IoT Enabled Smart Machines Monitoring System

INTERNET OF THINGS
hIOTron

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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

Connectivity

MoDBus, ProfiBus, Profinet, CANBus, RS232/485, 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, QUALCOMM, Microchip & Many more.

Communication Channel

Wi-Fi, Ethernet, GSM/GPRS (2G,3G,4G), GNSS, LTE.

Cloud Platforms

AWS, IBM Blue-mix Watson, Azure IoT, Thing-Worx, hIOTron® & Private.

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.

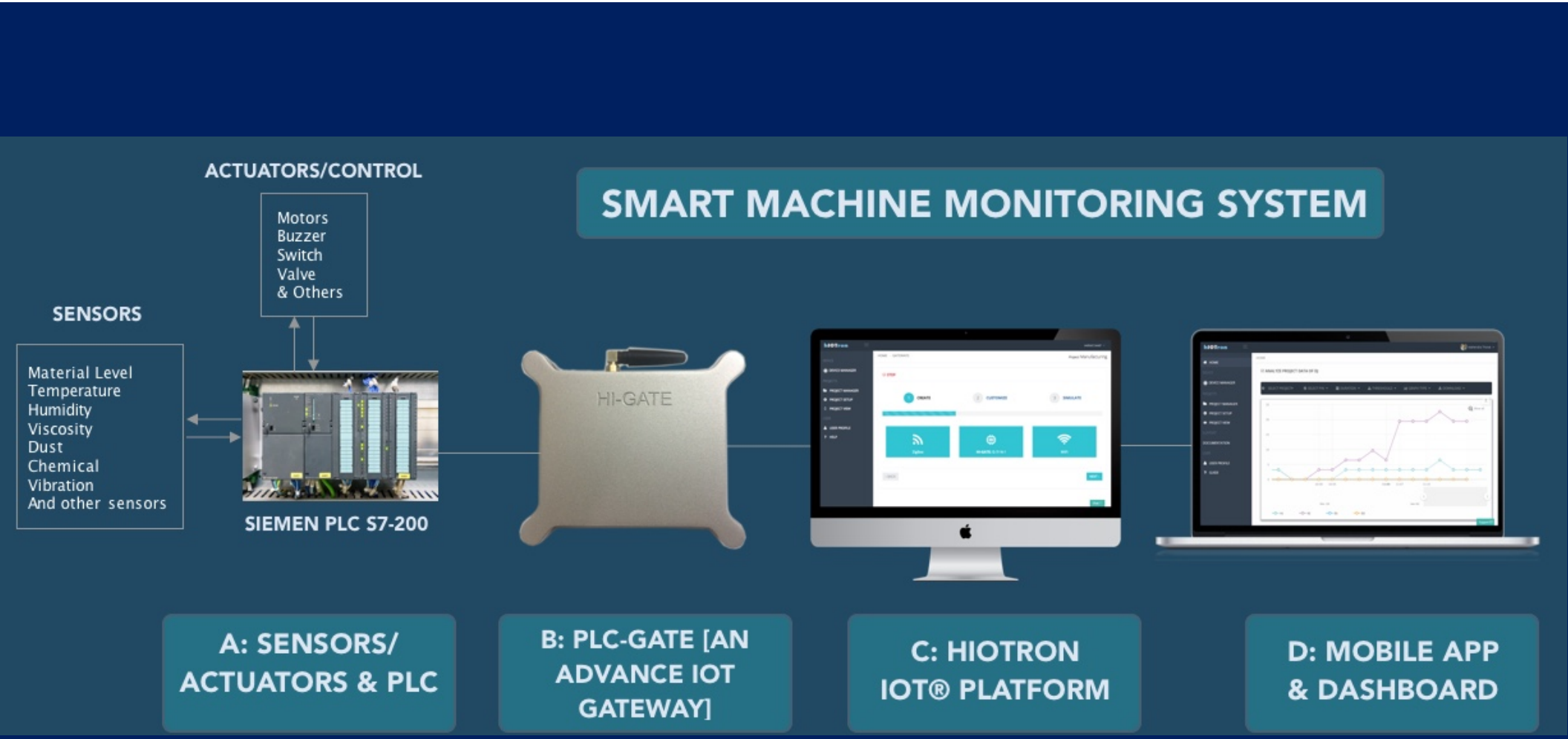
Achievements

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

Clientele

JOHN DEERE
ATP NETWORKS
DANA SPICER Drivetrain Products
BIOENABLE
Identify - Automate - Track
allure automation
TATA MOTORS
DYNAMIC LOGISTICS
Innovating Inventories
HITACHI
