# SMART WATER QUALITY MONITORING SYSTEM

aeron®

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# ABOUT AERON

- A pioneer in the Inertial Navigation technology, Aeron Systems was founded by Mr. Ashvani Shukla (B. Tech., IIT Kanpur) Mr. Abhijeet Bokil (B.E., MIT Pune) in the summer of 2008.
- Building deep-tech products in the field of Inertial Sensing and Internet of Things.
- Serving global customers in Aerospace, Automotive, Renewable Energy, Environment and Manufacturing sectors.

# PRODUCTS & SOLUTIONS

In over a decade's journey, Aeron with its innovative research, reliable products and diligent support, has become preferred choice of its customers. The products offered by Aeron are categorised in two divisions.

## Inertial Systems & Sensors

Navigate, control and stabilize your platform in aerospace, defense and automotive applications.

- MEMS Inertial Navigation Systems and IMUs
- FOG Inertial Navigation System
- Airborne qualified AHRS
- Digital magnetic compass
- Tilt sensor and inclinometers

## Internet of Things

High reliability rugged data loggers and full package environment monitoring solutions

- Wireless Data Logger and Gateway
- Weather monitoring system for solar power plants, wind farm and agri
- Air quality monitoring system
- Water quality and Flood monitoring system

# SMART WATER QUALITY MONITORING SYSTEM

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Aquaculture / Fish farming

Automate your farm and increase the yield!

Sewage Treatment Plant

Control foul smell, reuse water, comply with regulations

River / Lake

Monitor pollution and save the environment!

Effluent/Waste Treatment

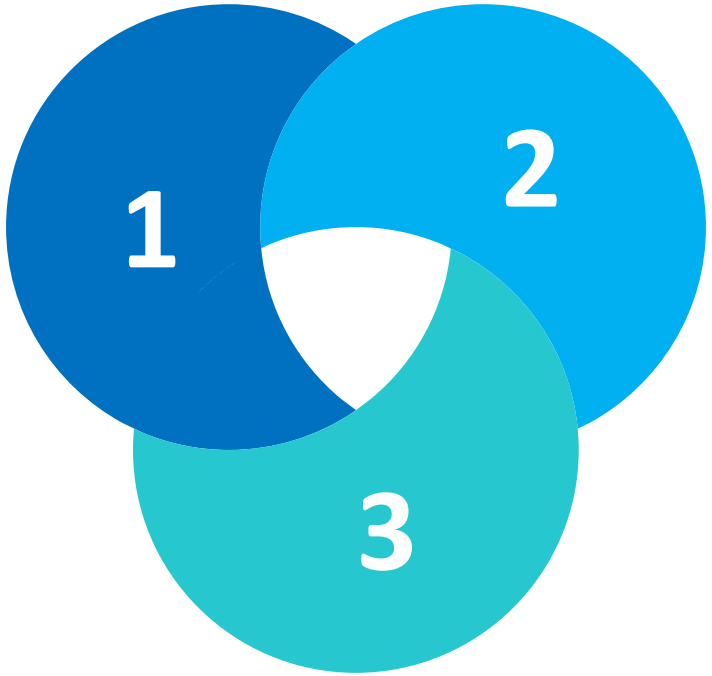
Reuse water, reduce operational cost and comply with regulations

# WHAT IS SMART WATER QUALITY MONITORING SYSTEM?

The smart water quality monitoring system from Aeron called STREAM has mainly three components.
1) Sensors, 2) Smart Controller, 3)  Cloud platform.

## SENSORS & PROBES

The sensors based on UV, Optical and other advance technologies measure the quality parameters of water and provide analog and digital signals.




## CONTROLLER

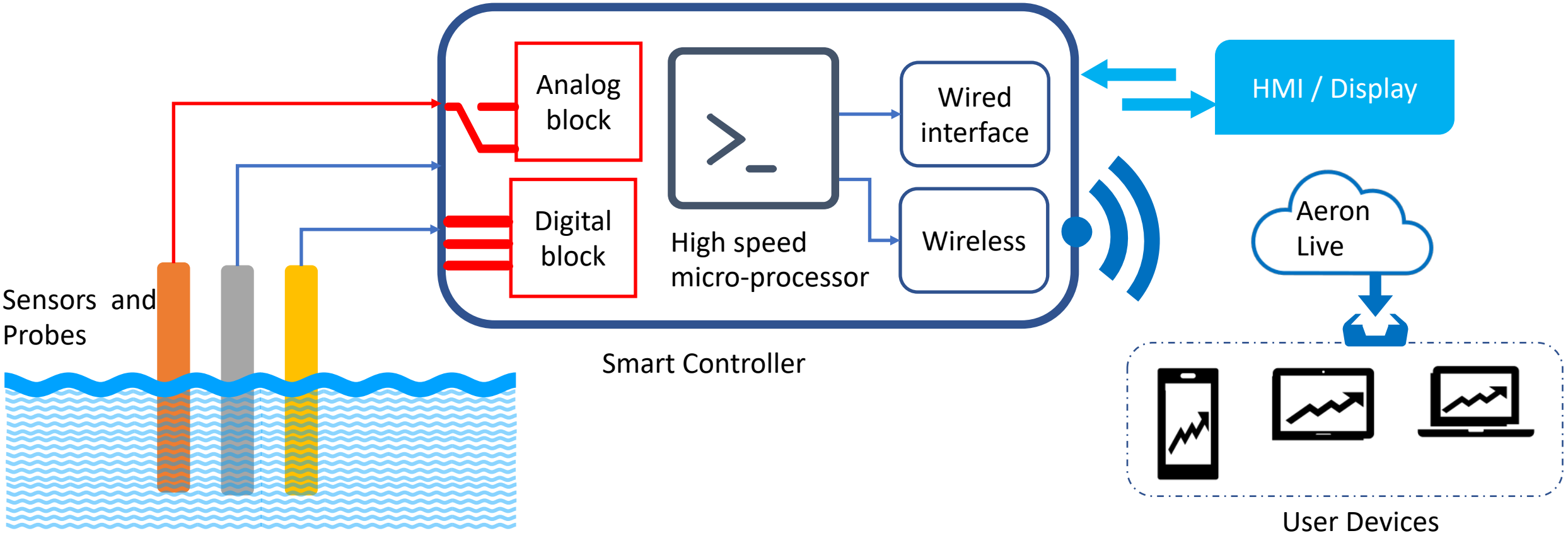
The smart controller is the heart of STREAM which connects with sensors and acquires signals, converts to digital and processes the values, applies algorithms and finally transmits to user through various means.

## CLOUD PLATFORM

The data received on cloud Is analysed and shown to the user in meaningful values and graphs

# WORKING PRINCIPLE OF WATER QUALITY MONITORING SYSTEM

The block diagram below shows the basic working principle of water quality monitoring system from Aeron.



# KEY FEATURES OF SMART CONTROLLER

## HIGH PRECISION

With industry leading 24 bit ADC data is acquired precisely even for low voltage sensors.

## COMMUNICATION

Wireless communication over 4G/LTE and Wi-Fi. Wired communication over Ethernet, RS485 MODBUS, RS232

## VERSATILE INPUTS

Various analog (0-5V, 0-1V, 0-20mV, 4-20mA), digital and serial inputs (RS232, RS485, MODBUS)

## RUGGED

Weather protection, IP65, surge protection, 9-36VDC power, powered by solar panel as well as AC supply

## GPS

Built-in GPS for precise time synchronization and location information

# KEY SPECS OF SMART CONTROLLER

**ANALOG INPUTS**

12/8 Analog Single Ended or 4/2 Differential Channels
0-20mA, 4-20mA, 0-1V, 0-5V input range

**ADC RESOLUTION**

24 bit ADC resolution for analog inputs, highest resolution in this class of products

**CONNECTIVITY**

Wireless connectivity over Wi-Fi, LTE (4G)/UMTS/GPRS and Wired connectivity over Ethernet, RS485 MODBUS

**INPUT INTERFACES**

Input digital interfaces: SDI-12, RS232, RS485 MODBUS RTU, MODBUS TCP

**TIME SYNCHRONIZATION**

Time synchronization through GPS, and internet, RTC with backup battery

**STORAGE MEMORY**

8 GB flash memory for years of data storage

**POWER**

9-30 VDC operating voltage

# SENSORS & PROBES

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STREAM

Aeron's STREAM series smart water quality monitoring system has wide range of latest optical and UV technology based sensors with fast response time, compact size and low maintenance.

