



SMART ACCESS CONTROL & ANTI VANDAL SOLUTIONS

Complete Infrastructure Protection

Comprehensive smart access control, real-time monitoring, vandal detection, and smart metering solutions. Proudly designed, developed and manufactured by an international team

 Smart Access Control

 Real-Time Alarms

 Remote Monitoring

 Mobile Management

 Vandal Detection

 Smart Metering

24/7

Remote
Monitoring

100%

Globally
Deployed

50+

Years Combined
Experience

1. SYSTEM OVERVIEW

Smart Access Control & Anti-Vandal Solutions

Introduction

The Smart Access Control solution is a keyless system that can be managed and monitored remotely through a centralized operations center. The software backend can be hosted either in the cloud or within the organization's own network.

This system leverages the latest network communication technologies and supports various locking methods. Additionally, it includes the capability to read different types of electricity meters, load credits, and manage tariffs effectively.

The Smart Access Control system enables organizations to manage and authorize access to protective structures (kiosk, mini sub-stations, sub-stations, pole mounts or streetlights) and resources. To mitigate risks, it regulates access by defining when, who, or what can view or use the resources, ensuring that appropriate access levels are assigned to users and maintaining robust security controls. Everything is logged with a timestamp, user and status.

The solution, with its secure, remotely operated electronic control and monitoring software, effectively addresses major challenges related to collecting all entitled revenue for services provided by electricity utilities or organizations.

Key Benefits

- ✓ Ensured continuous electrical supply to consumers
- ✓ Significant reduction in energy losses
- ✓ Decreased incidents of vandalism
- ✓ Minimization of illegal connections
- ✓ Enhanced revenue collection
- ✓ Improved access control management
- ✓ Fewer false standby callouts
- ✓ Standardized and consistent operations
- ✓ Streamlined asset auditing
- ✓ Complete audit trails with timestamps

Target Customers & Industries

Primary Target Markets:

Utilities & Municipalities:

- ✓ Municipal electrical infrastructure
- ✓ Street lighting networks
- ✓ Distribution substations
- ✓ Metering kiosks and pole boxes
- ✓ Public utility infrastructure

Power Generation & Distribution:

- ✓ Power stations and substations
- ✓ Transmission and distribution networks
- ✓ Transformer installations
- ✓ Switchgear facilities
- ✓ Grid infrastructure

2. PROTECTED EQUIPMENT & THE PROBLEM WE SOLVE

Real-World Challenges & Comprehensive Solutions

Infrastructure Vandalism Crisis

Organizations and utilities face a constant battle against infrastructure vandalism, theft, and unauthorized access. The traditional approach of welding kiosks shut has proven ineffective and costly.

Common Issues:

- ✓ **Forced Entry:** Vandals break through welded doors and locks
- ✓ **Cable Theft:** Valuable copper cables stolen from kiosks
- ✓ **Equipment Damage:** Deliberate destruction of critical infrastructure
- ✓ **Service Disruptions:** Power outages affecting entire neighborhoods
- ✓ **Emergency Access:** Municipalities must grind open their own welded kiosks
- ✓ **Revenue Loss:** Illegal connections and meter bypasses

Financial Impact:

- ✓ Repeated repair costs
- ✓ Emergency callout expenses
- ✓ Lost revenue from theft
- ✓ Increased insurance premiums
- ✓ Labor costs for constant monitoring
- ✓ Replacement equipment costs



Real Examples of Infrastructure Vandalism



Welded & Broken: Kiosk door welded shut by authorities, then broken open by vandals.



Multiple Entry Points: Vandals have compromised both doors despite welding.

💡 The Cycle of Vandalism:

1. Authorities weld kiosks closed to prevent theft
2. Vandals break through welding anyway
3. Emergency repairs require grinding open the welding
4. Kiosks are welded shut again
5. The costly cycle repeats indefinitely

Our smart access control solution breaks this cycle permanently.

Equipment Types We Protect



Various Kiosk Types: Our system works with both polyethylene and steel structures

Primary Applications:

- ✓ **Street Light Poles & Control Kiosks:**
Prevent theft and unauthorized access
- ✓ **Mini Substations:** Secure critical distribution points
- ✓ **Kiosks & Pole Boxes:** Protect metering and distribution equipment
- ✓ **LV Underground & Overhead Cables:**
Monitor and protect cable infrastructure
- ✓ **Ring Main Units:** Secure switching equipment
- ✓ **All Types of Transformers:** Ground and pole mounted protection

Additional Protection:

- ✓ **MV Substations:** Medium voltage switching stations
- ✓ **HV Substations:** High voltage installations
- ✓ **Pole Structures & Pylons:** Tower and pole infrastructure
- ✓ **High Masts:** Lighting tower protection
- ✓ **Switchgear Rooms:** Floor and wall mounted panels
- ✓ **Street Furniture:** Any valuable municipal assets

✔ **Smart Features for Every Asset:**

- ✔ **Real-time Monitoring:** 24/7 surveillance of all protected structures
- ✔ **Instant Alerts:** Immediate notification of any unauthorized access attempts
- ✔ **Keyless Entry:** Secure access for authorized personnel only
- ✔ **Anti-Climbing Detection:** Alerts when someone attempts to climb poles
- ✔ **Angle Grinder Detection:** Sensors detect cutting attempts
- ✔ **Tamper Alerts:** Vibration sensors detect any physical tampering

3. SYSTEM FEATURES & SPECIFICATIONS

Technical Capabilities

System Features

The Smart Access Control system provides comprehensive monitoring and control capabilities:

- ✓ Keyless entry system with multiple authentication methods
- ✓ Remote monitoring and management through centralized operations center
- ✓ Real-time alarm notifications (SMS, email, push notifications)
- ✓ Complete audit trail with timestamp logging
- ✓ Integration with smart metering systems
- ✓ Geographic asset mapping and tracking
- ✓ User and access level management
- ✓ Customizable alarm escalation procedures
- ✓ Offline operation capability with data synchronization
- ✓ Weather-resistant hardware design
- ✓ Battery backup for continuous operation
- ✓ Encrypted communication protocols



Access Control Operations

Access Control Methods:

The system supports multiple methods for accessing protected infrastructure:

Access Method	Description	Best Use Case
Mobile App	Smartphone-based access via secure app	Authorized personnel with registered devices
RFID Cards	Contactless card-based entry	Standard access for regular technicians
PIN Codes	Numeric code entry on keypad	Temporary or emergency access
Remote Unlock	Backend operator grants access remotely	Emergency situations or supervisor override
Time-Based	Automatic access during defined periods	Scheduled maintenance windows

User Access Levels:

- ✓ **Administrator:** Full system access, user management, configuration
- ✓ **Supervisor:** Regional access, approve requests, view reports
- ✓ **Technician:** Field access, assigned areas only, basic functions
- ✓ **Emergency:** Limited access, all actions logged and audited



Alarms & Events Being Monitored

The system continuously monitors and logs the following events:

Access Events:

- ✓ Door open/close with timestamp tracking
- ✓ Unauthorized entry attempts
- ✓ Failed authentication attempts
- ✓ Extended access duration warnings
- ✓ Remote unlock events

Security Events:

- ✓ Vandalism detection (angle grinder, cutting)
- ✓ Physical tampering attempts
- ✓ Anti-pole climbing sensor alarms
- ✓ Forced entry detection
- ✓ Panel removal attempts

System Events:

- ✓ Power loss and restoration
- ✓ Battery status and low battery warnings
- ✓ Communication and network failures
- ✓ Controller malfunction alerts
- ✓ Sensor failure notifications

Metering Events:

- ✓ Meter tampering detection
- ✓ Unusual consumption patterns
- ✓ Load shedding events
- ✓ Billing cycle notifications

Environmental Events:

- ✓ Temperature extremes
- ✓ Humidity levels
- ✓ Water ingress detection

4. ACCESS LEVELS & TECHNICAL SPECIFICATIONS

System Configuration Details



Different Levels/Methods of Accessing the Protective Structure

The system provides multiple access levels to accommodate different operational requirements:

1. **Administrator Level:** Full access to all system functions including user management, configuration changes, report generation, and system administration
2. **Supervisor Level:** Regional or departmental access with ability to approve access requests, generate reports, and monitor assigned areas
3. **Technician Level:** Field-level access limited to assigned equipment and areas with basic operational functions
4. **Temporary Access:** Time-limited access for contractors or temporary staff with automatic expiration
5. **Emergency Access:** Override access for emergency situations with enhanced logging and notification

Security Features:

- ✓ Encrypted communication between all system components
- ✓ Complete audit trail with timestamps for all access events
- ✓ Automatic lockout after multiple failed authentication attempts
- ✓ Real-time access notifications to supervisors and administrators
- ✓ Geo-fencing capabilities to restrict access based on location
- ✓ Biometric integration capability (fingerprint, facial recognition)
- ✓ Two-factor authentication support

Power Supply

The system is designed with robust power management to ensure continuous operation:

Primary Power Sources:

AC Mains Power:

- ✓ Input voltage: 220V/230V AC
- ✓ Wide input voltage range tolerance
- ✓ Power failure detection and notification
- ✓ Automatic switch to battery backup
- ✓ Surge protection and lightning arrestor

Solar Power Integration:

- ✓ Optional solar panel connectivity
- ✓ MPPT charge controller included
- ✓ Ideal for remote locations
- ✓ Reduces operating costs
- ✓ Environmentally friendly

Battery Backup System:

- ✓ **Battery Type:** Rechargeable lithium-ion or sealed lead-acid batteries
- ✓ **Backup Duration:** 7-30 days depending on configuration and usage
- ✓ **Intelligent Charging:** Microprocessor-controlled charging management
- ✓ **Low Battery Warning:** Multiple-stage warnings before critical battery level
- ✓ **Battery Health Monitoring:** Real-time battery status reporting
- ✓ **Temperature Compensation:** Charging adjusted based on ambient temperature
- ✓ **Overcharge Protection:** Prevents battery damage from overcharging

Power Consumption:

The system is designed for energy efficiency:

- ✓ Low standby power consumption (< 5W typical)
- ✓ Sleep mode during inactive periods
- ✓ Optimized for solar/battery operation
- ✓ Power consumption monitoring and reporting

5. NETWORK AND COMMUNICATIONS

Connectivity Solutions

Communication Technologies

The system supports multiple communication technologies to ensure reliable connectivity in various environments:

Wireless Communication Options:

Technology	Description	Best Application
LTE / 5G	Primary cellular connectivity for wide area coverage	Urban and suburban deployments
LoRa / LoRaWAN	Long-range, low-power communication up to 15km	Distributed assets, rural areas
Sigfox	Ultra-low power, narrow-band communication	Basic monitoring, battery-powered devices
Wi-Fi	Local area network connectivity 2.4GHz/5GHz	Sites with existing Wi-Fi infrastructure
Bluetooth Low Energy (BLE)	Short-range device pairing and configuration	Mobile app connectivity, local access
433MHz RF	Short-range wireless for sensors	Sensor networks, alarm systems

Wired Communication Options:

- ✓ **Ethernet:** High-speed, reliable TCP/IP connectivity (10/100 Mbps)
- ✓ **RS-485:** Industrial serial communication, multi-drop networks
- ✓ **RS-232:** Point-to-point serial communication

Communication Protocols:

- ✓ **TCP/IP:** Standard internet protocol suite
- ✓ **MQTT:** Lightweight IoT messaging protocol for publish/subscribe
- ✓ **HTTP/HTTPS:** Web-based communication, RESTful APIs
- ✓ **X25:** Packet-switched network protocol

Network Architecture Options

Cloud Hosting:

- ✓ Scalable infrastructure
- ✓ South African data hosting available
- ✓ Automatic backups and redundancy
- ✓ Accessible from anywhere with internet
- ✓ Lower upfront costs
- ✓ Automatic updates and maintenance
- ✓ 99.9% uptime SLA

On-Premise Hosting:

- ✓ Full data control and security
- ✓ Integration with existing networks
- ✓ No internet dependency for local operations
- ✓ Customizable infrastructure
- ✓ Compliance with data sovereignty requirements
- ✓ Dedicated resources
- ✓ Direct database access

Hybrid Deployment:

Combine cloud and on-premise solutions for optimal flexibility:

- ✓ Local control with cloud backup
- ✓ Disaster recovery capabilities
- ✓ Load balancing between environments
- ✓ Best of both worlds approach



Dealing with Long Cable Runs

For installations requiring extended cable runs beyond standard distance limits, the system can be equipped with specialized networking equipment:

Solutions for Extended Distances:

- ✓ **Ethernet Extenders:** Extend Ethernet connectivity up to 3km over existing copper infrastructure
- ✓ **Fiber Optic Conversion:** Convert to fiber optics for distances up to 100km with immunity to electromagnetic interference
- ✓ **Industrial I/O Modules:** Remote I/O expansion with long-distance communication capabilities
- ✓ **Wireless Bridge Solutions:** Point-to-point wireless links for distances up to 20km
- ✓ **PoE Extenders:** Power over Ethernet extension while maintaining data connectivity
- ✓ **Repeaters and Boosters:** Signal amplification for RS-485 and other serial protocols

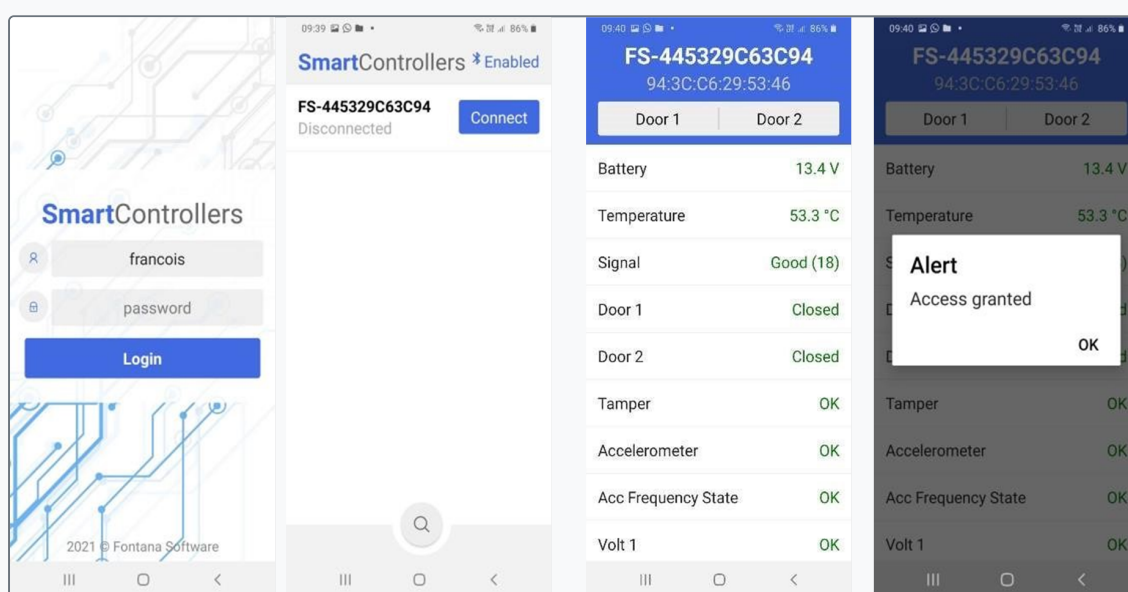
Harsh Environment Design: All long-distance equipment is specifically designed for harsh industrial environments with protection against dust, moisture, temperature extremes, and electromagnetic interference.

NETWORK ARCHITECTURE

Communication & Infrastructure

System Communication Architecture

The Smart Access Control system uses a flexible, scalable network architecture that supports multiple communication protocols and can be integrated into existing municipal infrastructure.



