Zhengzhou Hengling New Energy - Solution

Smart Park Solution

Zhengzhou Hengling New Energy Technology Co., Ltd.

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1. REQUIREMENT ANALYSIS & INVESTIGATION

1.1 Project Background

Public parks and recreational areas require intelligent lighting solutions that balance: - Visitor safety and security during evening hours - Energy efficiency and operational cost reduction - Aesthetic enhancement of landscape features - Environmental protection and wildlife consideration - Integration with smart city infrastructure

1.2 Client Requirements

- **Safety**: Uniform illumination for pathways, parking areas, activity zones
- **Energy**: 70%+ energy savings compared to conventional systems
- **Aesthetics**: Color temperature tuning for different zones and events
- **Smart Features**: Motion activation, scene presets, remote control
- **Durability**: Vandal-resistant, weatherproof design
- **Sustainability**: 100% solar-powered option available

1.3 Site Survey Parameters

- Park size classification: neighborhood (<5ha), community (5-20ha), regional (>20ha)
- Zone types: pathways, plazas, playgrounds, parking lots, landscape features
- Operating hours: dusk to dawn with variable dimming schedules
- Visitor patterns: peak hours (18:00-22:00), low activity (22:00-05:00)
- Environmental constraints: tree coverage, underground utilities, wildlife habitats

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2. SOLUTION DESIGN

2.1 System Architecture

Integrated Smart Park Ecosystem: - **Lighting Network**: Pathway lights, floodlights, accent lighting, bollards - **Sensor Network**: Motion, ambient light, air quality, noise monitoring - **Control Network**: Centralized CMS with zone-based control - **User Interface**: Mobile app for park managers, public information displays

2.2 Core Technologies

- **Adaptive Scene Control**: Predefined lighting scenes for different activities
- **Human Centric Lighting**: Circadian-friendly color temperature adjustment
- **Solar Energy Optimization**: AI-based charging and discharge algorithms
- **People Counting**: Visitor flow analytics for resource optimization
- **Emergency Response**: Integrated panic buttons and security camera triggers

2.3 Hardware Specifications

Zone Type	Fixture Type	Power Range	Height
Main Pathways	Solar LED Pathway Light	10W-30W	3m-4m
Plazas	High Mast Floodlight	100W-300W	8m-15m
Playgrounds	Sports Area Luminaire	50W-150W	6m-8m
Parking Lots	Area Lighting Pole	80W-200W	6m-10m
Landscape	Accent / Bollard Lights	5W-20W	0.5m-2m

2.4 Control System Features

- Zone-based independent control
- Astronomical clock scheduling
- Motion-activated brightening (10% → 100% on detection)
- Holiday and special event lighting presets
- Energy consumption dashboard and reporting
- Fault detection and automated maintenance alerts

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3. PRODUCT CUSTOMIZATION

3.1 Aesthetic Customization

- Pole design: modern, traditional, or nature-inspired styles
- Color finishes: matte black, silver, bronze, custom RAL colors
- Light distribution: asymmetric for pathways, symmetric for open areas
- Glare control: precision optics with UGR <19 for comfort
- Decorative elements: custom finials, banners, or branding options

3.2 Functional Customization

- Integrated WiFi hotspots for visitor connectivity
- USB charging ports on selected poles
- Public address system integration
- Environmental sensor packages (PM2.5, temperature, humidity)
- Emergency call buttons and blue light emergency stations

3.3 Energy Configuration

- 100% off-grid solar with 5-day autonomy
- Grid-tied with net metering capability
- Hybrid systems for critical areas
- Battery chemistry selection: LiFePO4 for long cycle life
- Solar panel efficiency: 23%+ monocrystalline

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4. PROJECT IMPLEMENTATION

4.1 Project Timeline

Phase	Duration	Key Activities
Site Assessment	1 week	Lighting simulation, shadow analysis, utility mapping
Design Approval	1 week	Photometric plans, material selection, cost finalization
Manufacturing	3-4 weeks	Custom production, QC testing, packaging
Installation	2-4 weeks	Foundation work, pole erection, cabling, networking
Commissioning	1 week	System calibration, scene programming, staff training
Total	8-11 weeks	Complete turnkey delivery

4.2 Installation Best Practices

- **Minimal Landscape Disruption**: Trenchless technology where possible
- **Tree Protection**: Root zone preservation, cable routing around mature trees
- **Wildlife Considerations**: Warm color temperatures (<3000K) to minimize disruption
- **Accessibility**: ADA-compliant pathway lighting levels
- **Safety**: Barriers and signage during installation

4.3 Quality Assurance

- IESNA RP-8-18 roadway lighting compliance
- IESNA RP-33-14 recreational area lighting
- Dark Sky Association compliant fixtures
- ASTM corrosion resistance testing
- Wind load certification for all pole structures

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5. SYSTEM COMMISSIONING & TESTING

5.1 Functional Verification

- Individual zone control and scene activation
- Motion sensor range and sensitivity calibration
- Solar charging efficiency verification
- Battery discharge and autonomy testing
- Communication reliability across entire park area

5.2 Photometric Testing

- Illuminance uniformity measurement (target: >0.4)
- Glare assessment and optimization
- Color rendering index verification (CRI >70)
- Light trespass measurement into adjacent properties
- Dark sky compliance verification

5.3 Performance Validation

- 7-day continuous operation test
- Energy consumption baseline establishment
- System response time verification
- Cybersecurity assessment
- User acceptance testing with park management

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6. PROJECT DELIVERY

6.1 Complete Deliverables

- All lighting fixtures and support structures
- Solar panels, batteries, and charge controllers
- Central management system with user licenses
- Mobile application for remote management
- Comprehensive documentation package

6.2 Documentation Package

- As-built drawings and CAD files
- Photometric analysis reports
- Operation and maintenance manuals
- Spare parts catalog with part numbers
- Training materials and video tutorials
- Warranty certificates and service agreements

6.3 Training Program

- **Administrator Training**: System configuration, user management, reporting
- **Operator Training**: Daily operation, scene changes, basic troubleshooting
- **Maintenance Training**: Component replacement, battery maintenance, winterization

- **Training Format**: On-site classroom + field demonstration
- **Follow-up**: 30-day post-installation support and refresher session

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7. OPERATION & MAINTENANCE

7.1 Maintenance Schedule

Frequency	Maintenance Activities
Weekly	System health check, alert review
Monthly	Visual inspection, cleaning solar panels
Quarterly	Battery health check, connection tightening
Semi-annually	Photometric verification, sensor calibration
Annually	Full system audit, firmware updates, corrosion inspection

7.2 Smart Maintenance Features

- Predictive failure alerts for batteries and LEDs
- Automated maintenance work order generation
- Spare parts inventory management
- Maintenance cost tracking and optimization
- Performance benchmarking across park network

7.3 Seasonal Adjustments

- **Summer**: Extended operating hours, increased solar charging
- **Winter**: Reduced solar gain compensation, battery insulation
- **Rainy Season**: Waterproofing verification, drainage check
- **Holiday Seasons**: Special lighting scene activation
- **Special Events**: Temporary lighting configuration support

7.4 Performance Metrics

- Energy cost per visitor (target: <$0.01)
- System uptime reliability (target: 99.8%+)
- Maintenance cost per fixture annually (target: <$3)
- Visitor satisfaction score (target: 4.5/5)
- Carbon emissions reduction tracking