Inspire the Next
unlimit
POWERED BY RELIANCE
TATA
TATA TECHNOLOGIES
verizon
magicrete
magic behind happy homes
BAJAJ Allianz
Whirlpool
Cognizant
ISYX
magicrete
magic behind happy homes
logitech
SUTTATI
SUTTATI ENTERPRISES LTD
SATISFACTION 100% GUARANTEED
smart inn
We Establish Connections
SYMMETRIC
EXCELLENCE • DEDICATION • INNOVATION
MK JOKAI
CYIENT
HYPER ENGAGE
IOX
Links Across Islands...
ATHER
BAJAJ
Bajaj Electricals Ltd.
TATA
TATA CONSULTANCY SERVICES
TOUCH MARQ

End-To-End Solution Architecture



Profinet communication
Ethernet HuB
Siemens PLC S7-200
Profinet
Profinet
Ethernet
HI-GATE
HMIs
HMI
GPRS (2G/3G/4G)
hIOTron™ Platform
SIEMENS PLC S7-200-TO-HIGATE
HIGATE—TO-PLATFORM
PLATFROM-TO-MOBILE/DASHBOARD
COMMUNICATION LEVEL
PHYSICAL PROTECTION OR FIRMWARE LEVEL SECURITY
SSL/TLS, X.509 SECURE CERTIFICATES
SECURITY LEVEL

