Remotely CNC Machine Monitoring & Fault Detection

Content Index

- About hIOTron®
- Specialization
- Clientele
- Why CNC Machine Monitoring Required
- Organizational Impact & Benefits
- End-To-End Solution Architecture
- Solution Components
- Solution Development Process
- POC Steps & Terms/Conditions

Techno-Commercial Proposal

About hIOTron

hIOTron® is leading custom IOT solution enabler in APAC [Asia-Pacific] region which provides ready to market IoT enabled products in shortest period of time with 100% customer satisfaction.

We are IoT experts providing End-To-End IoT solutions that improve processes, differentiate products and services, and create new revenue streams.

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.

Starting from 2013, We have covered 8 different IOT business verticals and delivered almost 18500 internet connected devices out of which 84% devices are live on hIOTron IOT Platform in 26 various cities across 4 countries.

Specialization

- **Connectivity**: Wi-Fi, ZigBee (Star/Mesh), LoRa (868 or 915 MHz), Z-wave, Sub-1, Bluetooth, BLE4.0, IR, NFC etc.

- **Semiconductor**: Freescale, Marvell, Atmel, TI, Microchip & Many more.

- **Communication Channel:** Wi-Fi, Ethernet, GSM/GPRS, GNSS, LTE.

- **Cloud Platforms:** AWS, IBM Blue-mix Watson, Xively, Thing-Worx, hIOTron & Private.

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

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

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

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

Clientele

Why CNC Machine Monitoring Required

Modern-day machining has grown in leaps and bounds in terms of processing complexity, precision, machine scale, and automation level. In the improvement of processing quality and efficiency, CNC (computerized numerical control) machine tools plays a key role.
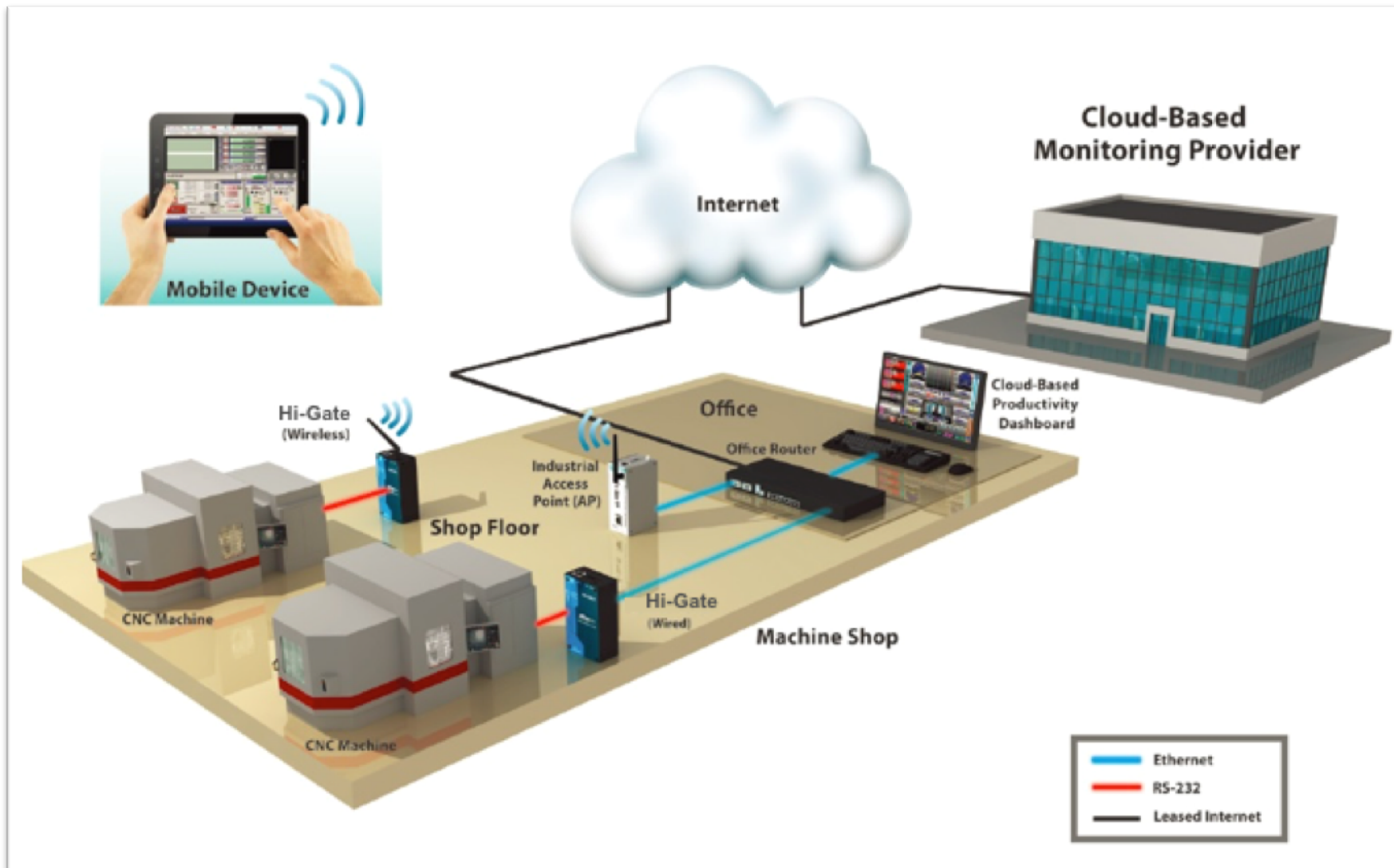
CNC Machine Operational downtime is a significant issue facing Original Equipment Manufacturers (OEMs). In most cases, the machinery involved runs without condition-based monitoring—essentially operating until a failure occurs. At that time, appropriate personnel are contacted to assess the situation and make the repairs as expeditiously as possible to prevent dramatically delaying production schedules. Outside factors like weather or traffic patterns might also add to possible downtime scenarios and lead to organizational inefficiencies and/or misallocation of resources.