- pH
- $COD_{eq}$
- BOD
- TSS
- ORP
- DO
- $NH_3$
- TOC
- TDS
- Conductivity
- Fluoride
- Chloride
- Sulphate
- Turbidity
- Alkalinity
- Ion Selective Electrode
- Free Chlorine
- Arsenic
- Color
- Flow Rate
- Hardness
- Temperature
- Oil & Grease

# TYPICAL PARAMETERS MEASURED IN ETP AND STP

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Following parameters are generally measured in the ETP and STP. Other parameters' measurement is also available with STREAM.

STREAM

| | |
|---|---|
| pH | 0 – 14<br>Combined electrode |
| BOD | 0 – 1,000 ppm<br>UV spectral absorption |
| Turbidity | 0 – 1,000 FAU<br>IR Nephelometry |
| TSS | 0 – 3,700 ppm<br>IR spectroscopy (870nm) |
| $COD_{eq}$ | 0 – 10,000 ppm<br>UV visible spectroscopy /<br>UV-254 spectral absorption |
| TOC | 0 – 1,000 ppm<br>UV visible spectroscopy /<br>UV-254 spectral absorption |
| Flow Rate | 15 – 1200 mm<br>EM Flow Meter |

# TYPICAL PARAMETERS MEASURED IN WTP

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Following parameters are generally measured in the WTP. Other parameters' measurement is also available with STREAM.

STREAM

| | |
|---|---|
| pH | 0 – 14<br>Combined electrode |
| ORP | 0 – 2,000 mv<br>Combined electrode |
| Conductivity | 0.001 – 2,000 mS/cm<br>Amperometric with 4 electrodes |
| Chloride | 0 – 200 ppm<br>Ion selective electrode |
| Hardness | 0 – 1,000 ppm<br>Ion selective electrode |

# TYPICAL PARAMETERS MEASURED IN RIVER AND LAKE

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STREAM

Following parameters are generally measured in the rivers and lakes. Other parameters' measurement is also available with STREAM.

| | | | | | |
|---|---|---|---|---|---|
| pH | 0 – 14<br>Combined electrode | DO | 0 – 100 ppm<br>Optical / Galvanic | Chloride | 0 – 200 ppm<br>Ion selective electrode |
| TSS | 0 – 3,700 ppm<br>IR spectroscopy | Total Ammonical Nitrogen | 0 – 100 ppm<br>Photometric | Sulphate | 0 – 1,000 ppm<br>Ion selective electrode |
| Hardness | 0 – 1,000 ppm<br>Ion selective electrode | Manganese | 0 – 1,000 ppm<br>Ion selective electrode | Copper | 0 – 2,000 ppm<br>Ion selective electrode |
| Conductivity | 0.001 – 2,000 mS/cm<br>Amperometric with 4 electrodes | | | Zinc | 0 – 1,000 ppm<br>Ion selective electrode |

# TYPICAL PARAMETERS MEASURED IN COOLING TOWER

STREAM

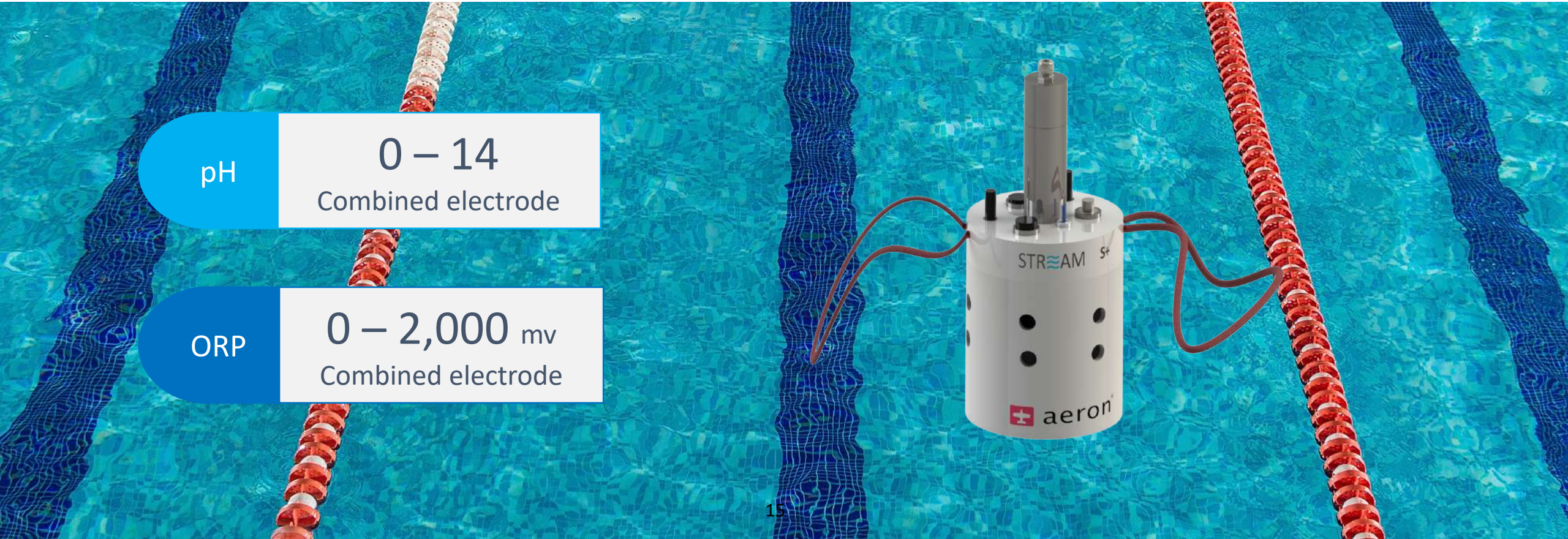
Following parameters are generally measured in the cooling tower. Other parameters' measurement is also available with STREAM.

| | |
|---|---|
| pH | 0 – 14<br>Combined electrode |
| Conductivity | 0.001 – 2,000 mS/cm<br>Amperometric with 4 electrodes |
| ORP | 0 – 2,000 mv<br>Combined electrode |
| TDS | 0 – 2,000<br>UV spectral absorption |

# TYPICAL PARAMETERS MEASURED IN SWIMMING POOL

STREAM

Following parameters are generally measured in the swimming pool. Other parameters' measurement is also available with STREAM.



# PRODUCT VARIANTS

STREAM

*Aeron's smart water quality monitoring system is available in three versions suitable for different installation requirements.*

## Inline (I⁺)

Installed in bypass line, it is an easy option mostly for E/S/WTP, indoor as well as outdoor installation near the treatment plant.

## Submerged (S⁺)

When the monitoring is required in stored water, processing tank, pond and other submerged applications.

## Floating (F⁺)

Suitable option for aquaculture, river water quality, pond and other water bodies.

# COMMUNICATION OPTIONS

STREAM

Wide range of communication options for variety of application requirements.

## Wi-Fi

When installed indoor, industrial area and even underground.

## Cellular (4G)

Best suitable for data collection from remote location.