Solution Potential Benefits

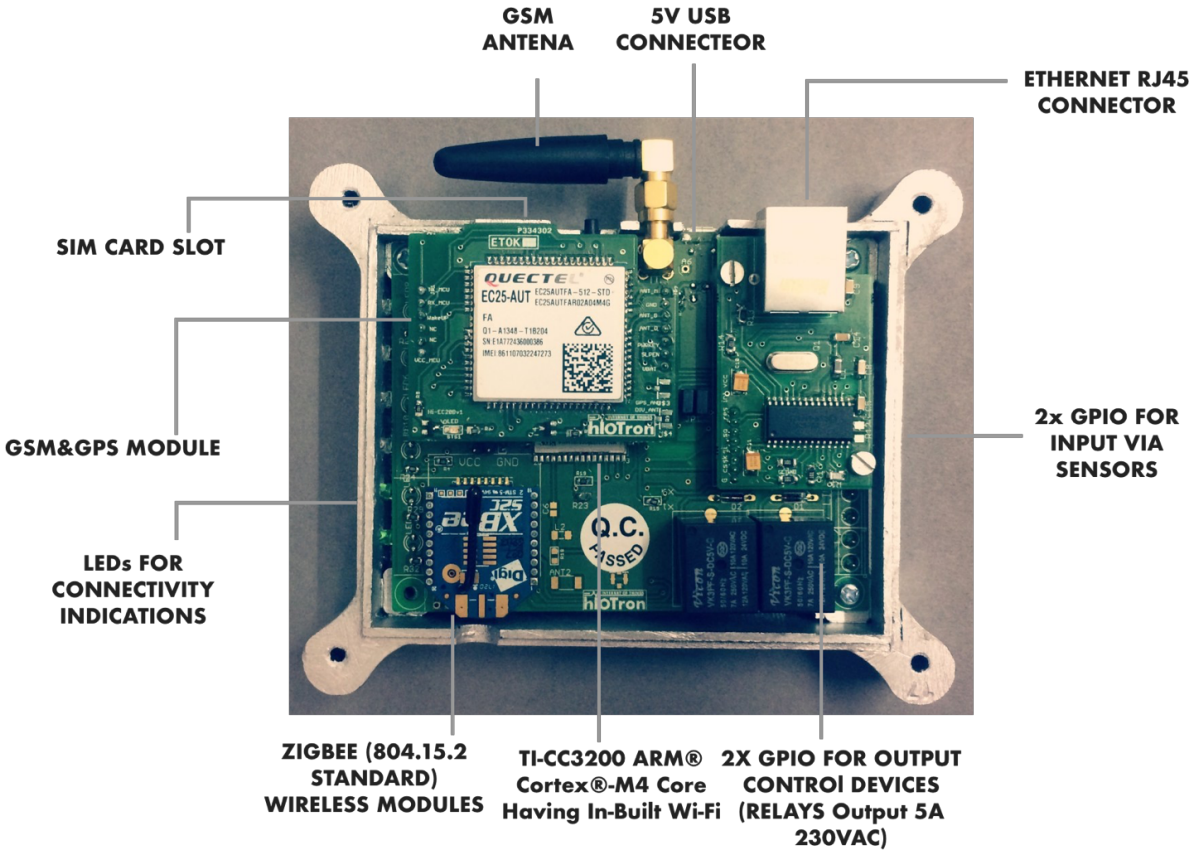
- ✓ Remote access of real time production data monitoring to all key stakeholders.
- ✓ Useful analytics to control machine performance.
- ✓ Buzzers/Alarms/SMS/Email triggered for any machine fault/process non-compliance.
- ✓ Move from breakdown maintenance to Preventive/Predictive maintenance there by 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.

