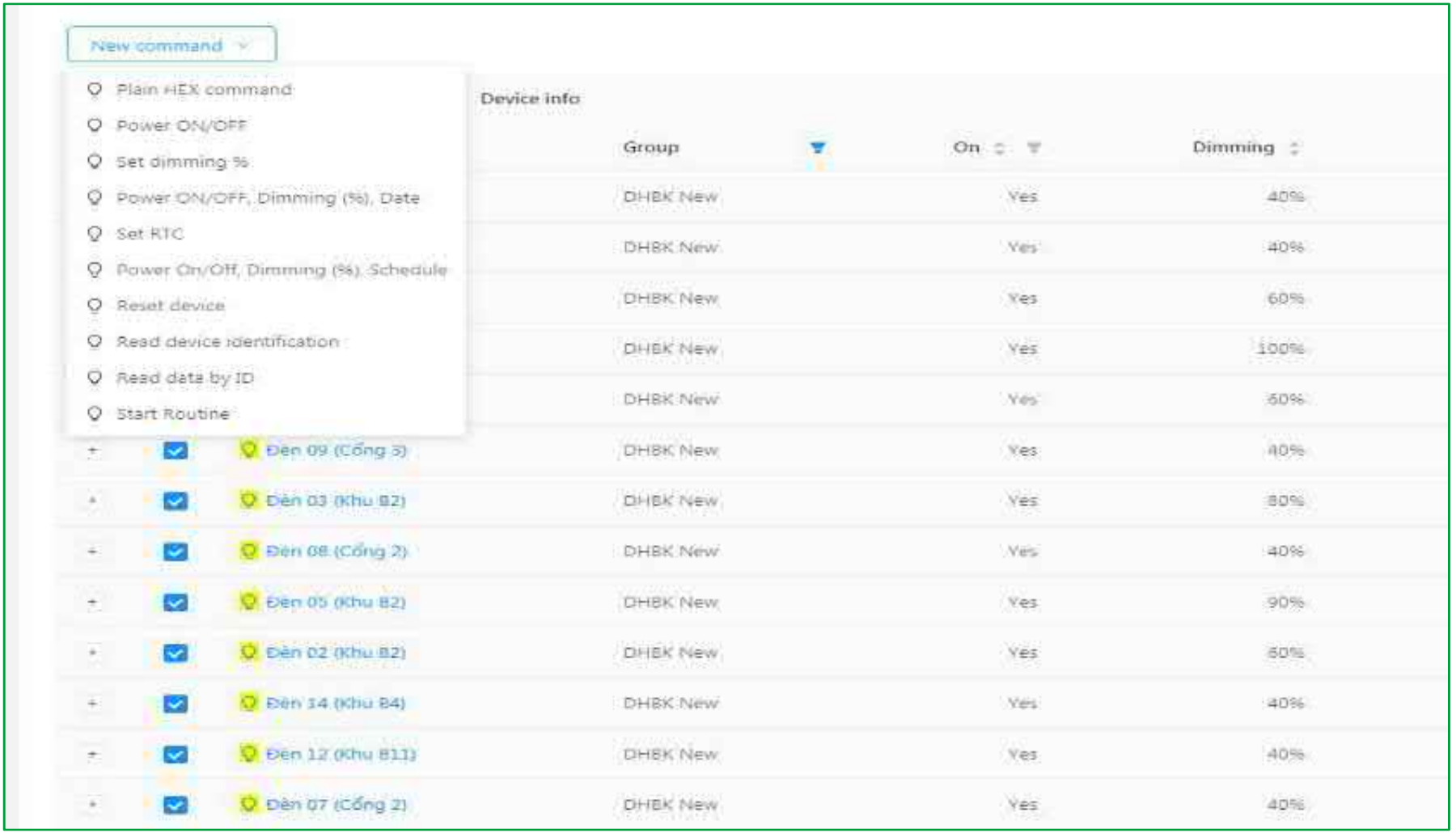
SMART STREET LIGHTING SYSTEM

DEVICE MANAGEMENT & NODE STATUS



SMART STREET LIGHTING SYSTEM

FUNCTIONAL SETTING FOR GROUP OF LAMPS OR EACH LAMP

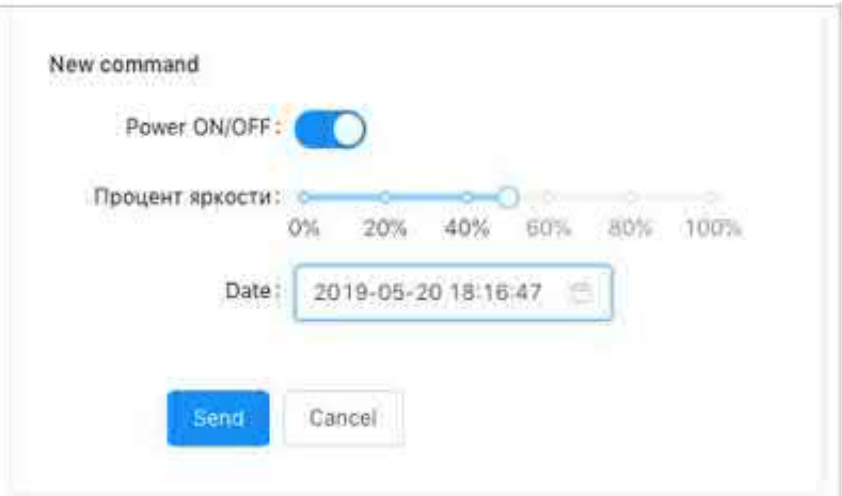


SMART STREET LIGHTING SYSTEM

ON/OFF/ DIMMING CONTROL

ON, OFF, DIM BY TIME

- Used to schedule ON / OFF / DIM lamp according to the scenario
- There are 24 installs in 1 day
- Do not save the script
- Select the time and press Send to send down the light