## Ethernet

Places where Cellular or Wi-Fi wireless network is not feasible

## RS485 MODBUS

When data is required to be given to PLC or RTU

# SPECIFIC ADVANTAGES OF AERON'S STREAM

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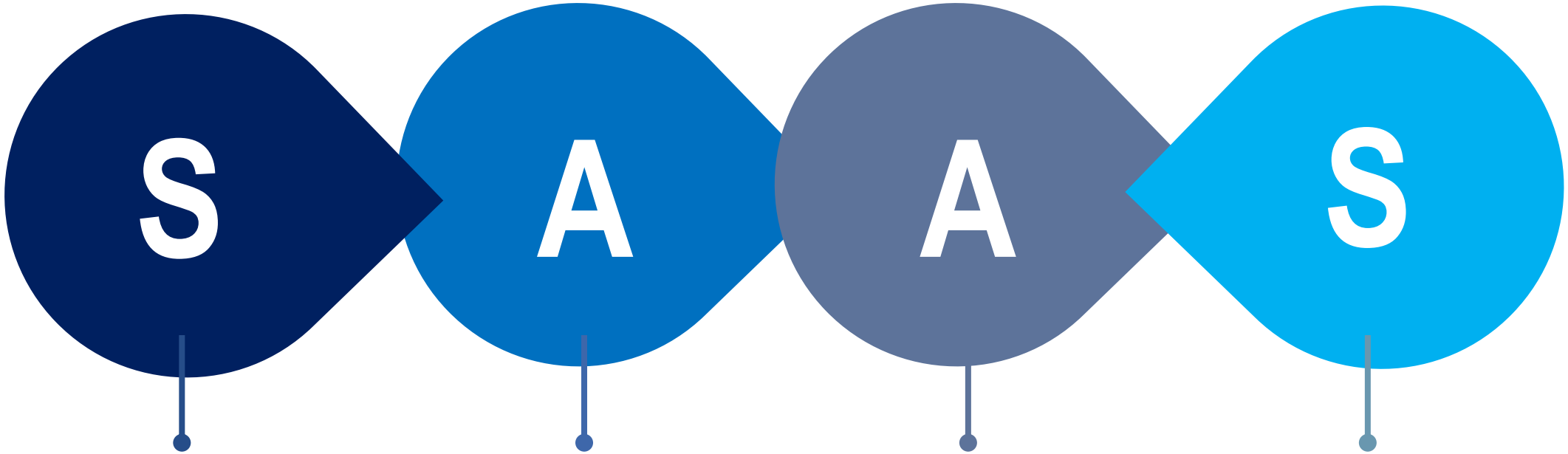



### SCALABILITY

Scalable architecture of STREAM allows addition of sensors in future without the need of a new system

### ACCURACY

24 bit ADC data logger for precise and real-time data collection from variety of sensors

### ALERTS

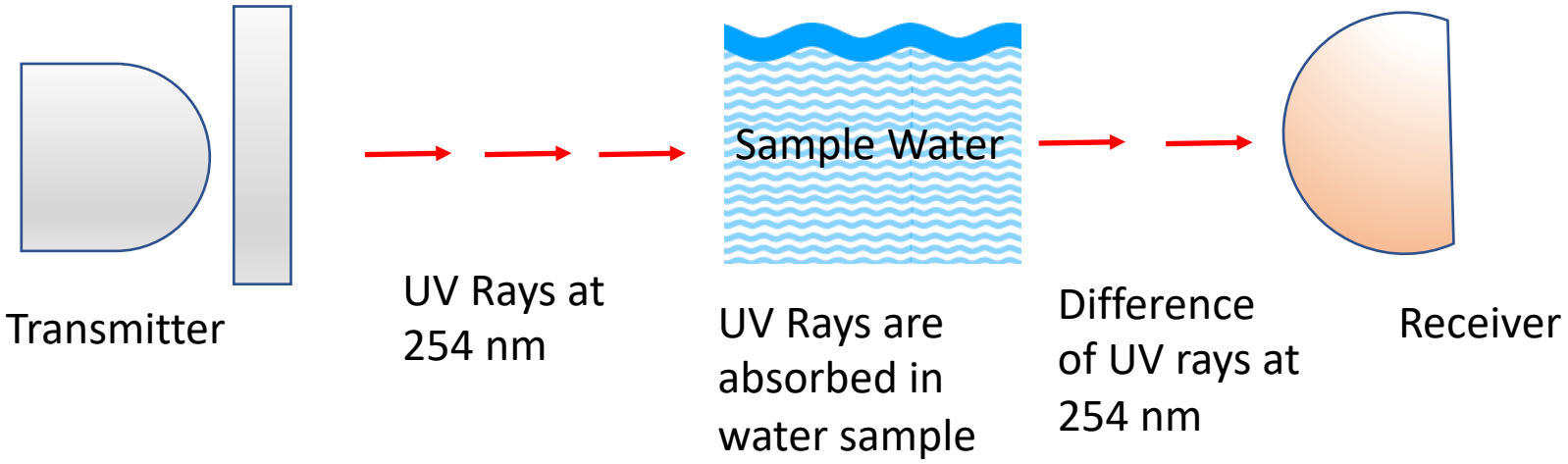
Scheduled and threshold based controls to operate aerators and other equipment for efficient operation.

### SUBMISSION

STREAM complies with Central and State Pollution Control Board guidelines. The data is sent to CPCB/SPCB server for continuous monitoring and environmental clearances.

# SENSOR TECHNOLOGY - BOD / COD / TSS

The COD and BOD values of treated water are critical parameters to verify that the treatment plant is working efficiently. Following block diagram shows the working principle of this sensor.



Main optical source is UV Absorption Spectroscopy – 254 nm
Secondary optical source – visible LED 530 nm
Auto cleaning mechanism

# WATER QUALITY MONITORING FOR AQUACULTURE

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## WHY MONITOR WATER PARAMETERS?

*Oxygen depletion is the most common cause of fish deaths.*

*The Dissolved Oxygen (DO) concentration in aqua farm changes rapidly. Over a matter of hours, or sometimes even minutes, DO can change from optimum to lethal levels. No other critical environmental variable in fish culture is so dynamic.*

*Measure Ammonia to control the feeding (feed conversion ratio), look after growth and health.*

*Significant cost saving, increase yield per pond and reduce greenhouse gas emission.*

# WATER QUALITY MONITORING FOR AQUACULTURE

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## WHAT ARE DESIRED VALUES?

| | Fish / Fresh Water | Shrimp / Brackish Water |
|---|---|---|
| DO (mg/L) | 5 ppm or above | 5 ppm or above |
| Temperature (°C) | 26-30 Deg C | 25-30 Deg C |
| pH | 6.5 to 8.5<br>< 4.0 - Acid death point<br>4.0 – 5.0 -No production<br>6.5 - 8.5 - Desirable range for fish production<br>8.5 - 11.0 - Slow growth<br>> 11.0 - Alkaline death point | 6.5 to 8.5<br>< 4.0 - Acid death point<br>4.0 – 5.0 -No production<br>6.5 - 8.5 - Desirable range for fish production<br>8.5 - 11.0 - Slow growth<br>> 11.0 - Alkaline death point |
| Total Ammonia Nitrogen (ionized NH3+ Unionized NH4) | <0-0.15 mg/l | 0.05-0.4 mg/l |
| Nitrite | < 4.5 mg/L | < 0.125 mg/L |

# TYPICAL PARAMETERS MEASURED IN AQUACULTURE

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STREAM

Following parameters are generally measured in the aquaculture and fish farming. Other parameters' measurement is also available with STREAM.

| | |
|---|---|
| pH | 0 – 14<br>Potentiometric |
| DO | 0 – 50 ppm<br>Galvanic |
| Temperature | 0 – 60 °C<br>Resistance thermometer |
| Total ammonia | 0 – 20 ppm<br>UV spectroscopy |
| Nitrite | 0 – 100 ppm<br>Ion selective electrode |