Organisational Impact & Benefits

Improve visibility into the processes of the CNC shop and gain deeper insight into operations

Add the ability to leverage real-time data from the shop floor and tie it to the scheduling ERP system, optimize the scheduling of parts to CNC modules

Increase productivity and ROI by gaining greater insight into asset and resource allocation

Improv collaboration between Operations and Information Technology (IT) departments, reduce downtime and enable more efficient responses to IT jobs

Reduce costs, effort, and development time by selecting proven, interoperable technologies

Provide quick proof-of-concept into the value of IoT via short, There Weeks agile process.
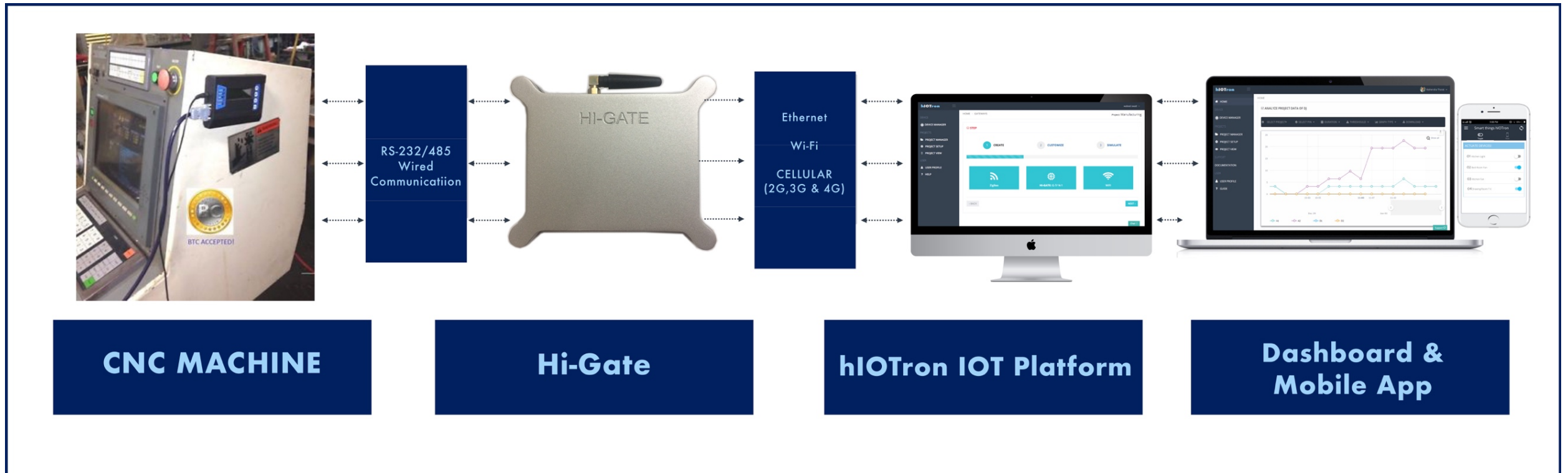
End-To-End Solution Architecture

The Process of collecting the data starts from Gateway through CNC machine via RS232, 485 protocols or any other proprietary protocols. Once the operational information (data) gathered on-gateway then it will be processed, analyzed on the edge/gateway itself before sending it cloud for actionable recommendations to its on-site quality professionals.
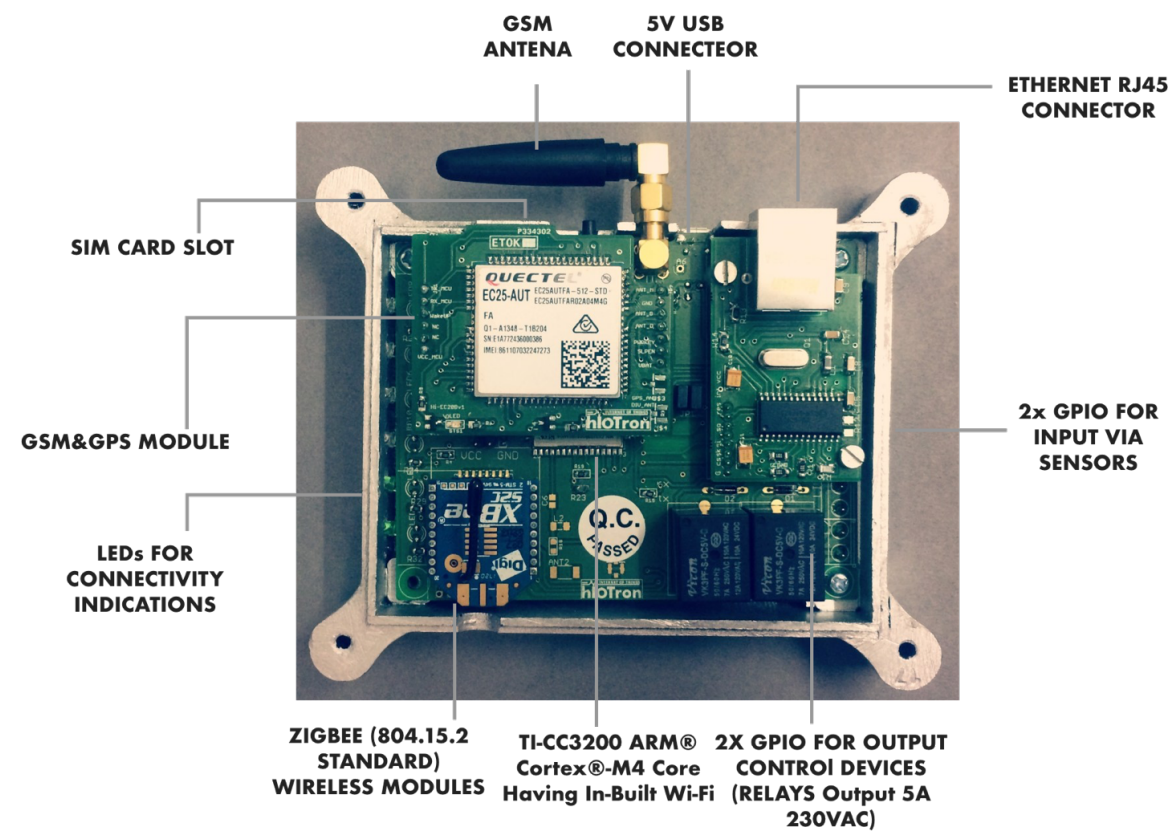
Solution Components