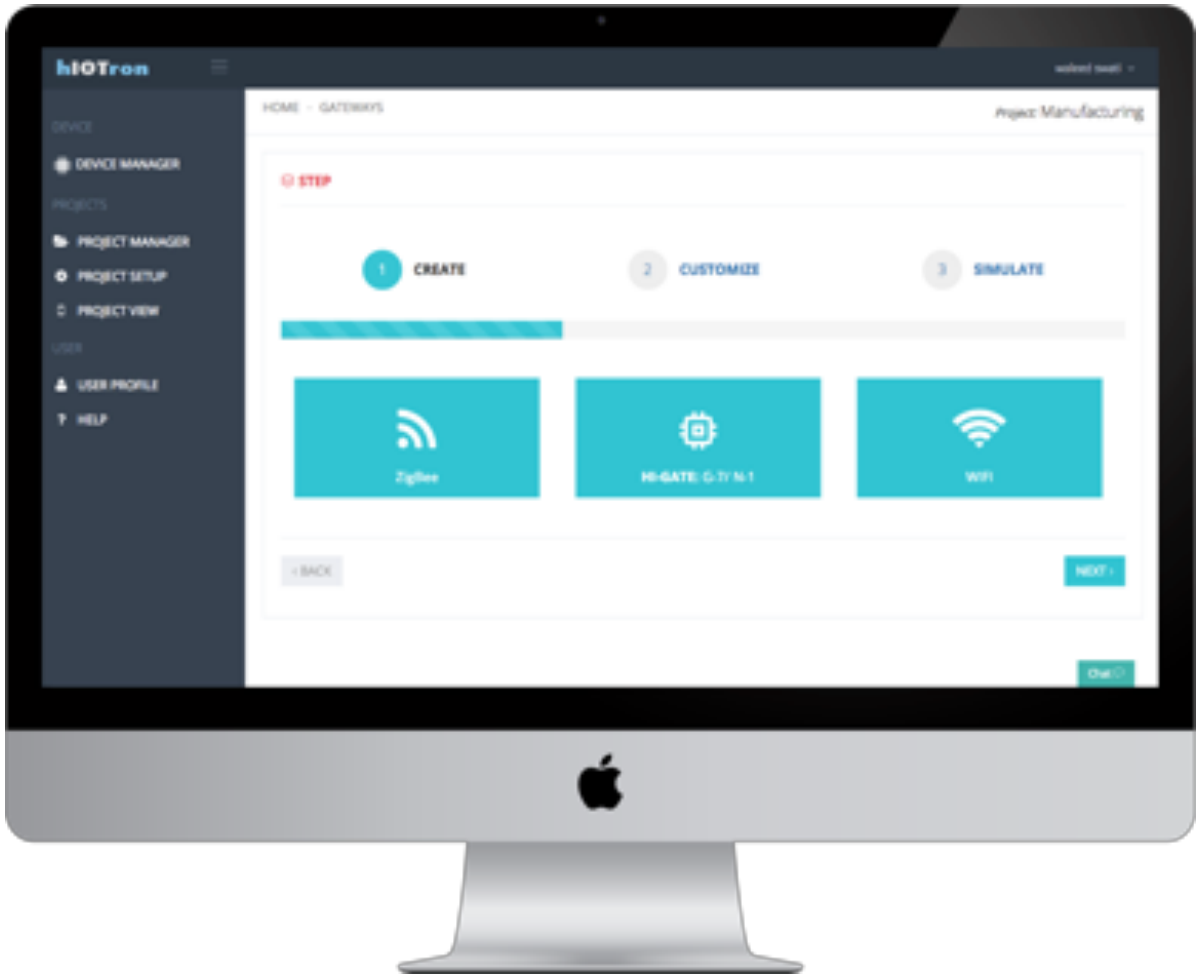
Solution Components

- **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.



Technology Overview	
1. In-Bound Communication Protocols	Wired – Profi-net, Ethernet, SPI, I2C, Serial etc.
2. Out-Bound Communication Protocols	Wi-Fi, GSM (Provision for 2G).
Hardware Overview	
3. RTC	Real time clock to store data with time logs.
4. EEPROM (256MB)	Memory to store 15-20 days records in case power or network failure.
5. External GPRS antenna	An antenna used for GSM connectivity having external SMA connector.
6. Power supply	12-24 VDC +/-20%, LPS
7. Extended Temperature Range Operating	-25°C to +70°C, 10 to 95% relative humidity (non-condensing) Storage: -40°C to +70°C, 10 to 95% relative humidity (non-condensing)
8. Dimensions	125 x 175 x 65mm (H x D x W) Weight: 300 grams DIN rail or wall screw fixing system
9. Warranty	12 months