# KEY ADVANTAGES OF STREAM F+ FOR AQUACULTURE

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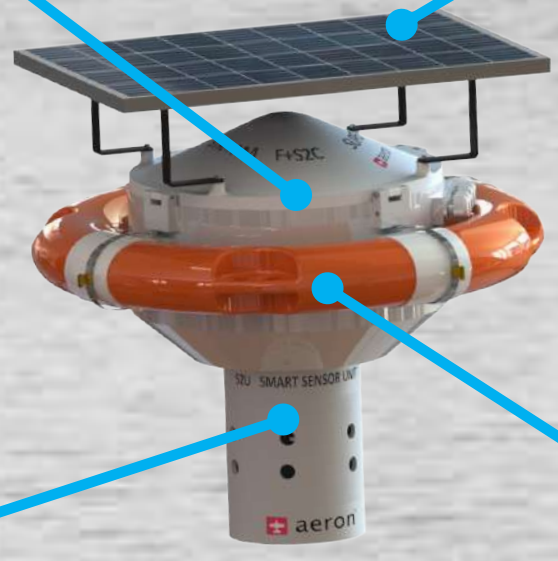
STREAM F+

**SMART CONTROLLER**

High performance controller offering multiple communication options.

**SOLAR POWERED**

Powered by solar, the system works 24x7 uninterrupted




Latest technology sensors with high reliability & accuracy

**SENSORS**

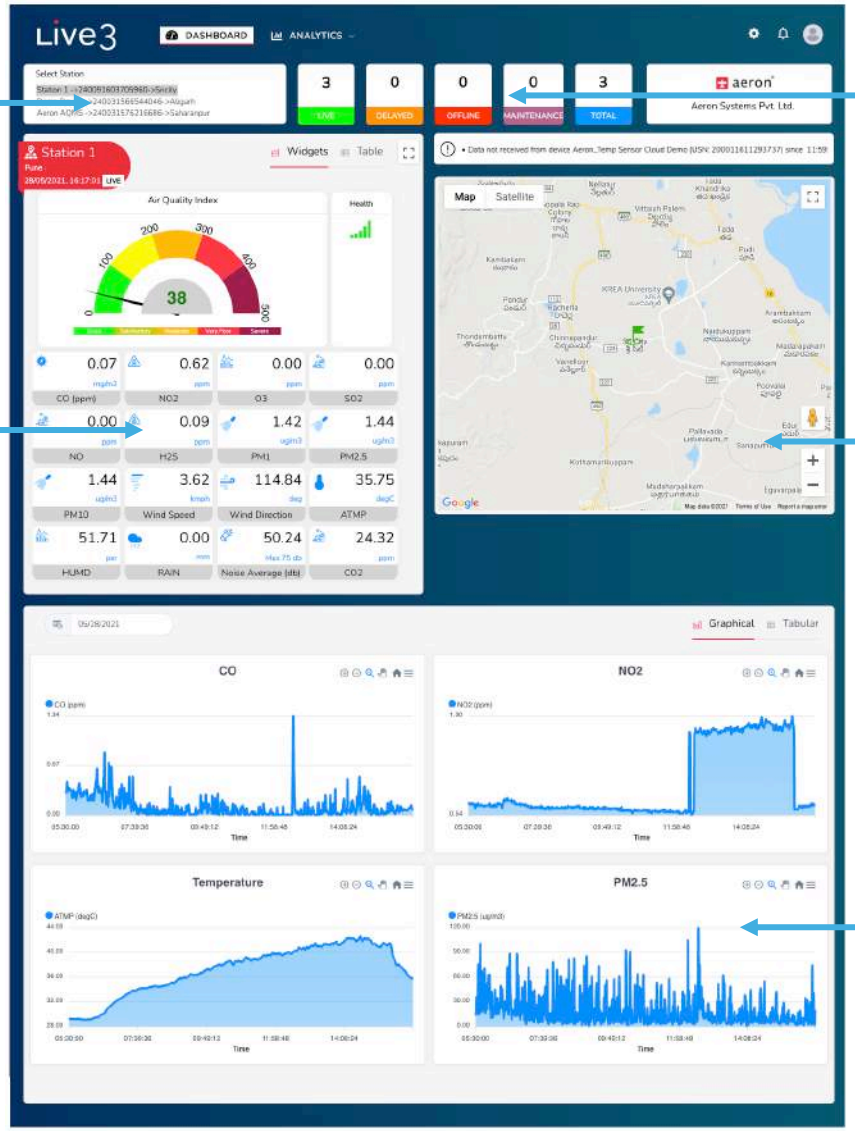
Floating structure made from high quality material for long life

**FLOATING**

# LIVE3 CLOUD SOFTWARE - DASHBOARD

**All Devices List**
Quick list of all the devices you have access to

**Widgets**
The Live view of recent data from your device including the health




**Device Status**
A quick view of the status of all your devices

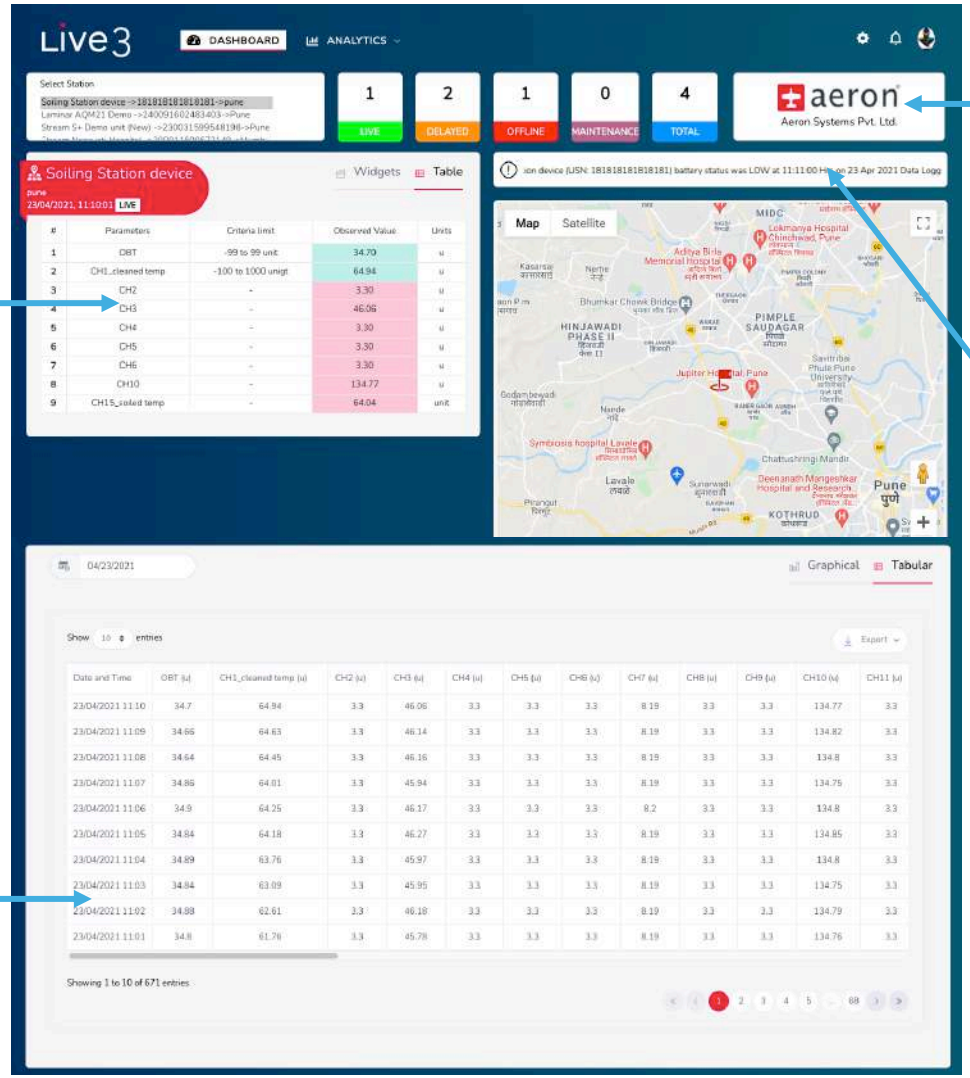
**Geo-Location**
Map view showing geo-location of all the systems

