COMMAND, CONTROL & COMMUNICATION (C3) SYSTEM

Enhancing Operational Efficiency
**The Command, Control and Communication (C3) System** enables seamless integration of modern metro operations using a powerful suite of modular software developed by ST Engineering Electronics Ltd. (STEE)

The C3 System offers the following built-in features:

- **Video Analytics**
- **Energy Management System (EMS)**
- **CyberSecurity**
- **Training & Development System (TDS)**
- **Plant Management System (PMS)**
- **Interface Systems**
- **Operations Control Centre (OCC)**
- **Depot Control Centre (DCC)**
- **Station Management System (SMS)**
- **Plant Management System (PMS)**

**OPERATIONS CONTROL CENTRE (OCC)**

OCC is the heart of the modern integrated metro operation. This improves the overall line capacity and operational efficiency while reducing infrastructure costs. The OCC enables the real-time monitoring and control of the integrated metro operation including Electrical & Mechanical (E&M) supervision, communication and remote management of the intricate metro power system network. The OCC also includes the Decision Support System, which helps the operator to make crucial and timely decisions during an incident or emergency.

**DEPOT CONTROL CENTRE (DCC)**

DCC forms the maintenance hub of the entire metro system. It controls the operations of the depot which provides stabling and maintenance facilities for the metro line. It also monitors train movements within the depot. Using our integrated multi-functional terminals, the depot operator is able to monitor daily train wash and conduct wash operations easily. Through our integrated monitoring and control system, the operator is able to seamlessly manage the depot operations with increased efficiency and ease.

**STATION MANAGEMENT SYSTEM (SMS)**

Our SMS consists of various subsystems crucial for the automatic and efficient day-to-day station operations, for example:

- Closed Circuit TV
- Passenger Information Displays
- Public Announcement
- Access Control
- Communications Management
- E&M Monitoring
- Fire Alarm Systems

The use of our multi-functional terminal for monitoring and control allows the station operator to multi-task and enhances his job efficiency.

**INTERFACE SYSTEMS**

The Integrated Supervisory and Control System (ISCS) monitors and controls a multitude of equipment across the entire MRT line.

The interfaced sub-systems include:

- **Traction Power Distribution**
- **High Voltage Power Distribution**
- **Low Voltage Power Distribution**
- **UPS and Standby Generator Systems**
- **Platform Screen Door**
- **Communications Systems**
- **Automatic Fare Collection**
- **Fire Detection and Protection**
- **Drainage Pumps**
- **Lifts and Escalators**
- **Automatic Train Supervision**

**TRAINING & DEVELOPMENT SYSTEM (TDS)**

The key goals of the TDS are the provision of operator training, development of new database and schematics, and various aspects of software testing to fulfill the diverse operational training, development and testing needs of metro operations.

As such, our TDS is a dedicated and controlled environment that comprises the following modes:

- In training mode, the system enables the training of operators in typical real-life scenarios.
- In development mode, the system enables the development of software, schematics, database and RTU/PLC configuration.
- In testing mode, the system enables the testing and distribution of new software, schematics and configuration updates.

**CYBERSECURITY**

Our solution provides a non-invasive multiple-layer detection and defence approach against cyber-attacks. It detects malicious cyber threats and alerts the operator for investigation and remedial action.

- Resilient and trusted monitoring infrastructure to collect data in a trusted manner.
- Big data analytics to detect advanced cyber threats including Advanced Persistent Threat.
- Detection and defence against malicious insiders to guard against internal threats.
- Detection and defence against cyber-attacks on field control devices.
- Integrated Operational Technology (OT) network Intrusion Detection System with C3 System.

**ENERGY MANAGEMENT SYSTEM (EMS)**

With a growing awareness of environmental issues and global warming, energy efficiency and optimisation are becoming increasingly important. Our EMS provides:

- Energy Consumption Prediction for peak, non-peak and extended service hours scenarios.
- Dynamic Real-Time System Condition Display.
- Condition Monitoring Data Acquisition and Predictive Alarm Generation.
- Data Trend Display.

**VIDEO ANALYTICS**

Our Video Analytics solution includes:

- Facial recognition and identification of targeted persons.
- Unattended object detection and identification.
- Playback video feature for review and follow-up action.