IoT Enabled Smart Machines Monitoring System
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About hIOTron

Hiotron Pvt. Ltd (hIOTron®) is an Indian technology corporation focused on development and implementation of Internet of Things based Products and Solutions. Our plug & play modular & industrial hardware & IoT platform allows businesses to securely connect, manage and analyze data from legacy to modern devices or assets.

We develop, manufacture, support, licenses IoT Platform and sell IoT based consumer, industrial electronics & software services. Hence, we provide a complete ecosystem for IoT solutions right from training, design, hardware manufacturing, integration, platform, analytics and support to any business or individual to make their IoT journey simple and successful.

Currently, Very Few companies have the in-house skills and tools to build IOT solutions quickly and cost-effectively whereas our in-house development team is very much expertise in all the major vertical of IOT technology such as custom PCB design/hardware development, embedded software development, device-cloud/network integration, communication/web protocols & IT experts, front-end/mobile app or Web-App development & big-data analyst.
## Core Expertise

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>Semiconductor</th>
<th>Communication Channel</th>
<th>Cloud Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>MoDBus, Profinet, CANBus, RS232/485, Wi-Fi, ZigBee (Star/Mesh), LoRa (868 or 915 MHz), Z-wave, Sub-1, Bluetooth, BLE4.0, IR, NFC etc.</td>
<td>Freescale, Marvell, Atmel, TI, QUALCOMM, Microchip &amp; Many more.</td>
<td>Wi-Fi, Ethernet, GSM/GPRS (2G,3G,4G), GNSS, LTE.</td>
<td>AWS, IBM Blue-mix Watson, Azure IoT, Thing-Worx, hIOTron® &amp; Private.</td>
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</tbody>
</table>

**Communication & Queuing Protocols**
- MQTT, REST, Web-sockets, COAP, XMPP, AMQP.

**Databases**
- Cassandra, MongoDB, Raven DB, MySQL, Oracle, MS-SQL.

**Mobile Application**
- Android, iOS, Windows.

**Standards**
- OPENIoT, HomeKit, Thread, Nest, Alljoyn, Brillo & Weave.
Achievements

- 6.3 Years in Existence
- 48+ Team Members
- 7+ Project Managers
- Completed 354+ Projects
- 21.5k IoT Devices Deployed
- For 13+ IoT Applications
- In 33 Cities
- Across 5 Countries
End-To-End Solution Architecture

A: SENSORS/ACTUATORS & PLC
B: PLC-GATE [AN ADVANCE IOT GATEWAY]
C: HIOTRON IOT® PLATFORM
D: MOBILE APP & DASHBOARD
Solution Potential Benefits

✓ Remote access of real time production data monitoring to all key stakeholders.

✓ Useful analytics to control machine performance.

✓ Buzzers/Alarms/SMS/Email triggered for any machine fault/process non-compliance.

✓ Move from breakdown maintenance to Preventive/Predictive maintenance there by reducing unplanned downtime & cost of operation.

✓ Monitor energy consumption.

✓ Easy data management to optimize production efficiency.

✓ Remote modify/change of machine PLC firmware.

✓ Brings transparency & enhances customer satisfaction.
Solution Enterprise Benefits

- Fully White Labelled H/W & S/W (Both) under customer brand.
- Ready to fit for any existing or new machine.
- Robust Integration with ERP's and other systems through the international standard ISA-95.
- Multi-company, multi-language and multi-plant.
- Easy to deploy to new and existing customer.
- Additional Services on SAAS model or a part of AMC.
- 24/7 online IoT (Dashboard/Mobile App) support and demand based offline support.
**Solution Components**