**Graph View**
Quick view of the parameters' trend over time for anomaly detection

# LIVE3 CLOUD SOFTWARE - DASHBOARD

**Quick Data View**
Recent values listed along with threshold limits

**Data Download**
All the data visible in tabular form for user selected time period, downloadable in .CSV file format




**User Logo**
User can add its logo and company name for personalized experience

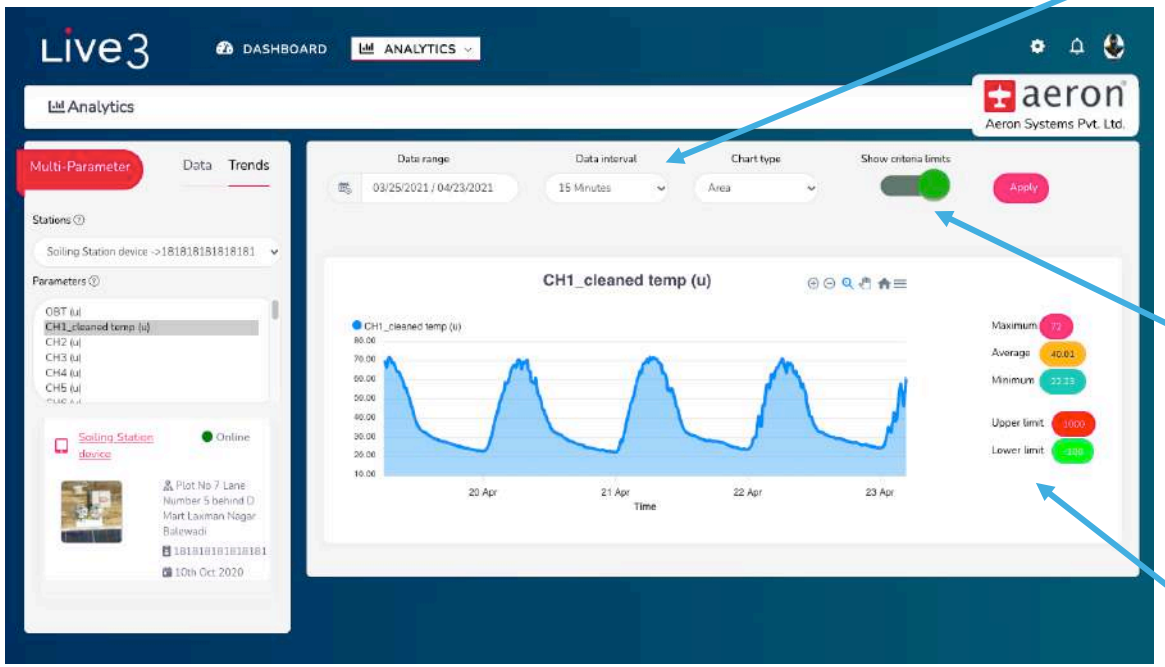
**Notification Panel**
All notifications at one place for easy view

# LIVE3 CLOUD SOFTWARE - ANALYTICS

**Multi Parameter**

Generate graphs of single parameter or multiple parameters (upto 3) at the same time.

Analyze the trend over time, identify threshold breaches. The data analysis available for raw data, 15min, 30 min, 1 hr, 12 hrs, and 24 hrs.




User can select different data interval and chart type

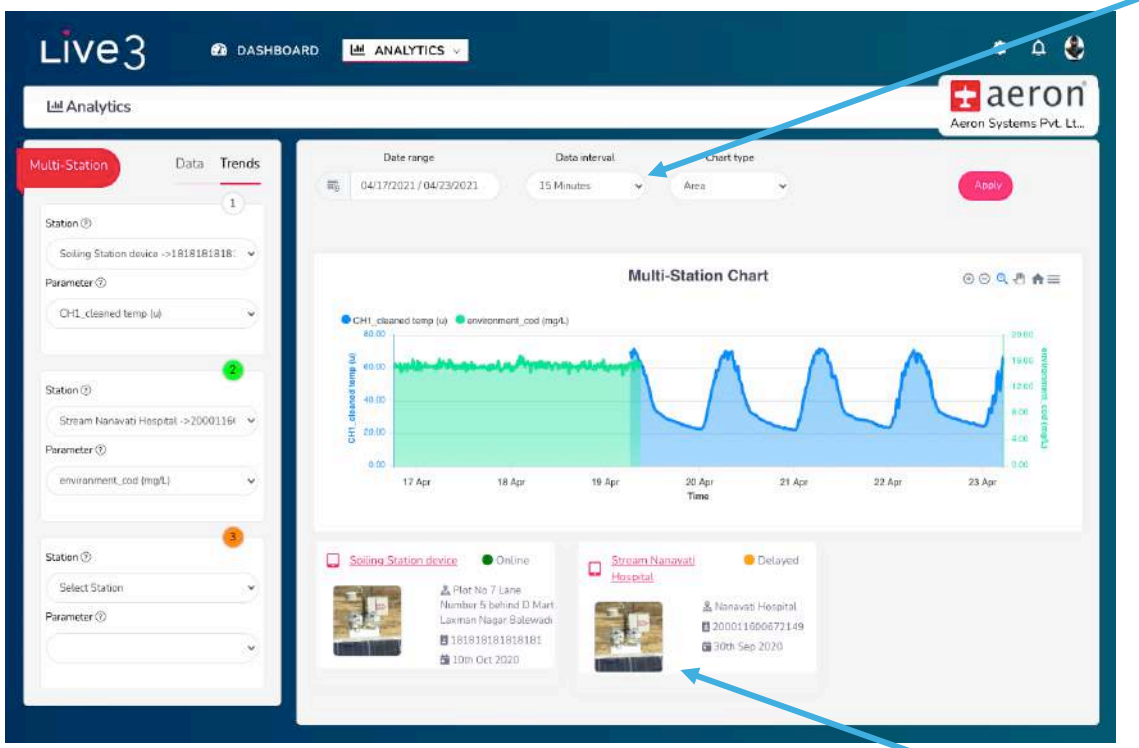
Overlay threshold limits on the graph

Identify maximum, minimum and average values from graphs

# LIVE3 CLOUD SOFTWARE - ANALYTICS

**Multi Station**

Compare parameters from multiple systems, analyze the trend of a particular parameter from different locations.




User can select different data interval and chart type

Profile of the selected devices

# LIVE3 CLOUD SOFTWARE - ANALYTICS

**Multi Time**
Analyze the trend of a particular parameter for two different intervals, like morning to evening, or day 1 to day 2.