Complete System Architecture: Showing communication paths between field devices, servers, and users

Network Components:

Communication Methods:

- ✓ **Primary: LTE (GSM/Sigfox):** 4G/LTE with 2G/3G fallback
- ✓ **Local: Bluetooth:** Direct mobile app connection
- ✓ **Optional: LoRa:** Long-range mesh networking
- ✓ **Optional: Wi-Fi:** Local area network integration
- ✓ **Optional: Ethernet/Fiber:** Hardwired connections
- ✓ **Serial: RS-485/RS-232:** Meter reading & Modbus

Infrastructure Components:

- ✓ **Field Devices:** Smart controllers in kiosks and poles
- ✓ **Application Servers:** Hosted locally or in cloud
- ✓ **Database Servers:** Secure data storage
- ✓ **Operations Center:** Centralized monitoring dashboard
- ✓ **Mobile Devices:** Field staff smartphones/tablets
- ✓ **Internet Gateway:** Secure connection to APN

Hosting & Data Management

Hosting Options:

- ✓ **Local Hosting:** On-premises servers for data sovereignty
- ✓ **Cloud Hosting:** Scalable cloud infrastructure
- ✓ **Hybrid Approach:** Combination of local and cloud
- ✓ **Redundant Servers:** Failover for high availability

Data Security:

- ✓ **South African Data:** Can remain in SA for sovereignty
- ✓ **Encrypted Storage:** All data encrypted at rest
- ✓ **Secure Transmission:** TLS/SSL encrypted communications
- ✓ **Access Controls:** Role-based permissions

Scalability:

- ✓ **Unlimited Devices:** Add controllers without limits
- ✓ **Multiple Sites:** Manage citywide deployments
- ✓ **Load Balancing:** Distribute traffic efficiently
- ✓ **Automatic Scaling:** Grow with your needs

Integration Capabilities:

- ✓ **1000+ APIs:** Connect to existing systems
- ✓ **SCADA Integration:** Link to utility infrastructure
- ✓ **Smart Meters:** Read and control metering systems
- ✓ **Vehicle Tracking:** Coordinate with fleet management

6. SMART METERING INTEGRATION

Revenue Protection & Management

Smart Metering Capabilities

The system includes comprehensive capabilities to read different types of electricity meters, load credits, and manage tariffs effectively, providing complete revenue protection and management solutions.

Supported Meter Types:

- ✓ **Prepaid Electricity Meters:** STS compliant prepaid meters with token vending integration
- ✓ **Smart Meters (AMI/AMR):** Automatic Meter Reading and Advanced Metering Infrastructure support
- ✓ **Traditional Mechanical Meters:** Integration with existing electromechanical meters
- ✓ **Split-Prepaid Systems:** Combination of prepaid and postpaid metering
- ✓ **Multi-Tariff Meters:** Time-of-use and seasonal tariff support
- ✓ **Three-Phase Meters:** Industrial and commercial meter integration

Meter Reading Features:

- | | |
|--|--|
| ✓ Automatic scheduled meter readings | ✓ Voltage and current monitoring |
| ✓ Real-time consumption monitoring | ✓ Power factor measurement |
| ✓ Historical data logging and analysis | ✓ Harmonic analysis |
| ✓ Load profile recording | ✓ Event logging (power failures, etc.) |
| ✓ Demand monitoring and peak detection | ✓ Meter health diagnostics |
| ✓ Power quality measurements | ✓ Battery status for prepaid meters |

Revenue Protection Features

Ensured Revenue Collection:

- ✓ **Tamper Detection:** Immediate alerts for meter tampering, bypass attempts, or unauthorized modifications
- ✓ **Consumption Analysis:** Advanced algorithms identify unusual consumption patterns indicating theft
- ✓ **Physical Security:** Secure access to metering kiosks prevents meter bypass
- ✓ **Audit Trails:** Complete history of all meter-related activities and access events
- ✓ **Real-Time Monitoring:** Continuous surveillance of metering infrastructure
- ✓ **Automated Reporting:** Regular revenue and loss reports for management

Load Credit Management:

- ✓ Real-time credit balance monitoring
- ✓ Low credit warnings and notifications
- ✓ Remote credit loading capability
- ✓ Credit transfer between meters (where applicable)
- ✓ Emergency credit allocation
- ✓ Credit usage history and reporting

Tariff Management:

- ✓ Flexible tariff configuration and updates
- ✓ Time-of-use (TOU) tariff support
- ✓ Seasonal tariff adjustments
- ✓ Block tariff structures
- ✓ Demand-based tariffs
- ✓ Remote tariff updates without site visits
- ✓ Historical tariff tracking



Billing Integration

The smart metering system can integrate with existing billing systems:

- ✓ Automatic data export to billing systems
- ✓ Standard data formats (CSV, XML, JSON, API)
- ✓ Scheduled or on-demand billing cycle data
- ✓ Consumer portal integration
- ✓ Payment notification integration
- ✓ Disconnection/reconnection management
- ✓ Debt management integration

7. SOFTWARE PLATFORM

Comprehensive Management & Monitoring

Smart Access Control Dashboards

The web-based dashboard provides comprehensive monitoring and management capabilities accessible from any modern web browser:

Real-Time Monitoring Features:

- ✓ Live asset status and location mapping
- ✓ Active alarm management console
- ✓ Equipment health monitoring
- ✓ Multi-site overview dashboard
- ✓ Custom widget configuration
- ✓ Real-time event stream
- ✓ Geographic information system (GIS) integration
- ✓ Asset hierarchy visualization
- ✓ Performance metrics and KPIs
- ✓ Trend analysis and forecasting
- ✓ Customizable alerts and thresholds
- ✓ Dashboard customization per user role

User Management:

- ✓ **Role-Based Access Control (RBAC):** Define custom roles with specific permissions
- ✓ **User and Group Management:** Organize users into departments, regions, or teams
- ✓ **Permission Assignment:** Granular control over feature and data access
- ✓ **Activity Logging:** Complete audit trail of all user actions
- ✓ **Multi-Tenant Support:** Separate multiple organizations on single platform
- ✓ **Single Sign-On (SSO):** Integration with Active Directory, LDAP, or OAuth
- ✓ **Session Management:** Automatic timeout and concurrent session control

Asset Management:

- ✓ Complete asset inventory and tracking
- ✓ Asset hierarchy and relationships
- ✓ Location and GPS coordinates
- ✓ Custom asset attributes and metadata
- ✓ Maintenance history and schedules
- ✓ Asset lifecycle management
- ✓ Document attachments (manuals, certificates)

Reports

Comprehensive reporting capabilities provide insights into system performance and operations:

Standard Reports:

- ✓ Access logs and audit trails
- ✓ Alarm and event history
- ✓ User activity reports
- ✓ Asset utilization reports
- ✓ Maintenance history
- ✓ System uptime and availability
- ✓ Vandalism incident reports
- ✓ Energy consumption reports
- ✓ Revenue collection reports
- ✓ Trend analysis and forecasting
- ✓ Performance metrics and KPIs
- ✓ Compliance and regulatory reports

Report Features:

- ✓ **Customizable Templates:** Create custom reports with drag-and-drop interface
- ✓ **Scheduled Reports:** Automatic generation and email delivery
- ✓ **Export Formats:** PDF, Excel, CSV, JSON
- ✓ **Interactive Dashboards:** Drill-down capabilities for detailed analysis
- ✓ **Report Sharing:** Share reports with stakeholders via secure links
- ✓ **Data Filtering:** Filter by date range, location, asset type, etc.
- ✓ **Visualization:** Charts, graphs, and heat maps

Mobile Application

Native mobile applications for iOS and Android provide field access and management:

Field Operations Features:

- ✓ One-touch access control from smartphone
- ✓ Real-time alarm push notifications
- ✓ GPS-based asset location and navigation
- ✓ Work order management
- ✓ Offline mode with data synchronization
- ✓ Photo capture and annotation
- ✓ Voice notes and comments
- ✓ Digital signatures
- ✓ Asset scanning (QR code, NFC)
- ✓ Emergency alarm triggering

Platform Features:

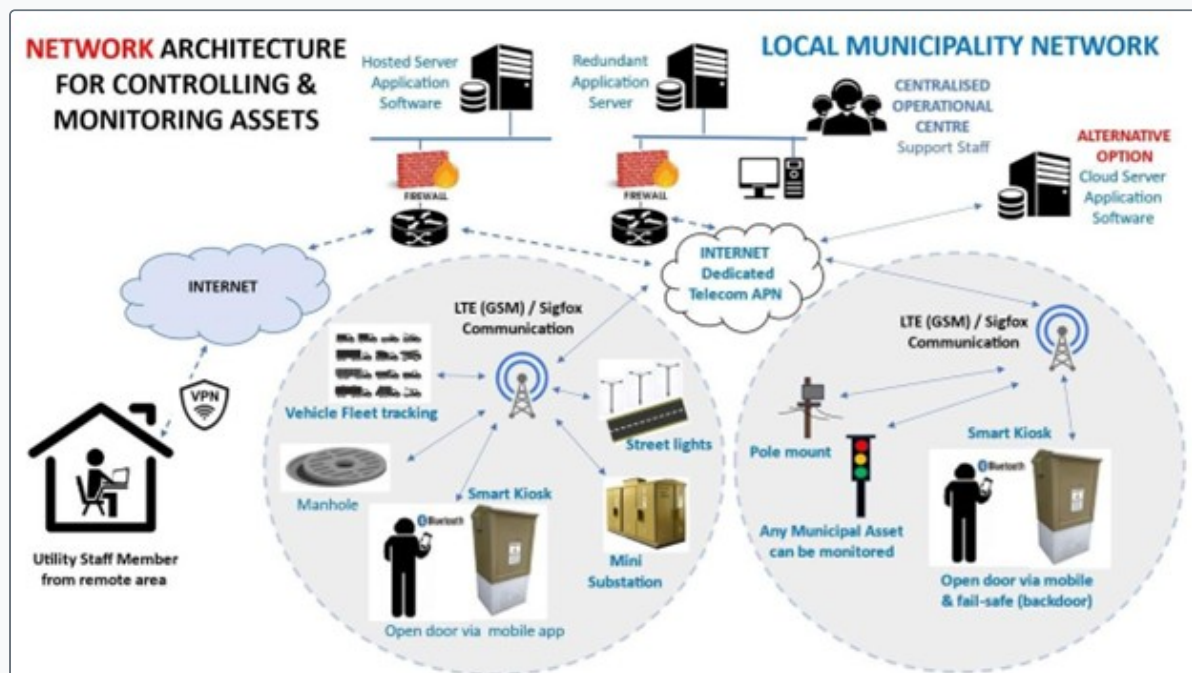
- ✓ **Cross-Platform:** Available for iOS (iPhone, iPad) and Android devices
- ✓ **Secure Authentication:** Biometric login (fingerprint, face recognition)
- ✓ **Encrypted Communications:** AES-256 encryption for all data transmission
- ✓ **Battery Efficient:** Optimized for extended field use
- ✓ **Offline Capability:** Continue working without network connectivity
- ✓ **Automatic Sync:** Data synchronization when connection restored
- ✓ **Push Notifications:** Instant alerts for critical events
- ✓ **Multi-Language:** Support for multiple languages

SMART MONITORING DASHBOARD

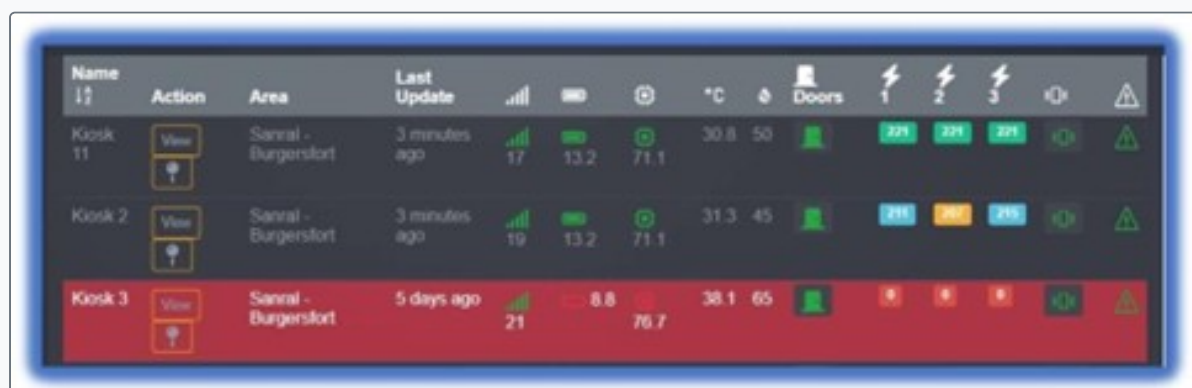
Real-Time Control & Visualization

Centralized Operations Center Dashboard

The Smart Access Control Dashboard provides comprehensive real-time monitoring and control of all your protected infrastructure from a single, intuitive interface.



Main Dashboard View: Real-time status of all kiosks showing area, last update, signal strength, temperature, and door status



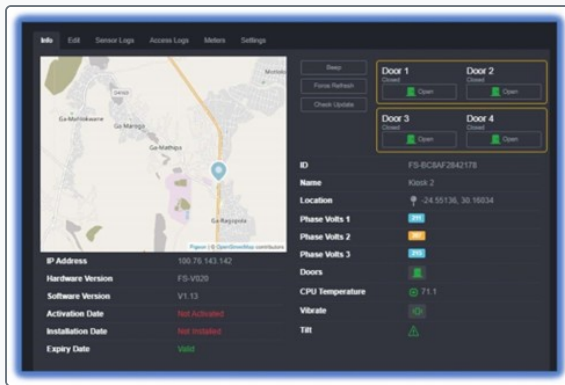
Geographic Visualization: Interactive map showing controller locations with detailed status panels for quick assessment

Dashboard Capabilities:

- ✓ **Real-Time Monitoring:** Live status updates every 1-2 minutes
- ✓ **Color-Coded Alerts:** Instant visual indication of problems
- ✓ **Geographic Mapping:** See exact locations of all assets
- ✓ **Multi-Door Status:** Monitor up to 4 doors per kiosk
- ✓ **Environmental Data:** Temperature, humidity, signal strength
- ✓ **Power Monitoring:** 3-phase voltage levels and battery status
- ✓ **Remote Control:** Open/close doors from the dashboard
- ✓ **User Management:** Add/remove authorized personnel
- ✓ **Advanced Filtering:** Search and sort by any parameter
- ✓ **Alarm Management:** Prioritize and respond to alerts
- ✓ **Historical Data:** Review past events and patterns
- ✓ **Custom Reports:** Generate comprehensive analytics



Event Logging & Access Control



Detailed Status View: Comprehensive information for each kiosk including all sensors and parameters



Complete Audit Trail: Every access event logged with user, time, controller, and action details

Comprehensive Event Tracking:

- ✓ **Access Logs:** Complete record of who accessed which structure, when, and for what purpose
- ✓ **Alarm History:** All triggered sensors with timestamps and response actions
- ✓ **Status Changes:** Track all door openings, power events, and system changes
- ✓ **User Activity:** Monitor field staff movements and access patterns
- ✓ **Fail-Safe Events:** Track emergency backdoor access usage
- ✓ **Communication Events:** Network status, signal strength changes, and connectivity issues
- ✓ **Maintenance Records:** Document all service activities and repairs

MOBILE APPLICATION

Field Access & Control



Smart Controllers Mobile App

The mobile application provides field personnel with secure, convenient access to protected structures using Bluetooth connectivity. No pairing required - just open the app, authenticate, and control doors directly from your smartphone.