- **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

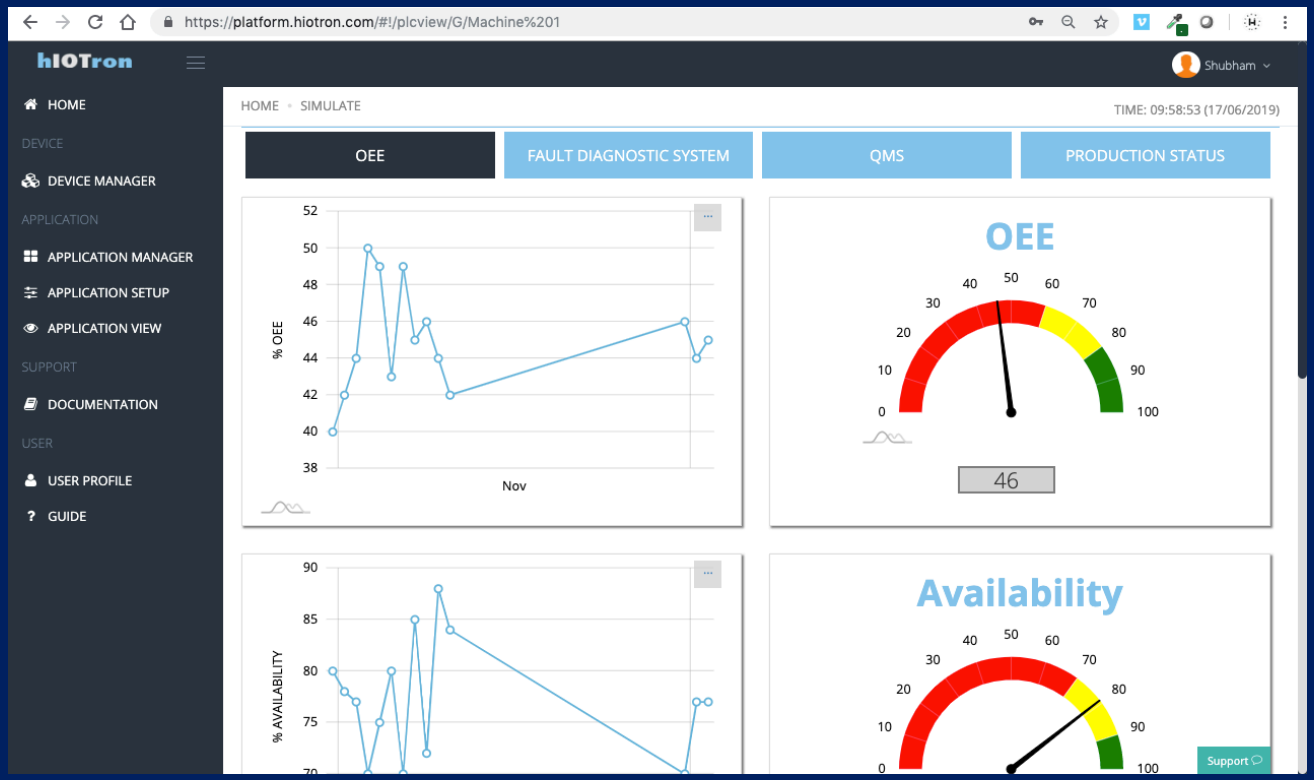
- ✓ Fault Pareto - Repeat alarms
- ✓ Fault Pareto – Downtime contribution
- ✓ Fault Category pie chart
- ✓ SMS/Alerts to trigger maintenance