Select two different time intervals

Overlay threshold limits on the graph

# LIVE3 CLOUD SOFTWARE - CONFIGURATION

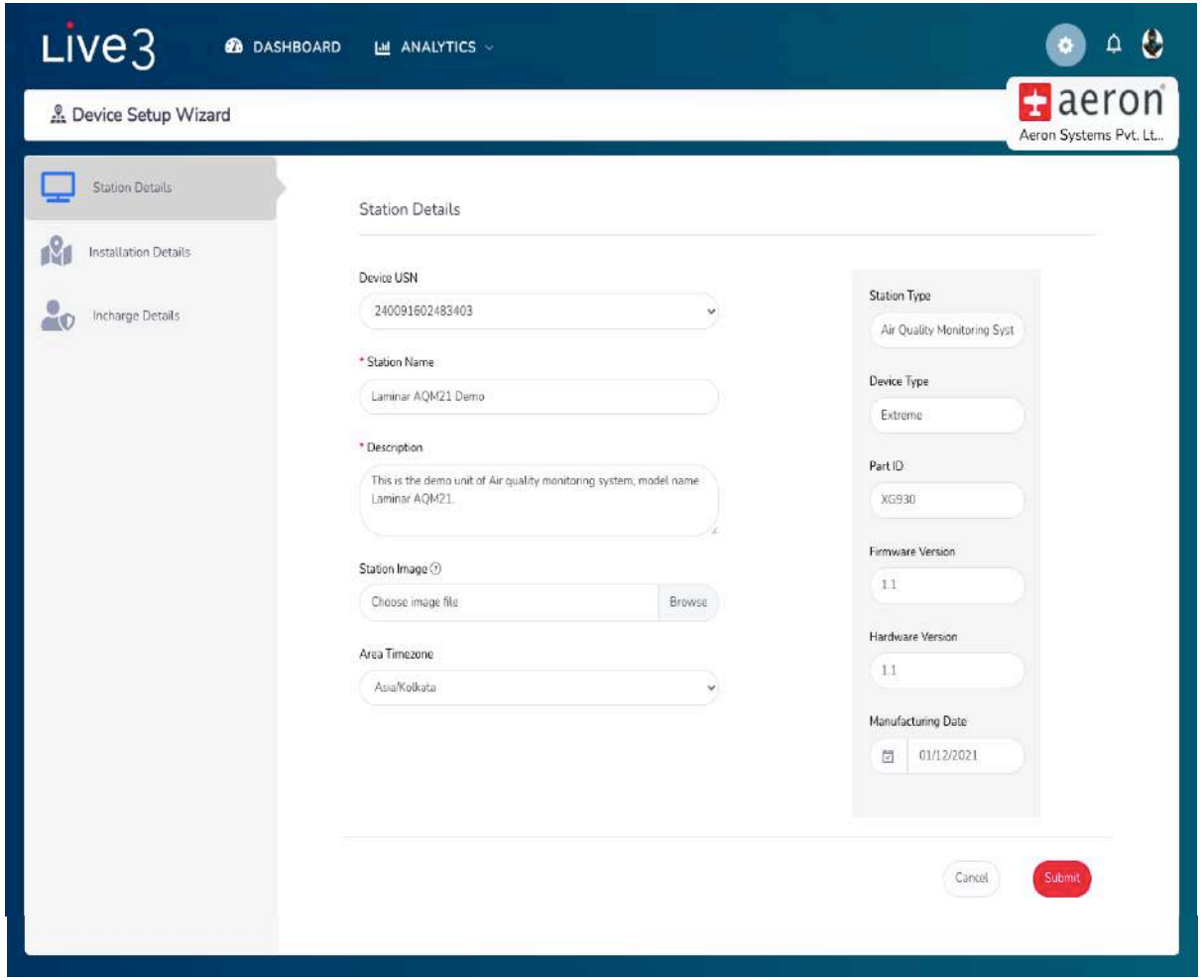
The configuration pages offer full control over your device

Give a unique identity to your device by creating device profile

Configure the parameters, manage what you want to see on Dashboard

Set the details of the site manager

Set alerts on parameters, set interval for reports and much more

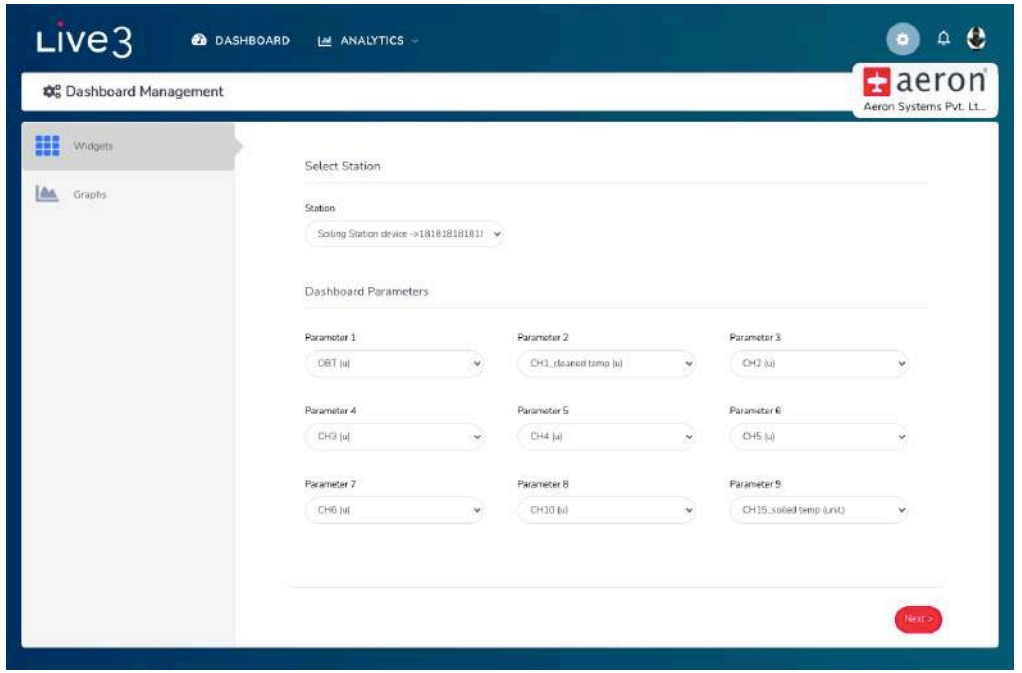


# LIVE3 CLOUD SOFTWARE - CONFIGURATION

**Dashboard Management**

Manage the parameters you want to see on Dashboard

Define the parameters in widgets and graphs

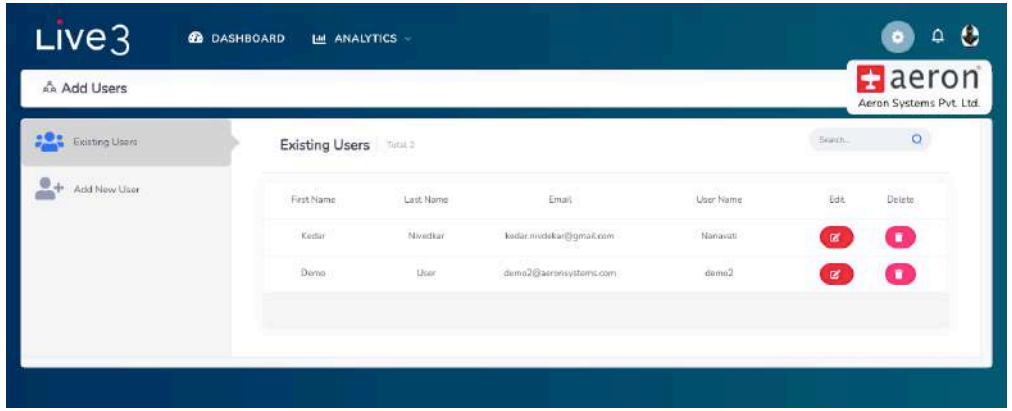



**Reports**

Data reports and health reports sent to user inbox at pre-defined time during the day

**Alerts & Notifications**

Get regular email alerts and notifications for threshold breaches, system health problems at user defined intervals




**User Management**

Manage your users, define rules for data access.

# ENVIRONMENT MONITORING PRODUCTS

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Aeron offers a range of products for environmental monitoring.