Info

Edit

Sensor Logs

Access Logs

Meters

Settings

Time	User	Controller	Description
09-Dec-2024, 09:31:07	williem	Kiosk 2	Opened door 1 on controller 'Kiosk 2' (FS-BC8AF2842178)

Mobile App Workflow: Login → Connect via Bluetooth → View Status → Control Doors → Receive Confirmation

Mobile App Features:

Core Functionality:

- ✓ **Secure Login:** Encrypted authentication required
- ✓ **Bluetooth Access:** No pairing needed - direct connection
- ✓ **Multi-Door Control:** Open/close multiple doors independently
- ✓ **Real-Time Status:** View battery, temperature, signal, door states
- ✓ **Instant Alerts:** Access granted/denied confirmations
- ✓ **Sensor Monitoring:** Check tamper, accelerometer, voltage status

Advanced Features:

- ✓ **GPS Coordinates:** Automatic location capture during commissioning
- ✓ **Photo Upload:** Document field conditions and installations
- ✓ **Notes & Comments:** Add maintenance records and observations
- ✓ **Fail-Safe Access:** Emergency backdoor access when needed
- ✓ **Installation Mode:** Simplified commissioning workflow
- ✓ **Offline Operation:** Works even without cellular signal

Security Features:

- ✓ **Centralized User Management:** All users created and managed from head office
- ✓ **Role-Based Access:** Different permission levels for different staff
- ✓ **Instant Revocation:** Remove access immediately when personnel leave
- ✓ **Complete Audit Trail:** Every action logged with user, time, and location
- ✓ **Encrypted Communication:** All data transmissions secured
- ✓ **No Pairing Vulnerability:** Bluetooth connection without traditional pairing

Why Mobile App Access is More Secure Than Physical Keys or RFID Cards:

- Physical keys can be duplicated or lost
- RFID cards can be cloned or stolen
- Mobile apps require authentication + physical phone presence
- Access can be revoked instantly from anywhere
- Complete audit trail of all access events
- Biometric security can be added (fingerprint/face ID)

8. STREET LIGHT POLES AND MINI CONTROLLER

Specialized Protection Systems

Street Light Pole Protection System

The street light pole protection system is specifically designed to combat the growing problem of street light vandalism and theft. The system provides comprehensive protection through multiple layers of security:

Physical Security Features:

- ✓ **Anti-Climbing Device:** Physical deterrent prevents unauthorized climbing with tamper detection
- ✓ **Secure Access Panel:** Smart lock integration for maintenance access
- ✓ **Reinforced Mounting:** Tamper-proof installation hardware
- ✓ **Weather-Sealed Enclosure:** IP65+ rated protection against elements

Detection Capabilities:

- ✓ **Vibration Sensors:** Detect angle grinder attacks, cutting attempts, or forceful impacts
- ✓ **Climbing Detection:** Pressure sensors trigger alarms when pole is climbed
- ✓ **Door/Panel Sensors:** Magnetic switches detect unauthorized opening
- ✓ **Cable Monitoring:** Detect cable cutting or disconnection
- ✓ **Tilt Sensors:** Alert if pole is being moved or uprooted

Response Actions:

- ✓ **Local Alarm:** High-decibel siren deters criminals immediately
- ✓ **Strobe Light:** Visual deterrent draws attention to the pole
- ✓ **Backend Notification:** Instant alerts to monitoring center
- ✓ **SMS/Email Alerts:** Notify field technicians and supervisors
- ✓ **Video Recording:** Trigger CCTV cameras if integrated
- ✓ **GPS Location:** Precise location information for rapid response



Mini Controller Specifications

The intelligent mini controller is the heart of the street light protection system:

Technical Specifications:

Feature	Specification
Processor	Industrial-grade ARM Cortex microcontroller
Operating Temperature	-20°C to +70°C
Humidity Range	0% to 95% RH (non-condensing)
Enclosure Rating	IP65 (dust-tight and water-resistant)
Input Voltage	12-24V DC or 110-240V AC with built-in adapter
Battery Backup	7-14 days typical (depending on alarm frequency)
Communication	LTE/4G/3G, Wi-Fi, LoRa (selectable)
Sensor Inputs	6 digital inputs, 2 analog inputs
Output Relays	2 x 5A relays for sirens, lights, etc.
GPS	Built-in GPS module with external antenna
Memory	1GB flash memory for local event logging
Mounting	DIN rail or pole mount with anti-tamper screws

Software Features:

- ✓ Firmware over-the-air (OTA) updates
- ✓ Local event buffering (up to 10,000 events)
- ✓ Configurable alarm thresholds and sensitivity
- ✓ Programmable alarm responses and actions
- ✓ Automatic health check reporting
- ✓ Watchdog timer for automatic recovery
- ✓ Encrypted storage of configuration and data

Installation & Configuration

Installation Requirements:

- ✓ Pole diameter compatibility: 60mm to 300mm
- ✓ No welding or permanent modification required
- ✓ Installation time: 30-60 minutes per pole
- ✓ Minimal disruption to existing infrastructure
- ✓ Works with existing street light electrical system

Configuration Options:

- ✓ Remote configuration via web dashboard
- ✓ Local configuration via Bluetooth mobile app
- ✓ Bulk configuration templates for multiple poles
- ✓ Customizable per-pole settings
- ✓ Alarm schedules (e.g., no alarm during maintenance windows)

9. PRODUCT HIGHLIGHTS

Key Features & Differentiators

★ Product Highlights

Our Smart Access Control and Anti-Vandal solutions offer unique advantages:

1. Comprehensive Solution

- ✓ **End-to-End System:** Complete solution from hardware to software, all from one supplier
- ✓ **Integrated Platform:** Single application for all monitoring needs - no multiple vendors or apps
- ✓ **Unified Management:** Manage access control, alarms, metering, and monitoring from one dashboard

2. Proven Technology

- ✓ **Field-Tested:** Deployed in harsh mining and industrial conditions
- ✓ **Reliable Performance:** 99.9% uptime with redundant communication paths
- ✓ **Battle-Hardened:** Designed to withstand extreme weather, vandalism attempts, and power issues

3. Cost-Effective

- ✓ **ROI:** Typical payback period of 12-18 months through reduced theft and vandalism
- ✓ **Scalable Pricing:** Flexible pricing models from pilot projects to large-scale deployments
- ✓ **Reduced Operating Costs:** Fewer site visits, faster response times, reduced false callouts
- ✓ **Energy Efficient:** Low power consumption reduces ongoing costs

4. Easy Integration

- ✓ **Open APIs:** RESTful APIs for integration with existing systems
- ✓ **Standard Protocols:** Supports Modbus, MQTT, HTTP/HTTPS
- ✓ **Legacy Compatibility:** Works with existing infrastructure and meters
- ✓ **No Rip and Replace:** Overlay existing systems without complete replacement

5. International Support

- ✓ **USA & South Africa Based:** Local design, development, and manufacturing
- ✓ **Responsive Support:** Direct access to developers and engineers
- ✓ **Customization:** Tailor solutions to specific local challenges
- ✓ **USA or Local Hosting:** Data sovereignty options available for compliance
- ✓ **Training:** Comprehensive on-site training and knowledge transfer

6. Future-Proof Design

- ✓ **Software Updates:** Over-the-air firmware and software updates
- ✓ **Modular Architecture:** Easy to add new features and capabilities
- ✓ **Technology Agnostic:** Support for current and emerging communication technologies
- ✓ **Continuous Improvement:** Regular feature additions based on user feedback

Unique Differentiators

What sets Zoei Tech Solutions apart:

- ✓ **Custom Development:** In-house development team can create custom features specific to your needs
- ✓ **Rapid Response:** Direct access to technical team - no overseas call centers or long wait times
- ✓ **Flexible Deployment:** Cloud, on-premise, or hybrid - your choice
- ✓ **No Vendor Lock-In:** Open APIs and data export capabilities
- ✓ **Proven Track Record:** Successfully deployed in municipalities, utilities, and private sector
- ✓ **Cost Transparency:** Clear, upfront pricing with no hidden costs
- ✓ **Partnership Approach:** We view clients as long-term partners, not transactions

10. APPLICATION AREAS

Real-World Implementations



Application Areas

The Smart Access Control and Anti-Vandal system is deployed across various infrastructure types:

Municipal Applications:

Infrastructure Type	Protection Requirements	Key Features Utilized
Street Lighting	Cable theft, luminaire theft, vandalism	Anti-climb sensors, cutting detection, remote monitoring
Distribution Kiosks	Unauthorized access, meter tampering, theft	Smart locking, access control, audit trails, meter integration
Mini Substations	Equipment theft, vandalism, safety compliance	Multi-level access, video integration, alarm systems
Public Toilet Facilities	Vandalism, maintenance access control	Time-based access, usage monitoring, cleaning schedules
Water Pump Stations	Equipment security, operational monitoring	Access control, pump status monitoring, leak detection

Utility Applications:

Application	Challenges Addressed
Power Substations	Critical infrastructure protection, regulatory compliance, safety management
Transmission Towers	Remote location monitoring, climbing detection, equipment theft prevention
Distribution Transformers	Oil theft, copper theft, vandalism, safety compliance
Metering Points	Revenue protection, tamper detection, accurate billing

Industrial Applications:

- ✓ **Mining Sites:** Remote asset protection, access control for restricted areas, equipment monitoring
- ✓ **Manufacturing Plants:** Electrical infrastructure protection, energy management, access control
- ✓ **Warehouses & Logistics:** Facility access control, utility monitoring, security integration
- ✓ **Commercial Properties:** Tenant metering, utility management, access control

Implementation Approaches

Pilot Project:

Start small with a pilot deployment to demonstrate value:

- ✓ Deploy to 10-50 high-risk assets
- ✓ Measure theft reduction and cost savings
- ✓ Gather user feedback and refine
- ✓ Typical duration: 3-6 months
- ✓ Low-risk way to validate technology

Phased Rollout:

Expand gradually across the infrastructure:

- ✓ Phase 1: Critical infrastructure and high-loss areas
- ✓ Phase 2: Medium-risk areas based on Phase 1 success
- ✓ Phase 3: Comprehensive coverage of all assets
- ✓ Allows for budget management and learning

Full Deployment:

Comprehensive implementation for immediate impact:

- ✓ Suitable when theft/vandalism costs are very high
- ✓ Rapid deployment teams for large-scale rollout
- ✓ Comprehensive training program
- ✓ Dedicated project management

11. DETAILED TECHNICAL SPECIFICATIONS

Complete System Specifications



Controller Technical Specifications

Category	Specification	Details
Processor	ARM Cortex-M series	32-bit industrial-grade microcontroller, 120MHz+ clock speed
Memory	Flash: 1GB, RAM: 256MB	Local event storage up to 10,000 events, configuration backup
Operating System	Real-Time OS (RTOS)	Deterministic performance, low latency
Power Input	12-24V DC or 110-240V AC	Universal input with built-in power supply
Power Consumption	Standby: <5W, Active: <15W	Low power design for solar/battery operation
Battery Backup	12V 7Ah-18Ah Sealed Lead Acid	7-30 days backup depending on configuration
Operating Temp	-20°C to +70°C	Extended temperature range option: -40°C to +85°C
Humidity	0-95% RH non-condensing	Conformal coating for moisture protection
Enclosure	IP65 (dust-tight, water jet proof)	Polycarbonate or aluminum enclosure options
Dimensions	200mm x 150mm x 80mm (LxWxH)	Compact design for easy installation

Input/Output Specifications:

I/O Type	Quantity	Specifications
Digital Inputs	6	12-24V DC, optically isolated, suitable for door sensors, PIR, etc.
Analog Inputs	2	0-10V or 4-20mA, 12-bit resolution, for temperature, vibration, etc.
Relay Outputs	2	5A @ 250V AC, Form C (SPDT), for sirens, lights, locks
Serial Ports	2 (RS-485, RS-232)	Modbus RTU support, meter reading interface
Ethernet	1 x 10/100 Mbps	RJ45 connector, PoE support (optional)
USB	1 x USB 2.0	For local configuration and diagnostics



Communication Specifications

Technology	Specifications	Range/Coverage
LTE Cat-M1/NB-IoT	All South African carriers, fallback to 3G/2G	Wide area, dependent on carrier coverage
Wi-Fi	802.11 b/g/n, 2.4GHz, WPA2 encryption	Typical: 100m outdoors, 30m indoors
LoRa	863-870MHz (EU), Adaptive Data Rate	Up to 15km line-of-sight, 2-5km urban
Bluetooth	BLE 5.0, low energy mode	10-30m typical range
GPS	Built-in GPS/GLONASS receiver	Accuracy: <5m typical, <10m with external antenna

Data Security:

- ✓ **Encryption:** AES-256 for data at rest, TLS 1.2+ for data in transit
- ✓ **Authentication:** Certificate-based device authentication
- ✓ **Secure Boot:** Prevents unauthorized firmware loading
- ✓ **Tamper Detection:** Hardware tamper switches with event logging

Sensor Specifications

Vibration/Acoustic Sensor:

- ✓ Detects angle grinder, drilling, cutting, and impacts
- ✓ Adjustable sensitivity levels (1-10)
- ✓ Frequency analysis to reduce false alarms
- ✓ Temperature compensated for accuracy

Magnetic Door/Panel Sensor:

- ✓ Detection gap: up to 20mm
- ✓ Weatherproof reed switch design
- ✓ Optional tamper-proof mounting

PIR Motion Sensor:

- ✓ Detection range: up to 12m
- ✓ 120° detection angle
- ✓ Pet immunity: up to 20kg
- ✓ Anti-masking detection

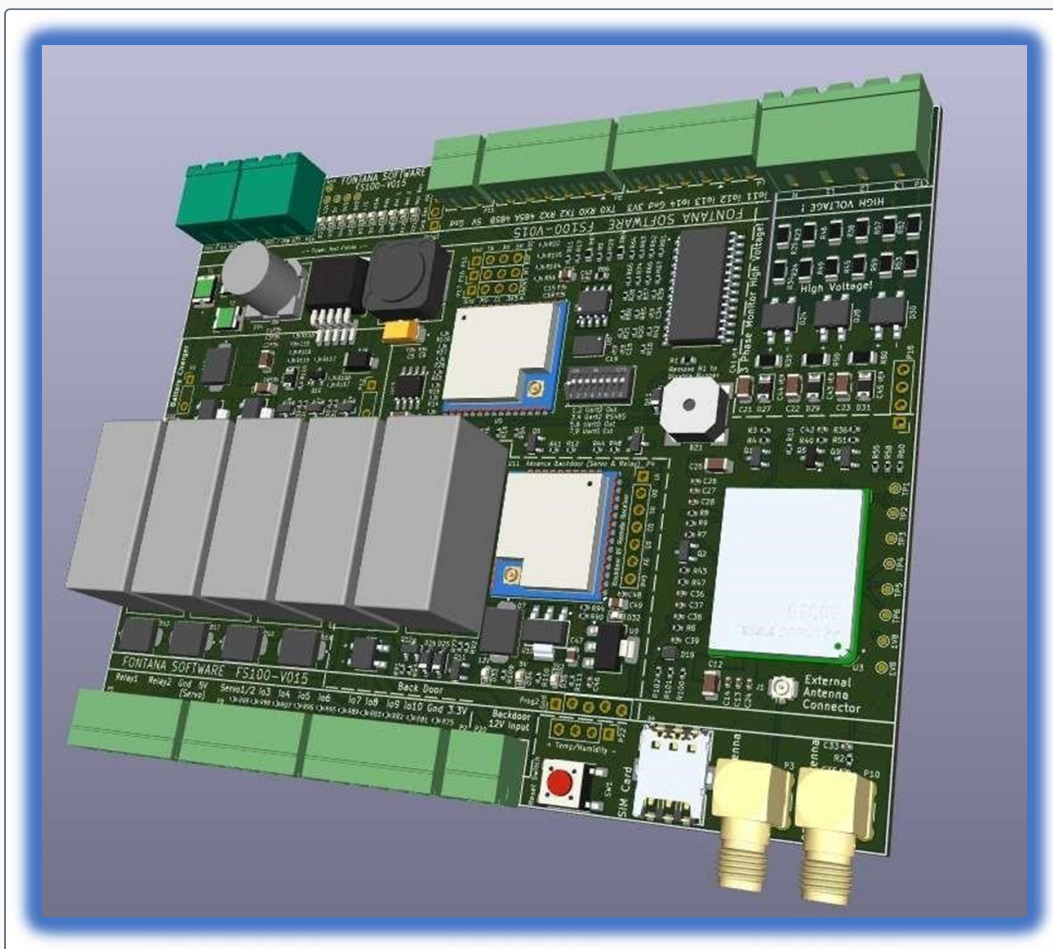
Environmental Sensors:

- ✓ **Temperature:** -40°C to +85°C, ±0.5°C accuracy
- ✓ **Humidity:** 0-100% RH, ±3% accuracy
- ✓ **Water Detection:** Conductive probe, instant alert

TECHNICAL HARDWARE DETAILS

Advanced Controller Technology

Smart Controller Hardware

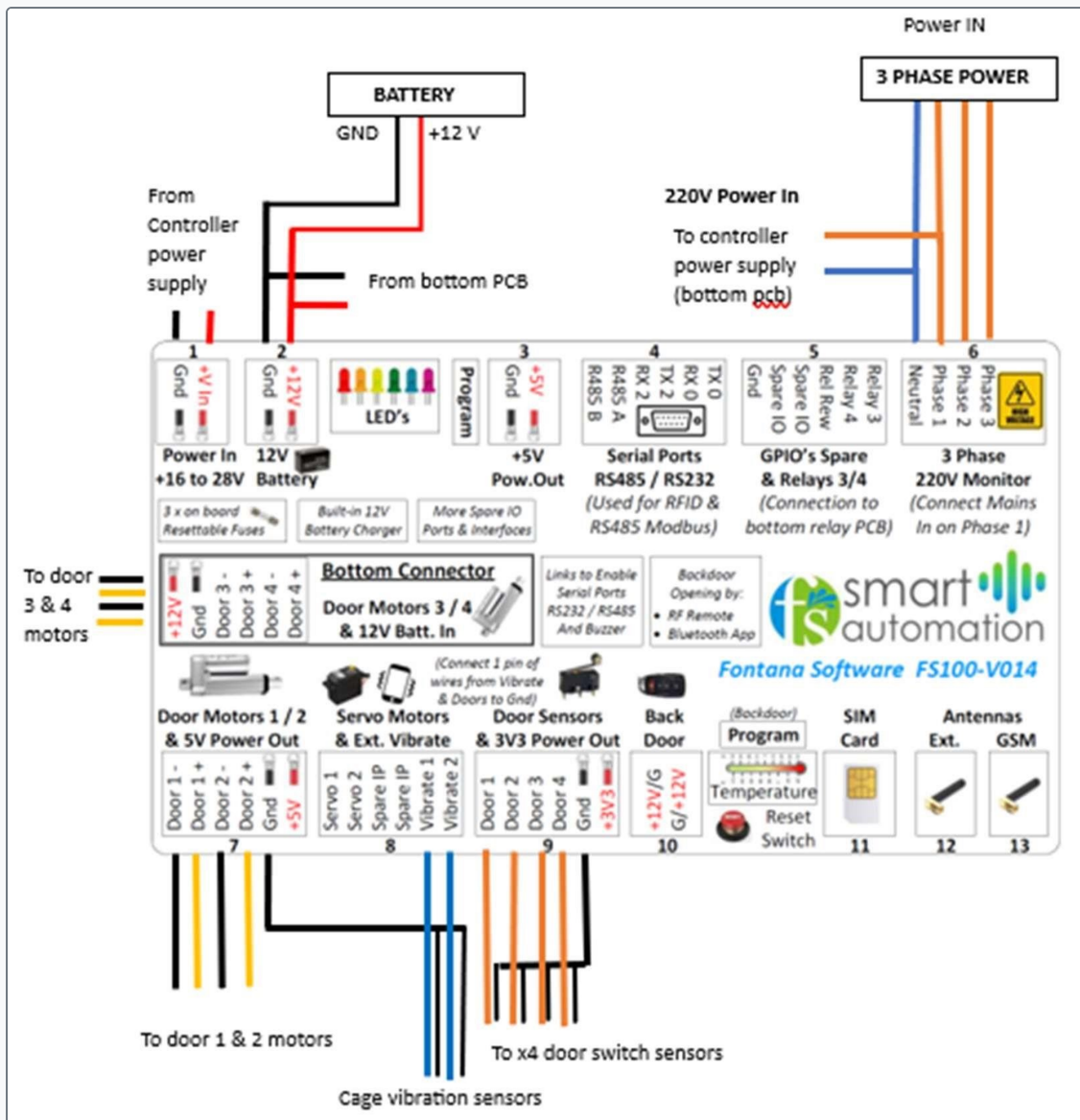


Fontana Software Smart Controller Board: Custom-designed PCB with advanced features

Advanced Controller Features:

- ✓ **Dual Micro-processors:** Primary and fail-safe backup
- ✓ **Multiple Connectivity:** Bluetooth, Wi-Fi, GSM 4G/LTE
- ✓ **40+ GPIO Ports:** Extensive expansion capabilities
- ✓ **Accelerometer Module:** Tampering & vibration detection
- ✓ **Intelligent Battery Charger:** Built-in 12V management
- ✓ **Temperature & Humidity Sensors:** Environmental monitoring
- ✓ **3-Phase Power Monitor:** Voltage level detection
- ✓ **Multiple Door Sensors:** Up to 4 door monitors
- ✓ **Motor/Solenoid Control:** Relay outputs for actuators
- ✓ **Serial Ports:** RS-232, RS-485, Modbus support
- ✓ **Optional LoRa:** Long-range wireless communication
- ✓ **Antenna Connectors:** GSM, Bluetooth, Wi-Fi external antennas

Wiring & Connection Diagram



Complete Wiring Schematic: Showing all connections for doors, sensors, power, and communication

Connection Points:

- ✓ **Power Input:** 16V to 28V AC input with 12V battery backup
- ✓ **Door Motors:** Connections for up to 4 door actuators
- ✓ **Sensors:** Door switches, vibration, and accelerometer
- ✓ **Serial Ports:** RS485/RS232 for meter reading & RFID
- ✓ **3-Phase Monitor:** Real-time voltage monitoring
- ✓ **GPIO & Relays:** Spare inputs/outputs for customization
- ✓ **Communication:** SIM card, GSM antennas, external antenna
- ✓ **Programming Port:** For firmware updates and configuration

12. PRICING STRUCTURE & SUBMISSION REQUIREMENTS

Commercial Information

Product Pricing Structure

Zoei Tech Solutions offers flexible pricing models to accommodate different project sizes and budgets:

Pricing Models:

1. CAPEX Model (Capital Purchase):

- ✓ One-time purchase of hardware
- ✓ Perpetual software license
- ✓ Annual maintenance and support contract
- ✓ Best for: Organizations with capital budget

2. OPEX Model (Subscription):

- ✓ Monthly or annual subscription per device
- ✓ Includes hardware, software, and support
- ✓ Upgrade to latest hardware at contract renewal
- ✓ Best for: Budget-conscious organizations

3. Hybrid Model:

- ✓ Customer owns hardware (CAPEX)
- ✓ Subscription for cloud platform and support (OPEX)
- ✓ Flexibility in cost management
- ✓ Best for: Mixed budget scenarios

Pricing Components:

Component	Description	Pricing Basis
Hardware	Controllers, sensors, locks, sirens	Per unit or bundled package
Software License	Platform access, mobile apps	Per device or enterprise license
Installation	On-site installation and commissioning	Per device or day rate
Training	User and administrator training	Per session or per attendee
Support	Technical support and maintenance	Annual percentage of hardware cost
Data/Connectivity	SIM cards and data packages (if cellular)	Monthly per device
Hosting	Cloud hosting (if cloud deployment)	Monthly fee or per device
Customization	Custom features or integrations	Project-based quotation

Volume Discounts:

- ✓ **10-50 devices:** Standard pricing
- ✓ **51-200 devices:** 5-10% discount
- ✓ **201-500 devices:** 10-15% discount
- ✓ **500+ devices:** Custom pricing, up to 20% discount

Request a Detailed Quote

For a detailed, project-specific quotation, please contact our sales team with the following information: number of devices, deployment locations, required features, existing infrastructure, budget constraints, and timeline. We will provide a comprehensive proposal tailored to your needs.