In order to improve quality, reduce downtime, and optimize production schedules, hIOTron end-to-end IoT solution includes

1. Hi-Gate: An Enterprise & Modular IoT Gateway equipped with Wired & Wireless InBound communication & OutBound communication protocols along with on-board GPS, RTC & storage facility.

2. hIOTron IoT™ Platform – An IoT (Middleware) Platform delivers a comprehensive platform as a service (PaaS) for rapidly designing, developing, deploying, and operation of CNC machine from monitoring to tracking with proactive fault/problem detection and resolution to shop floor engineer.

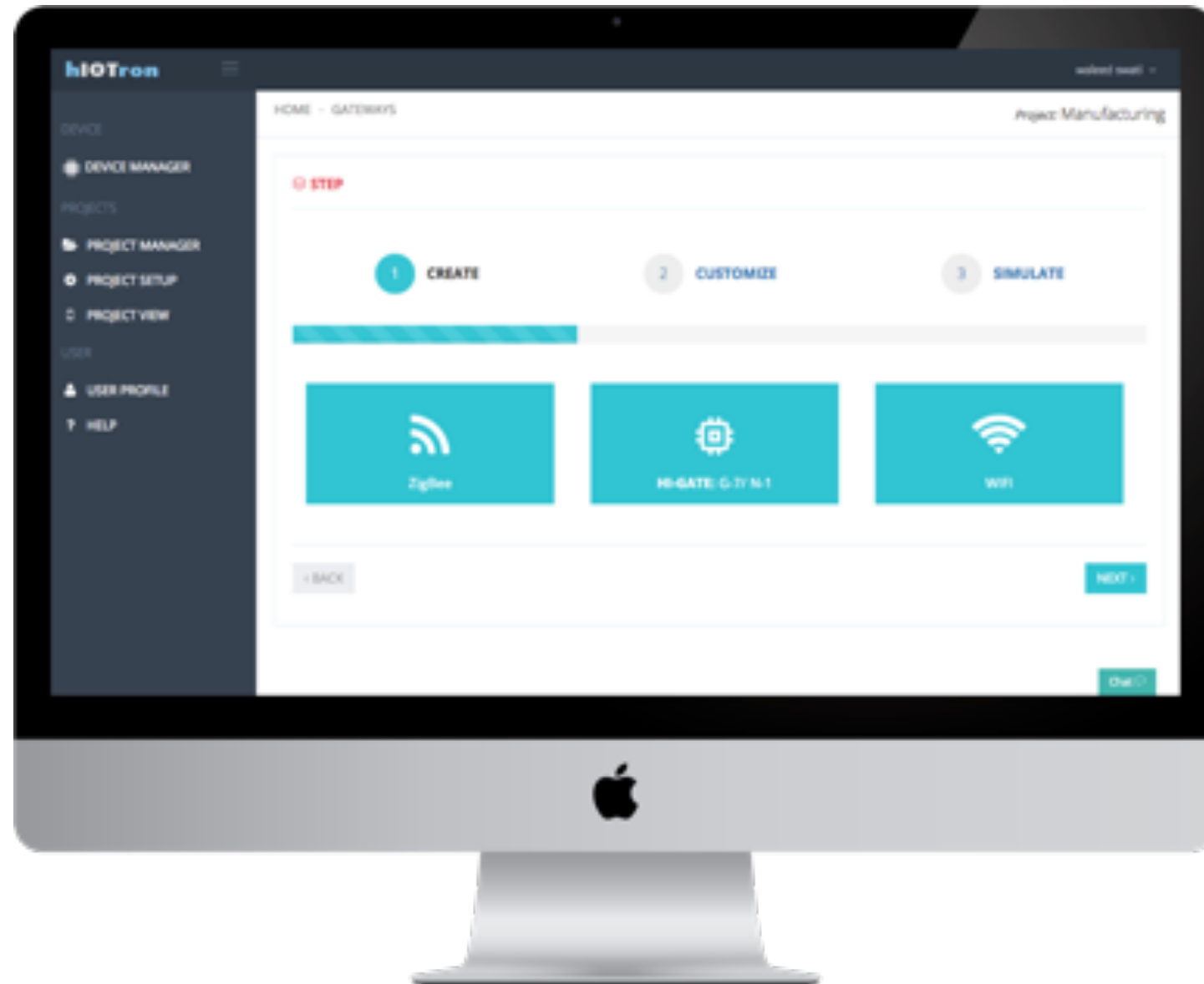3. Mobile app – User level Android & iOS mobile app sync with platform features.