## AIR

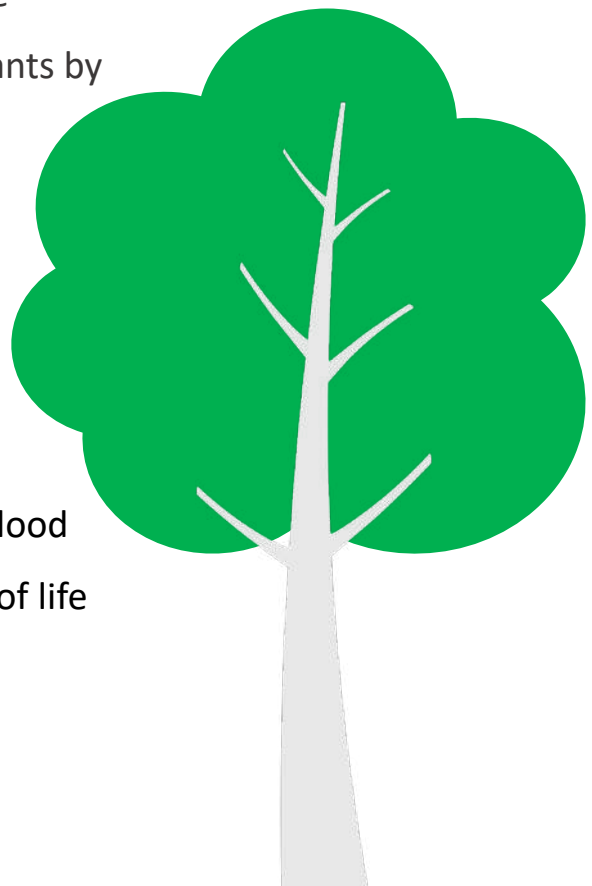
Real-time monitoring of air quality parameters for Smart City, Factory and Commercial Buildings.

## WATER

Online real-time monitoring of water quality parameters for Industries, Rivers, and aquaculture.

## SOLAR & WIND POWER

Real-time performance monitoring of Solar plants by measuring weather parameters.



## WEATHER

Measurement of weather parameters for research, forecast, and smart agriculture

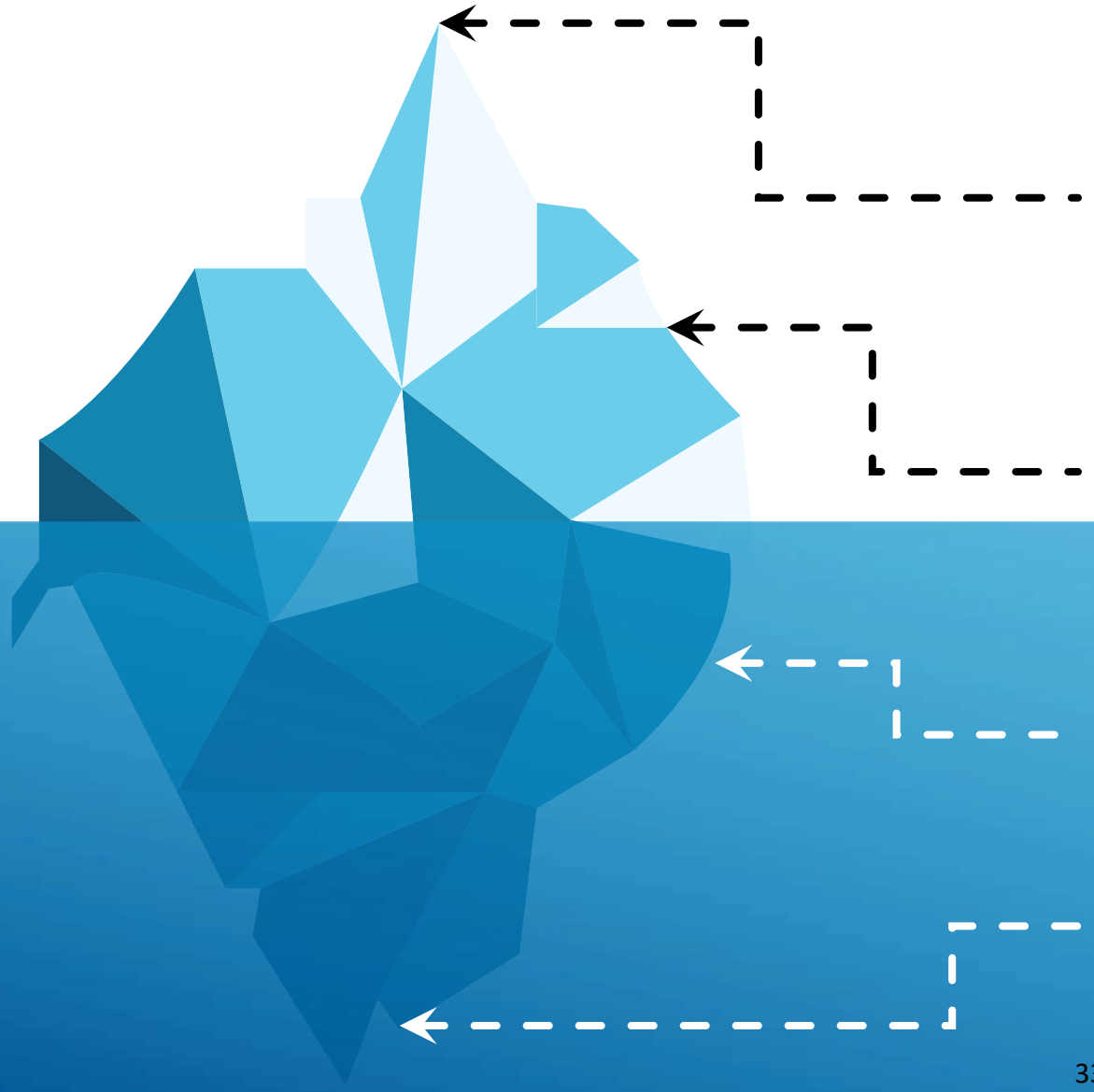
## AGRICULTURE

Monitoring of soil temperature, moisture, weather for higher farm output & reduced irrigation cost.

## FLOOD

Monitor the potential flood situation and save loss of life and property.

# ADVANTAGE AERON



## QUALITY YOU CAN TRUST

Inherited from defense electronics, Aeron offers highest quality product. With key systems made in India and certified to international standards, you can trust on Aeron for the quality product.

## SERVICE YOU CAN RELY ON

Serving customers for over a decade with exceptional service standards you can rely on for your critical requirements.

## TECHNOLOGY YOU ASPIRE FOR

The latest IoT and sensor technology is the next big trend in the world, and Aeron is at the forefront of technology development.

## PRICES WITHIN YOUR BUDGET

The value optimization is the key mantra for low prices with high quality. Our product prices remain within your budget.