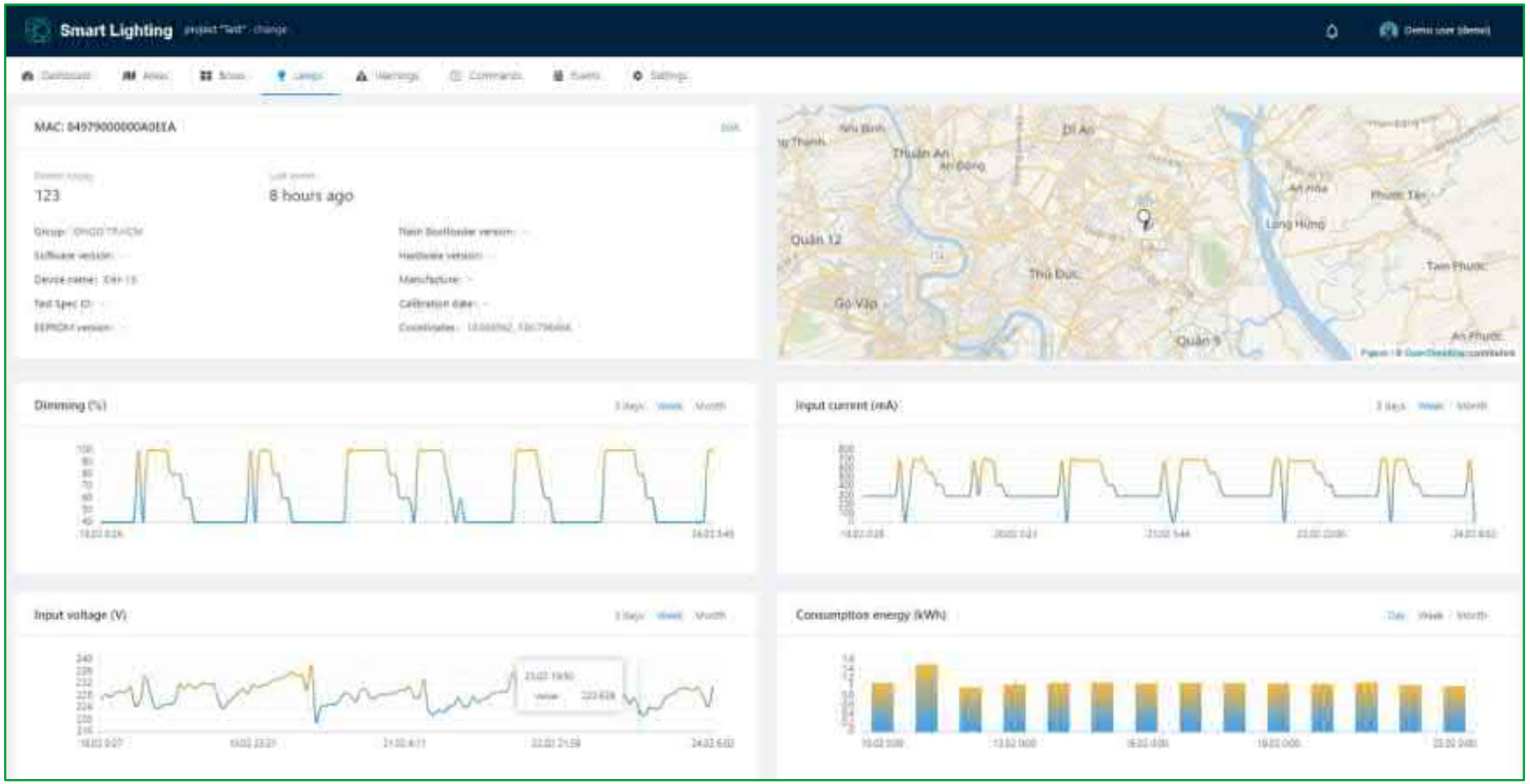


ON, OFF, DIM SCHEDULE

- Used to schedule ON / OFF / DIM lights according to the scenario
- There are 24 installs in 1 day
- Save the script
- Select the time and press Send to send down the light

SMART STREET LIGHTING SYSTEM

DATA MANAGEMENT



SMART STREET LIGHTING SYSTEM

THE SMART LIGHTING SYSTEM AT HCMUT

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Thanks for your attention !

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