| CNC MACHINE | Hi-Gate | hIOTron IOT Platform | Dashboard & Mobile App |

Hi-Gate – HI-1210MI is an enterprise gateway act as a main central unit which is perfectly suitable to collect data through CNC machine over RS232/485 over serial, also having other on-board wireless communication protocols along with Wi-Fi, Ethernet & GSM (2G,3G & 4G) to communicate with cloud.

Technology Overview

1. InBound Communication Protocols	Wired – RS232/485, SPI, I2C, Serial etc. Wireless – Zig-Bee, BLE4.0 & Sub-1
2. OutBound Communication Protocols	Wi-Fi, Ethernet, GSM (Provision for 2G, 3G & 4G network).
3. Internal GNSS	Global positioning system/Global Navigation Satellite System.

Hardware Overview

4. RTC	Real time clock to store data with time logs.
5. EEPROM (256MB)	Memory to store 15-20 days records in case power or network failure.
6. Li-ion battery	2700MAH battery backup in case of power failure
7. Internal GNSS antenna	An antenna used for GPS connectivity. Integrated into FM device PCB. Does not have external connector.
8. External GPRS antenna	An antenna used for GSM connectivity having external SMA connector.
9. Charging/Discharging circuit	Charge & discharge internal battery through mains automatically.
10. Over voltage protection	Protect device through over voltage from mains.