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)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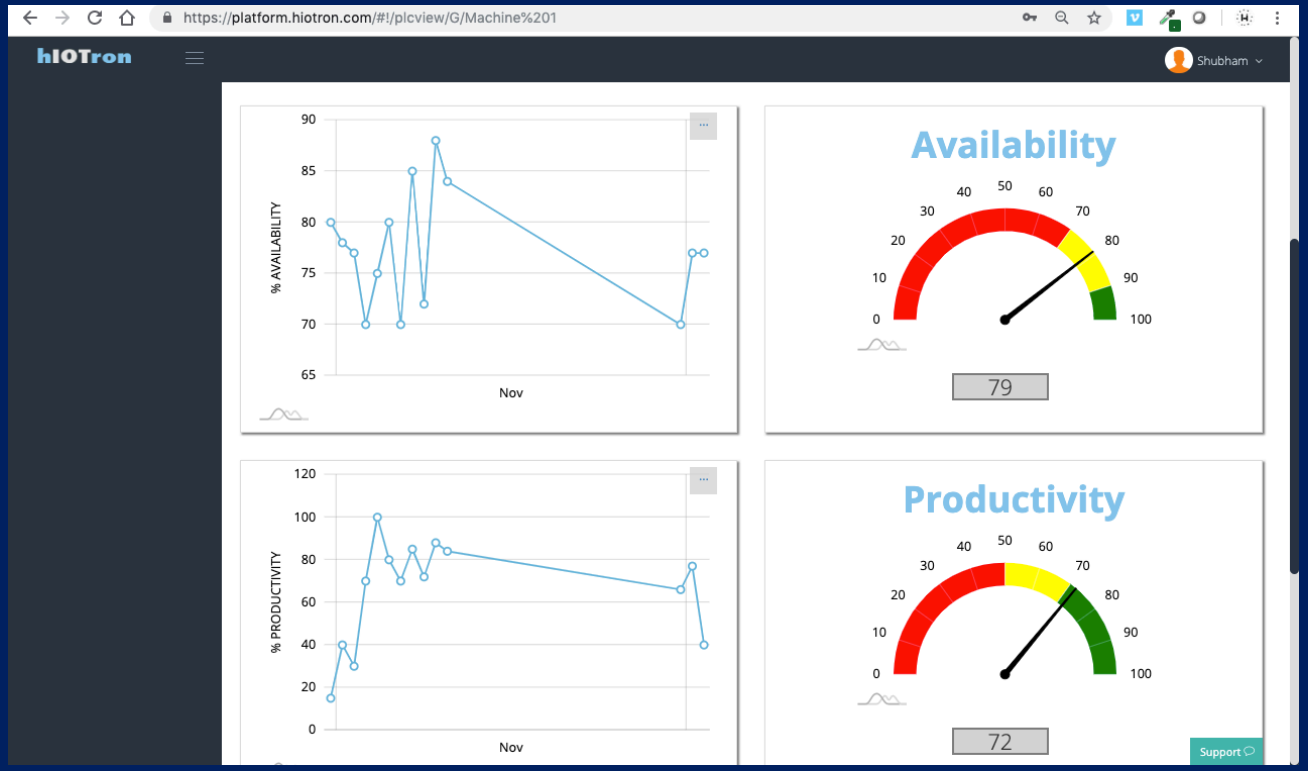
hIOTron
Shubham
HOME
DEVICE
DEVICE MANAGER
APPLICATION
APPLICATION MANAGER
APPLICATION SETUP
APPLICATION VIEW
SUPPORT
DOCUMENTATION
USER
USER PROFILE
GUIDE
HOME • SIMULATE
TIME: 09:58:53 (17/06/2019)
OEE
FAULT DIAGNOSTIC SYSTEM
QMS
PRODUCTION STATUS
% OEE
Nov
OEE
46
% AVAILABILITY
Availability
Support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% AVAILABILITY
Nov
Availability
79
% PRODUCTIVITY
Productivity
72
Support

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Shubham
HOME
DEVICE
DEVICE MANAGER
APPLICATION
APPLICATION MANAGER
APPLICATION SETUP
APPLICATION VIEW
SUPPORT
DOCUMENTATION
USER
USER PROFILE
GUIDE
HOME • SIMULATE
TIME: 10:00:23 (17/06/2019)
OEE
FAULT DIAGNOSTIC SYSTEM
QMS
PRODUCTION STATUS
Pareto Chart :
(No. of faults)
Duration
TODAY
YESTERDAY
THIS WEEK
THIS MONTH
LAST MONTH
CUSTOM
50
40
30
20
10
0
A
B
C
D
E
F
G
H
I
Pareto Chart :
(Duration , Minutes)
Support

https://platform.hiotron.com/#!/plcview/G/Machine%201
hIOTron
Shubham
Pareto Chart :
(Duration , Minutes)
200
180
160
140
120
100
80
60
40
20
A
B
C
D
E
F
G
H
I
Fault Category
MECHANICAL 10
HYDRAULIC 20
Others: 13.3%
Mechanical: 7.4%
Support

