Professional competition projects list

A. Electrical & Power Systems (EEE Focus)

1. Smart LED Driver with PWM-Based Dimming and Surge Protection
2. Constant-Current Dimmable LED Driver (Triac & Phase-Cut Based)
3. DC Lighting Micro-Grid for Small Solar Homes (with MPPT Controller)
4. Solar + Grid Hybrid Controller for LED Streetlights
5. IoT-Based Energy Monitoring Dashboard for Streetlights
6. DMX Controller for RGB Lighting
7. Power-Factor-Correction Driver (>0.98 PF, CV & CC Compatible)
8. Automatic Lux-Based Dimming Controller for Street Lighting
9. Fault-Detection System in PCB Network (Powered/Non-Powered)
10. Automated LED Driver Test Bench

B. Electronics, Embedded & IoT (ECE / AI Focus)

1. LoRa/Zigbee wireless nodes for streetlight control
2. Simple AI-based fault prediction for lighting health
3. Centralized dashboard prototype for 100 smart lights
4. Sensor-integrated adaptive lighting (motion + ambient)
5. Smart lighting control system using Wi-Fi + mobile app (AP mode and cloud-based / voice-based offline task performer with SD card data activation)
6. MQTT/LoRa-based alert and status-reporting system for solar streetlights
7. Detect unknown persona via CC camera and send email alert with image attachment
8. Motion-detection camera module (Raspberry Pi) to monitor unusual activities around smart poles
9. RGB Pixel LED programming and customization with cloud support (for text and pattern display)
10. Barcode scanning and data tracking system linked to cloud platform

C. Computer Science / AI / Data Analytics

1. ML model to forecast lighting energy use by area
2. Simple computer-vision app for real-time lux estimation
3. ML-based predictive battery monitoring system
4. “GLOLED Cloud” – centralized data platform prototype
5. AR-based visualization (mobile app) for lighting design
6. Smart-city lighting energy-saving simulation tool
7. Platform recommending lighting products by space / lux
8. Auto-quotation generator from uploaded layout
9. Digital-twin simulator for factory / solar yard lighting
10. Lightweight cybersecurity module for IoT lighting data

D. Civil & Structural Engineering

1. Optimized pole foundation design (3 m – 12 m)
2. Wind-load and vibration analysis for lighting poles
3. Modular precast RCC base for solar streetlights

4. Lighting-uniformity and glare study for highways
5. Industrial lighting layout optimization tool
6. Anti-tilt and vibration-damping bracket design
7. Retrofitting technique for corroded poles
8. Portable collapsible pole system for rural solar setups
9. Anti-theft anchor-bolt and base-plate design & selection (based on pole size & shape)
10. Corrosion-resistance comparative study (GI vs MS vs Al) with selection guide and proof-of-concept

E. Mechanical / Thermal / Material Science

1. CFD-based thermal optimization of LED housings
2. Improved die-cast mold design for better heat dissipation
3. Modular cooling-fin system for high-power floodlights
4. Powder-coating vs anodizing durability comparison with proof of concept
5. Pole-vibration fatigue analysis under wind conditions
6. 3D-printed decorative-light housing prototype
7. Weather-proof gasket design for IP66/IP67 fixtures
8. Solar-panel automatic cleaning system
9. Semi-automatic cleaning arm for high-mast luminaires
10. Manual/auto seasonal solar-panel tilt-adjustment mechanism

F. Solar Energy & Storage Systems (Final – Practical & Innovative)

1. Self-aligning solar panels using gravity-based tilt mechanism (no motors)
2. AI-based shadow prediction and dynamic panel placement tool
3. Plug-in solar battery module with automatic cell balancing
4. Hybrid solar–kinetic charger for low-power lighting poles
5. Solar pole-to-pole wireless energy transfer prototype (LoRa-based energy sharing data)
6. Thermal-regulated battery casing for high-temperature regions
7. Smart charge controller with predictive load scheduling (AI + IoT)
8. Solar efficiency tracker with mobile dashboard (real-time comparison)
9. Self-cleaning solar panel using electrostatic dust repulsion
10. Smart solar pole with LED light, P3 display, charging point, and live weather info

G. Manufacturing, Quality & Process Automation

1. Inline LED-driver testing jig for quality control
2. Camera-based visual inspection system using OpenCV
3. Barcode/QR-based production traceability and data logging app
4. Mini environmental test chamber (heat + humidity) for stress testing
5. Vibration-resistant luminaire design for transport and industrial use
6. Automated photometry-measurement fixture for LED luminaires
7. ERP–IoT bridge prototype for live production monitoring
8. Low-cost LM-79-style photometric test bench for small manufacturers
9. Compact accelerated-aging tester for LED driver life-cycle analysis
10. Solder reflow profile efficiency study using embedded thermocouples

H. Smart City, Infrastructure & Automation

1. Modular smart pole integrating lighting + Wi-Fi / CCTV / environmental sensors
2. Centralized web dashboard for monitoring and control of city streetlights and CCTV cameras
3. Solar-powered smart bus-stop prototype with digital information display
4. Automated maintenance ticketing and alert system for lighting faults
5. Centralized CCTV monitoring and analytics system to detect unusual or stranger activity
6. Adaptive street-light control based on real-time traffic density and movement
7. Lighting-data heat-map visualization tool for urban safety and crime analysis
8. Modular decorative pole attachments with programmable RGB rings
9. Smart solar bench with USB & wireless charging and automatic lighting operation
10. Dynamic street-signage system powered entirely by solar energy

I. Sustainability & Environment

1. Recycling and recovery method for failed LED PCBs and components
2. Environmental impact assessment of discarded LED drivers and housings
3. Glass and reflector recycling process design for end-of-life luminaires
4. Life-Cycle Assessment (LCA) comparing solar and grid-based lighting systems
5. Development of biodegradable diffusers or eco-friendly luminaire housings
6. Take-back and refurbishment model for failed solar-light components
7. Smart dimming and scheduling strategy to minimize light pollution
8. Glare-free LED fixture design suitable for wildlife and eco-sensitive areas
9. Eco-friendly, recyclable packaging design for lighting exports
10. Carbon-credit calculation and offset model for large-scale LED retrofit projects

J. Business, Marketing & Management

1. **ROI calculator comparing LED vs traditional lighting solutions with real-time practical test reports**
2. Predictive demand-forecasting model for GLOLED retail outlets (AI/ML-based)
3. Online lighting configurator tool – choose lights by area, lux, and usage type
4. AI-driven CRM and warranty management dashboard for after-sales service
5. Study on consumer perception and brand awareness of “Made in India” lighting
6. Dealer-loyalty mobile app with performance analytics and reward system
7. Digital dashboard for tender tracking and project progress monitoring
8. Franchise performance analytics and benchmarking tool
9. Integrated finance management system for solar and LED projects (cost tracking, EMI, ROI, payback)
10. Consumer-behavior and trend analysis in smart-home lighting adoption