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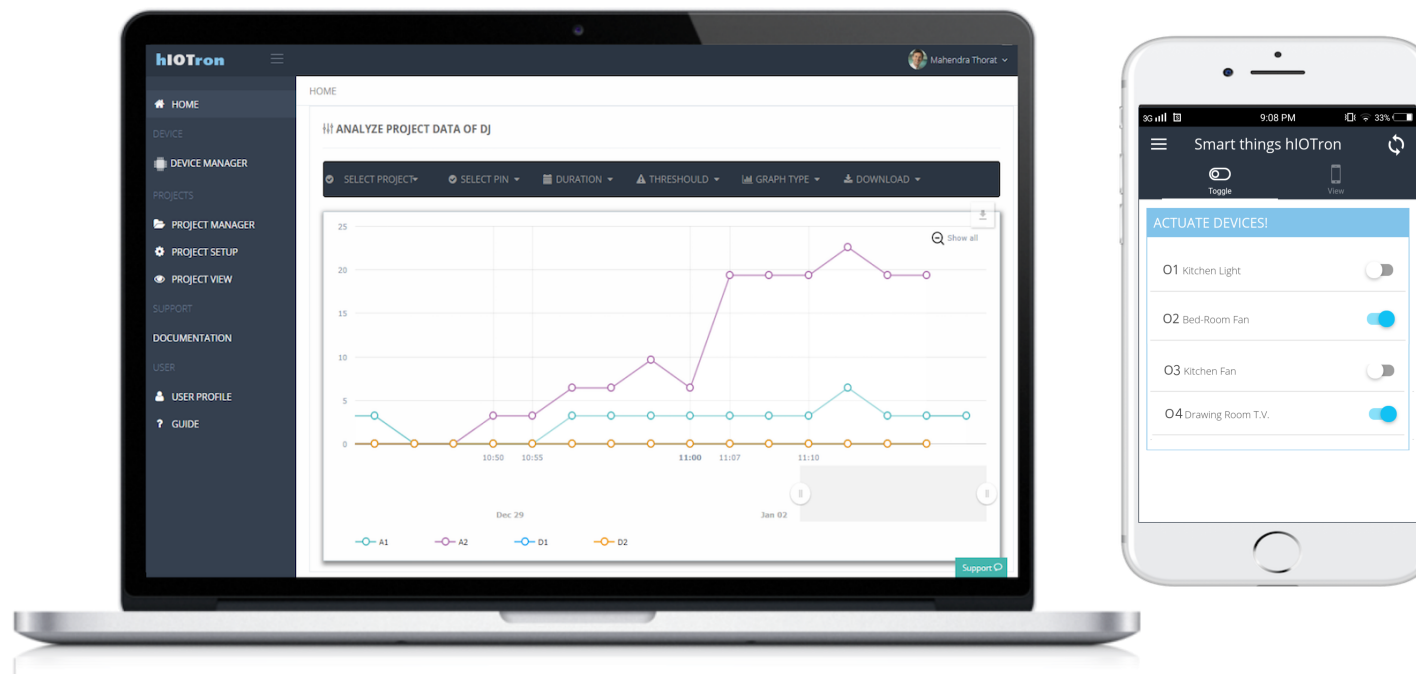
❖ **Device Connectivity** – Web based Platform manages seamless device connectivity & configuration from platform to gateway (Out-Bound Connectivity Protocols: Wi-Fi, Ethernet & 2G/3G/4G/LTE modem) & gateway to wireless/wired end node [In-Bound Connectivity Protocols (Wired – Serial, I2C, SPI, RS232/485, 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.

Enterprise Features

❖ **Open APIs for Custom UI Models & Business Logics** - Access of REST APIs in JSON/string format allows you to embed raw data anywhere in the form custom visualizing model as per business logics or branding requirement.

❖ **Logo/Theme Branding** - Partners can serve hIOTron IOT platform as their own IoT platform to their clients with logo & theme branding features.

❖ **White Label Custom URL Branding** - Partners can also serve hIOTron IOT platform as their own IoT platform with completely white label branding option right from their custom logo to URL.

Dashboard & Mobile application – Multiple user role level mobile Application & Dynamic Dashboard/Web-app access fully sync with each other.