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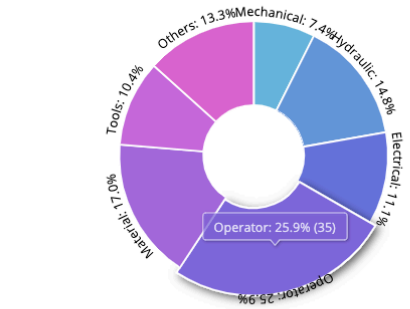
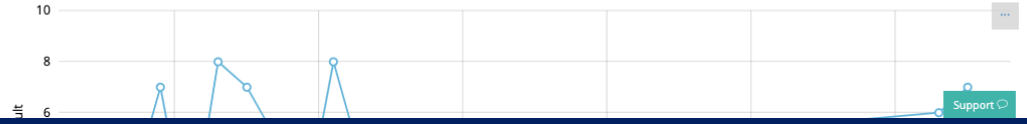
Fault Category

MECHANICAL	10
HYDRAULIC	20
ELECTRICAL	15
OPERATOR	35
MATERIAL	23
TOOLS	14
OTHERS	18



Mechanical 7.4% Hydraulic 14.8% Electrical 11.1%
Operator 25.9% Material 17.0% Tools 10.4%
Others 13.3%

Total no. of Fault(Monthwise) :



Support

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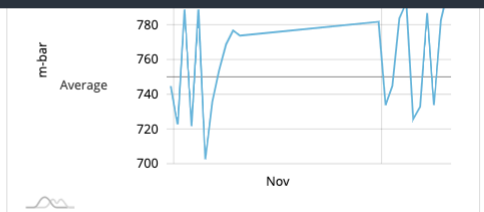
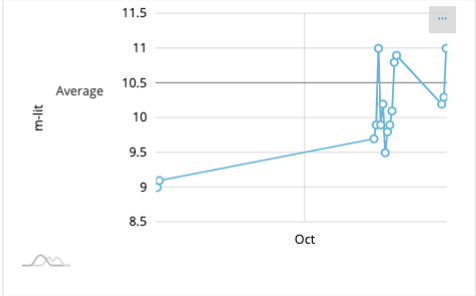


Actual Readings

Average : 750
Min : 700
Max : 820

Standard Deviation : 720
Range : 700

Flow Meter :



Actual Readings

Average : 10.5
Min : 60
Max : 80

Standard Deviation : 30
Range : 70

Support

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HOME

DEVICE

DEVICE MANAGER

APPLICATION

APPLICATION MANAGER

APPLICATION SETUP

APPLICATION VIEW

SUPPORT

DOCUMENTATION

USER

USER PROFILE

GUIDE

HOME • SIMULATE

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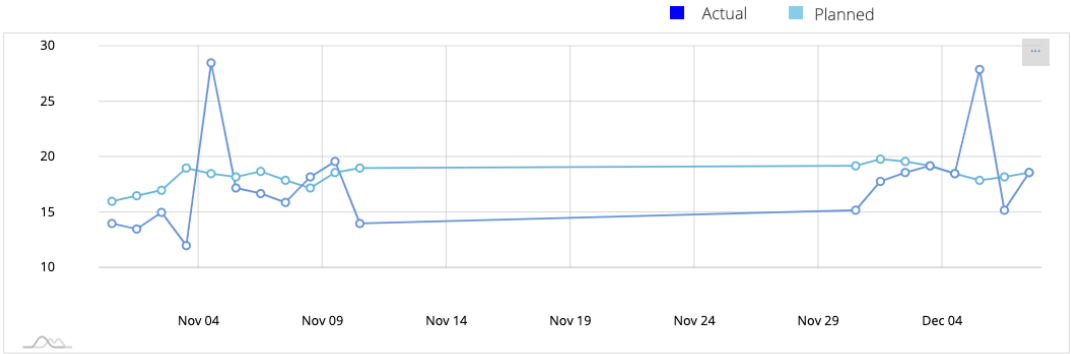
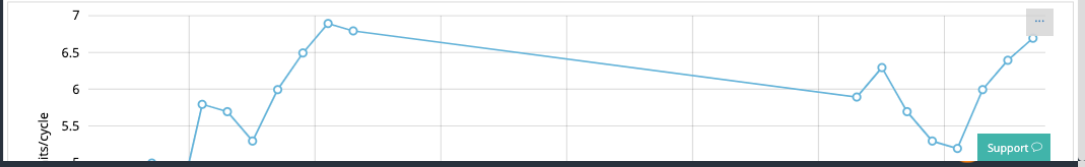
OEE | FAULT DIAGNOSTIC SYSTEM | QMS | PRODUCTION STATUS