**HI-PLC** - HI-PLC is an Industry4.0 gateway act as a main central unit which is perfectly suitable to collect data through Dispensing machines having Siemens or any other brand PLC over Profinet/Profi-Bus using ethernet, also having other on-board wireless communication protocols along with Wi-Fi, Ethernet & GSM (2G,3G & 4G) to communicate with cloud.
<table>
<thead>
<tr>
<th><strong>Technology Overview</strong></th>
<th></th>
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<tbody>
<tr>
<td>1. In-Bound Communication Protocols</td>
<td>Wired – Profi-net, Ethernet, SPI, I2C, Serial etc.</td>
</tr>
<tr>
<td>2. Out-Bound Communication Protocols</td>
<td>Wi-Fi, GSM (Provision for 2G).</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Hardware Overview</strong></th>
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<tbody>
<tr>
<td>3. RTC</td>
<td>Real time clock to store data with time logs.</td>
</tr>
<tr>
<td>4. EEPROM (256MB)</td>
<td>Memory to store 15-20 days records in case power or network failure.</td>
</tr>
<tr>
<td>5. External GPRS antenna</td>
<td>An antenna used for GSM connectivity having external SMA connector.</td>
</tr>
<tr>
<td>6. Power supply</td>
<td>12-24 VDC +/-20%, LPS</td>
</tr>
<tr>
<td>7. Extended Temperature Range Operating</td>
<td>-25°C to +70°C, 10 to 95% relative humidity (non-condensing)</td>
</tr>
<tr>
<td></td>
<td>Storage: -40°C to +70°C, 10 to 95% relative humidity (non-condensing)</td>
</tr>
<tr>
<td>8. Dimensions</td>
<td>125 x 175 x 65mm (H x D x W)</td>
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<tr>
<td></td>
<td>Weight: 300 grams</td>
</tr>
<tr>
<td></td>
<td>DIN rail or wall screw fixing system</td>
</tr>
<tr>
<td>9. Warranty</td>
<td>12 months</td>
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**hIoTron Industrial IoT™ Platform** – An IoT (Middleware) Platform includes user dashboard & mobile application (Android/iOS) with multiple hierarchy which enables to optimize & control the machine performance. The platform will help to provide decision support inputs to reduce the unplanned downtime by shifting breakdown maintenance to predictive maintenance.
Technical Features

- **Device Connectivity** - Web based Platform manages seamless device connectivity & configuration from platform to gateway (Out-Bound Connectivity Protocols: Wi-Fi, Ethernet & 2G/3G/4G/LTE modem) & gateway to wireless/wired end node (In-Bound Connectivity Protocols (Wired – Serial, I2C, SPI, RS232/485, Mod-Bus & CAN) & (Wireless – BLE4.0, ZigBee, Z-Wave, Lo-Ra, Sub-1, RF)) & Vice versa.

- **Device Management** - Platform IoT Device Management makes it easy for you to manage your connected devices at any scale with right authentication & authorization process. Organize & Manage your Hub (gateway) & Nodes in hierarchical structure based on its category which help to search/edit/remove devices in bulk.

- **Basic/Advance Edge Analytics Models** - Platform supports multiple Anomaly Detection Models to filter data based on event or time & perform some actions (if assigned any) at edge before it reaches to cloud to eliminate the round-trip latency of an actionable insight. In a production environment, same filtered events can be mapped with notifications/switching models to make the process automatic through cloud.

- **Basic/Advance Analytical Models** - Platform provides a spectrum of analytics that enable you to start quickly and realize value immediately and visualize your device real time or historical Raw, Formatted & Formulated (Application category based) data in charts/graphs/bars in well-organized way with multiple filters like project/data/time/threshold/download options.

- **Data Storage** - Platform stores last 90 days device generated data for any application which is directly in-sync with heart-beat interval (data update period from device to platform) period (default 10 minutes). For example- if Heart-beat interval kept 5 minutes then storage duration will also become half 45 days. For any customization in storage please contact.
Reporting Tools – Platform allows user to visualize real time & historical data along with time/event-based mail reporting feature for overall (combined) or each & every pattern of data in PDF format. [excel format reporting also available with data filtering option].

FOTA (Firmware over the air) – Platform maintains the record of every version (Newly or Previous) of firmware of devices associated to it which allows you to update gateways & its associated nodes new firmware one by one or all in one in single click.

Dashboard Parameters

OEE (Overall Equipment Performance)
✓ Availability
✓ Productivity
✓ Quality

Fault Analytics
✓ Fault Pareto - Repeat alarms
✓ Fault Pareto – Downtime contribution
✓ Fault Category pie chart
✓ SMS/Alerts to trigger maintenance

Quality Management System (QMS)
✓ Accuracy
✓ Cp, Cpk
✓ Critical Process parameters trending

Production Performance & Energy Management
✓ Plan vs Actual output
✓ Energy consumption (Units per Cycle, Time series plot of Voltage, Current, Frequency for each cycle)
Pareto Chart:
(No. of faults)

Pareto Chart:
(Duration, Minutes)
Development Phases

Turnkey Project Delivered in 18 to 20 weeks

Quickly prototyped & Hi-PLC integrated with S7-200 (smart) PLC for package dispensing machine to validate the end-to-end concept with the help of basic parameters shared in Excel file.

Application UI Dashboard built to convert the raw data into business relevant information to increase & optimize the machine performance & presented to stakeholders positively.

Started beta testing in coordination with Twin team to deploy one smart machine at customer site to make it perfect to start the production before finalizing production plan & delivery schedules.

Started hardware production & incorporated beta testing inputs in hardware firmware & platform as well as dashboard & mobile application (Android/iOS) & finally delivery as per mutually agreed schedule.