Ready to Market – Total 10 Weeks

Phase-2 Customization Timeline – 4 Weeks

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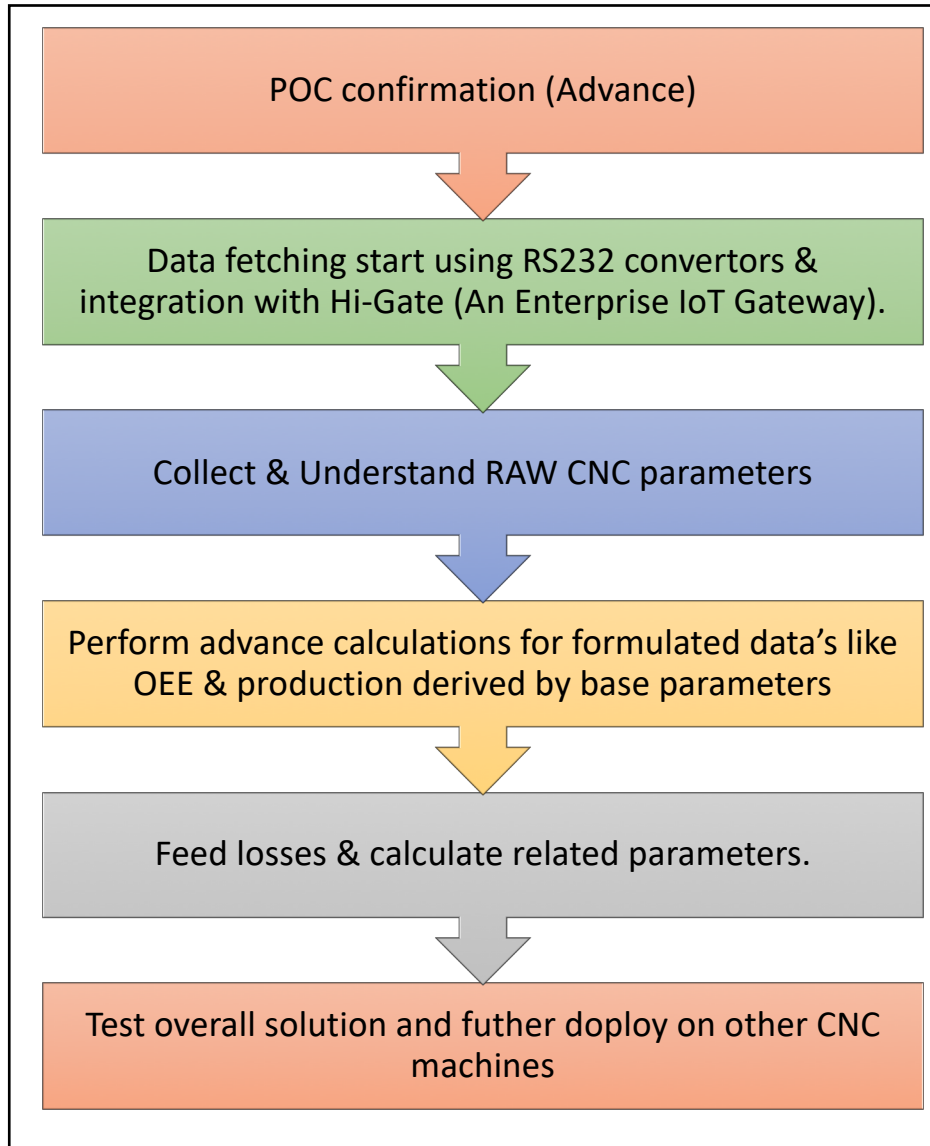
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Phase-1 Proof of Concept (POC) Timeline – 2 Weeks

Phase-3 Production Timeline – 4 Weeks

HOW TO START - POC STEPS & TERMS/CONDITIONS

POC confirmation (Advance)

↓

Data fetching start using RS232 convertors & integration with Hi-Gate (An Enterprise IoT Gateway).

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Collect & Understand RAW CNC parameters

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Perform advance calculations for formulated data's like OEE & production derived by base parameters

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Feed losses & calculate related parameters.

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Test overall solution and futher doploy on other CNC machines

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➢ Free access of hIOTron IOT platform. [valid up-to POC period]

➢ POC Installation Support –Technical team will visit on-site for testing & deploying purpose. Team may need support from your on-site engineers.

➢ Data Privacy policy – We will not share or sell Information such user id, password, device details, device data, mail, message
and other data which passes through www.platform.hiotron.com without your express. Read more about our data privacy policy
https://www.hiotron.com/iot/hioton-privacy-policy/

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