Production (Plan vs Actual)

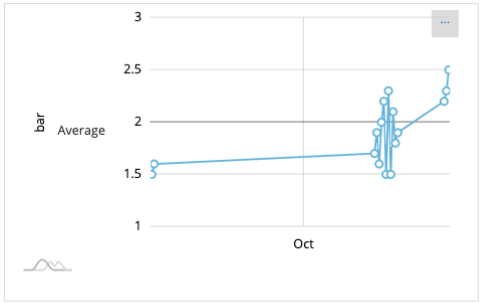


Energy Management



Support

Pressure :

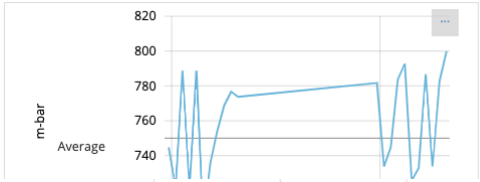


Actual Readings

Average : 2
Min : 1
Max : 3

Standard Deviation : 2
Range : 3

Vacuum :



Actual Readings

Average : 750
Min : 700
Max : 820

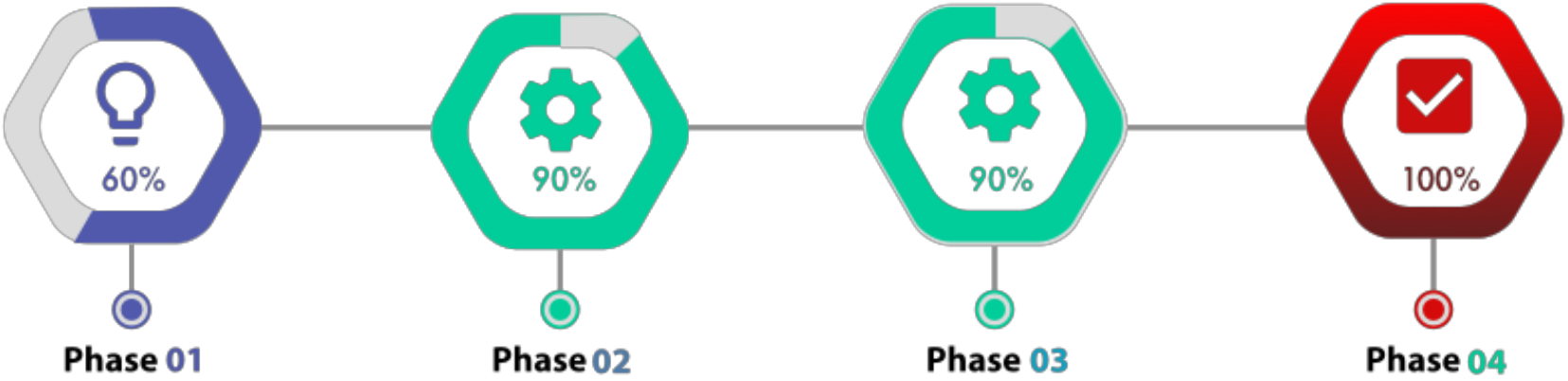
Standard Deviation : 720
Range : 700

Support

Development Phases

Turnkey Project Delivered in 18 to 20 weeks

Proof of Concept - Done	Alpha Testing - Done	Beta Testing – In-Done	Production – Yet to Start



Phase 01	Phase 02	Phase 03	Phase 04
Quickly prototyped & Hi-PLC integrated with S7-200 (smart) PLC for package dispensing machine to validate the end-t-to-end concept with the help 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.

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