Submission Requirements

For formal tenders or RFP responses, Zoei Tech Solutions can provide the following documentation:

Technical Documentation:

- ✓ **Technical Specifications:** Detailed specs for all hardware and software components
- ✓ **Compliance Certificates:** CE, RoHS, IP ratings, and other certifications
- ✓ **Test Reports:** Performance test results and reliability data
- ✓ **Installation Manuals:** Step-by-step installation guides
- ✓ **User Manuals:** Comprehensive documentation for end users
- ✓ **API Documentation:** Integration guides for third-party systems
- ✓ **Network Diagrams:** System architecture and communication flows

Commercial Documentation:

- ✓ **Company Profile:** Background, experience, and capabilities
- ✓ **Insurance Certificates:** Public liability and professional indemnity
- ✓ **References:** Client references and case studies
- ✓ **Financial Statements:** Audited financial statements (if required)
- ✓ **Quality Certifications:** ISO certifications or quality management documentation

Project Documentation:

- ✓ **Project Plan:** Detailed implementation timeline and milestones
- ✓ **Risk Assessment:** Project risks and mitigation strategies
- ✓ **Resource Plan:** Team composition and skill sets
- ✓ **Training Plan:** Comprehensive training program outline
- ✓ **Support Plan:** Ongoing support and maintenance approach
- ✓ **SLA:** Service Level Agreement with defined metrics

13. ABOUT ZOEI TECH SOLUTIONS

Company Overview & Expertise

Company Overview

Zoei Tech Solutions is an international company specializing in comprehensive industrial solutions, combining traditional engineering excellence with cutting-edge technology. We provide integrated solutions across multiple sectors including pumping systems, smart access control, digital infrastructure, and electrical systems.

Our Heritage:

With over 50 years of combined experience in the electrical and industrial sectors, Zoei Tech Solutions brings deep expertise in:

- ✓ LV and MV electrical distribution networks
- ✓ Industrial automation and control systems
- ✓ Software development for mission-critical applications
- ✓ Hardware design and manufacturing
- ✓ Pumping systems and mineral processing

What We Do:

Zoei Tech Solutions provides end-to-end solutions combining:

- | | |
|---|---|
| ✓ Industrial pumping systems (12 complete ranges) | ✓ Smart metering and revenue protection |
| ✓ Smart access control and anti-vandal solutions | ✓ SCADA and monitoring systems |
| ✓ Electrical switchgear and motor drives | ✓ Custom software development |
| ✓ Digital networking infrastructure | ✓ 24/7 support and maintenance |



Core Competencies

Software Development Excellence:

With over 25 years of software development experience, we excel in:

- ✓ **Emergency Command & Control:** Mission-critical call-taking and dispatch software trusted by emergency services for over 20 years
- ✓ **Smart Automation:** Intelligent automation and monitoring solutions for homes, factories, and infrastructure
- ✓ **Transaction Processing:** High-volume web-based systems handling hundreds of transactions per minute
- ✓ **GIS Development:** Incident management, vehicle tracking, and infrastructure management systems
- ✓ **Custom Development:** Bespoke solutions tailored to specific client needs

Hardware Development:

- ✓ Electronic circuit design and prototyping
- ✓ Embedded systems and firmware development
- ✓ Industrial-grade hardware for harsh environments
- ✓ Custom sensor and controller development
- ✓ Manufacturing capability for production volumes

Industrial Expertise:

- ✓ 50+ years experience in LV and MV electrical systems
- ✓ Underground mining electrical reticulation
- ✓ Municipal electrical infrastructure
- ✓ Polyethylene kiosk manufacturing and design
- ✓ Generator sets and power systems

</> Technology Expertise

Software Development Stack:

Category	Technologies
Programming Languages	Python, React, React Native, Django, Java, JavaScript, Flask, C/C++/C#, PHP, JSX
Platforms	Linux, Windows Desktop, Windows CE, Web-based applications, Android, iOS
Databases	PostgreSQL, MySQL, MongoDB, SQL Server, SQLite
Cloud & DevOps	AWS, Azure, Docker, Kubernetes, CI/CD pipelines

Wireless Communication Technologies:

Short Range:

- ✓ 433MHz RF
- ✓ Bluetooth Low Energy (BLE)
- ✓ Wi-Fi (2.4GHz and 5GHz)

Long Range:

- ✓ LTE / 5G cellular
- ✓ LoRa / LoRaWAN
- ✓ Sigfox

Communication Protocols:

- ✓ TCP/IP, HTTP/HTTPS, REST APIs
- ✓ MQTT (IoT messaging)
- ✓ X25 (packet-switched networks)
- ✓ Modbus (RTU and TCP)
- ✓ RS-485/RS-232 serial protocols



Why Choose Zoei Tech Solutions?

- ✓ **Single Vendor Solution:** One company for both hardware and software - no vendor coordination
- ✓ **Unified Platform:** One application for all monitoring and control needs
- ✓ **Integration Specialists:** Highly skilled in integrating multiple protocols and systems
- ✓ **Qualified Team:** Certified personnel with backgrounds in development, engineering, and industrial applications
- ✓ **Multi-Protocol Support:** Knowledge and experience with LoRa, Sigfox, NB-IoT, BLE, WiFi, Modbus, and more
- ✓ **Hosting:** Data sovereignty options available - USA or local hosting
- ✓ **Bespoke Development:** Custom systems, financial apps, GIS, incident management, and vehicle tracking
- ✓ **Hardware Capability:** Design and manufacture custom electronics when needed
- ✓ **Comprehensive Integration:** Over 1000 APIs for integrating with other systems
- ✓ **Open Systems:** Committed to integrating any manufacturer's products (where possible)
- ✓ **Partnership Approach:** We want customers for life, not just transactions
- ✓ **Continuous Improvement:** Regular updates and feature additions based on customer feedback

CONTACT INFORMATION

Get In Touch With Us

Zoei Tech Solutions

Company Information:

Company Name: Zoei Tech Solutions

Tagline: Complete Industrial Solutions

Registration: USA & RSA registered Company

Head Office:

110 Stonebridge Ln
Downingtown
PA 19335

Contact Details:

Phone: +1 484 364 3568

Email: info@zoeitech.com

Website: www.zoeitech.com

Business Hours:

Office Hours: Monday - Friday, 08:00 - 17:00

Emergency Support: 24/7 Available

Response Time: Within 4 hours for critical issues

Key Departments:

Sales Enquiries: info@zoeitech.com

Project Management: Available upon request

Training: Scheduled as needed

Service Coverage:

- ✓ Service coverage across the USA and South Africa
- ✓ On-site installation and commissioning
- ✓ Remote support and monitoring
- ✓ Regular maintenance programs

Ready to Get Started?

Contact us today to discuss your smart access control and anti-vandal protection needs. We offer:

- ✓ **Free Consultation:** Initial assessment of your requirements
- ✓ **Site Survey:** On-site evaluation and recommendations
- ✓ **Pilot Programs:** Small-scale deployment to demonstrate value
- ✓ **Custom Proposals:** Tailored solutions for your specific needs
- ✓ **Demonstration:** Live demo of system capabilities



Complete Solutions Portfolio

Smart Access Control:

- ✓ Keyless entry systems
- ✓ Anti-vandal protection
- ✓ Real-time monitoring
- ✓ Smart metering integration

Digital Infrastructure:

- ✓ Underground networks
- ✓ Wi-Fi tracking systems
- ✓ SCADA integration
- ✓ Remote monitoring

Pumping Systems:

- ✓ 12 complete pump ranges
- ✓ End suction pumps
- ✓ Vertical spindle pumps
- ✓ Submersible systems

Electrical Systems:

- ✓ Switchgear solutions
- ✓ Motor drives (VSDs)
- ✓ Power distribution
- ✓ Energy management

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Smart Access Control

Anti-Vandal Protection

24/7 Monitoring

Smart Metering

Globally deployed

50+ Years Experience

Integrated Solutions