# GLOBAL DISTRIBUTOR PARTNERS

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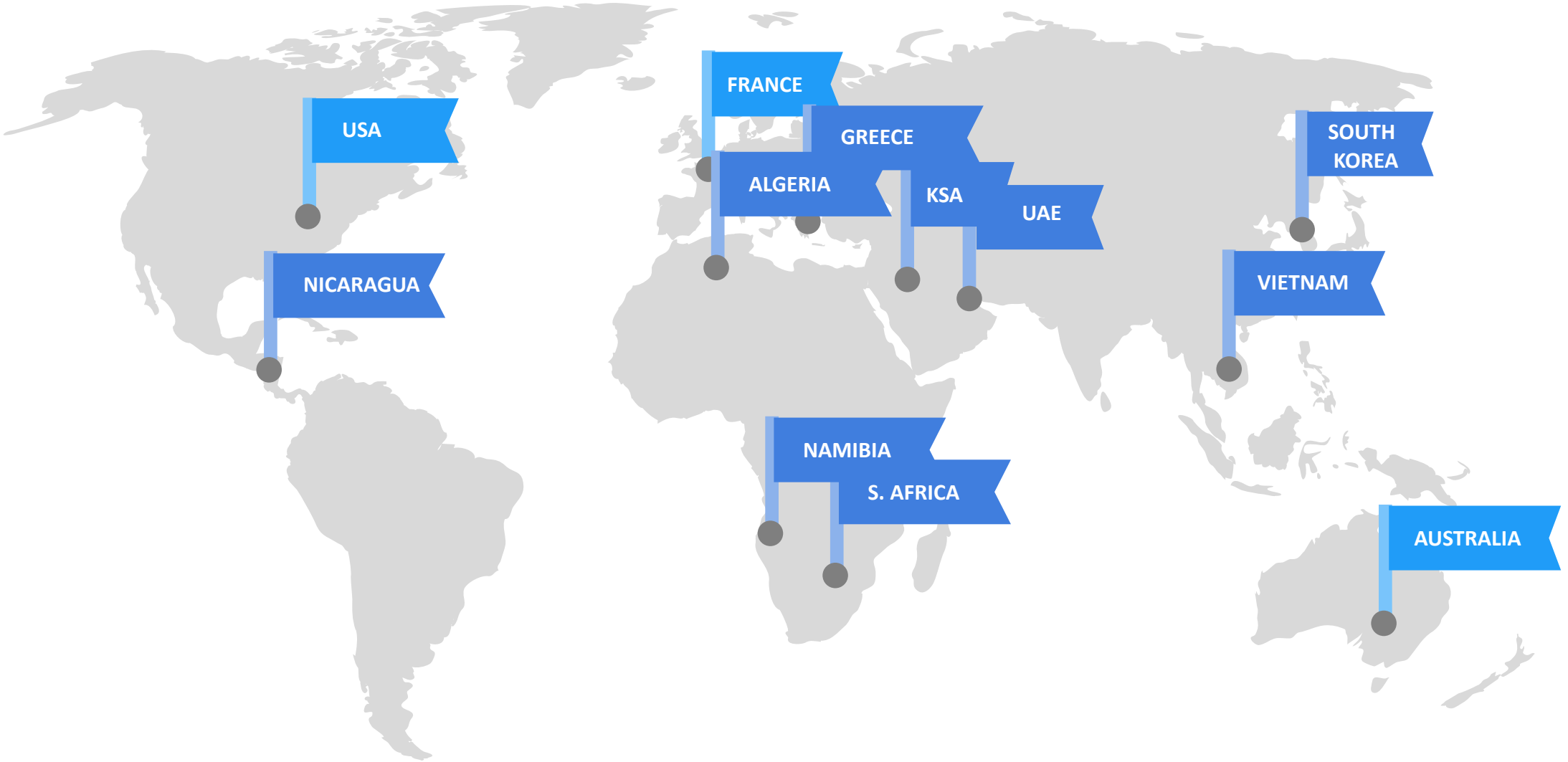

# PRODUCTION & TESTING FACILITY

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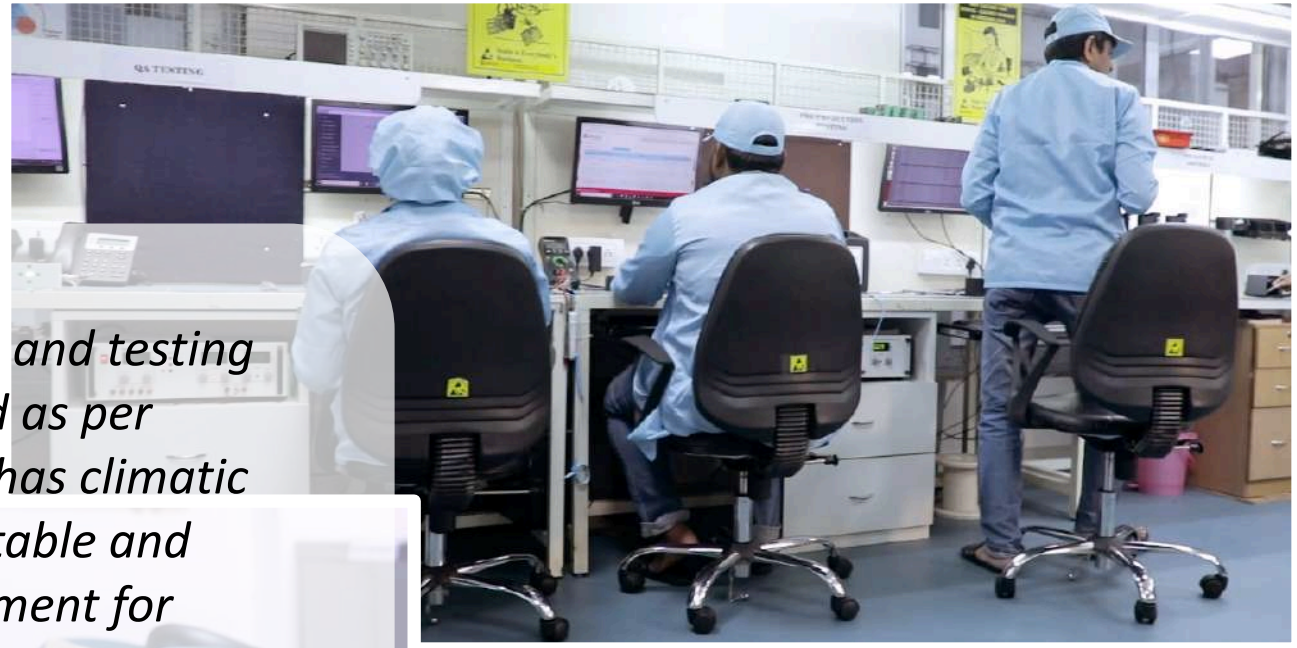
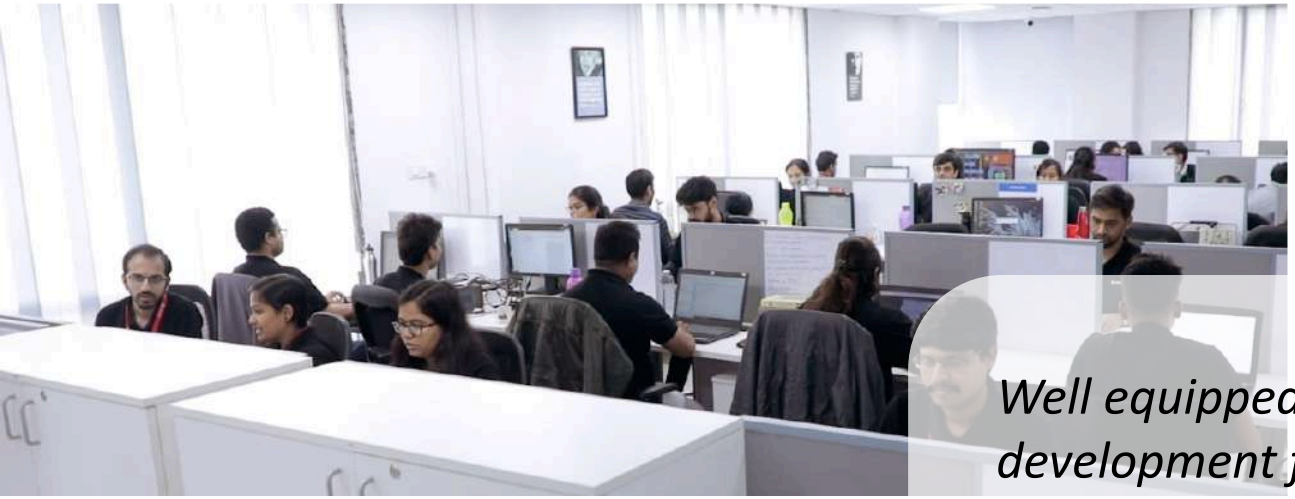
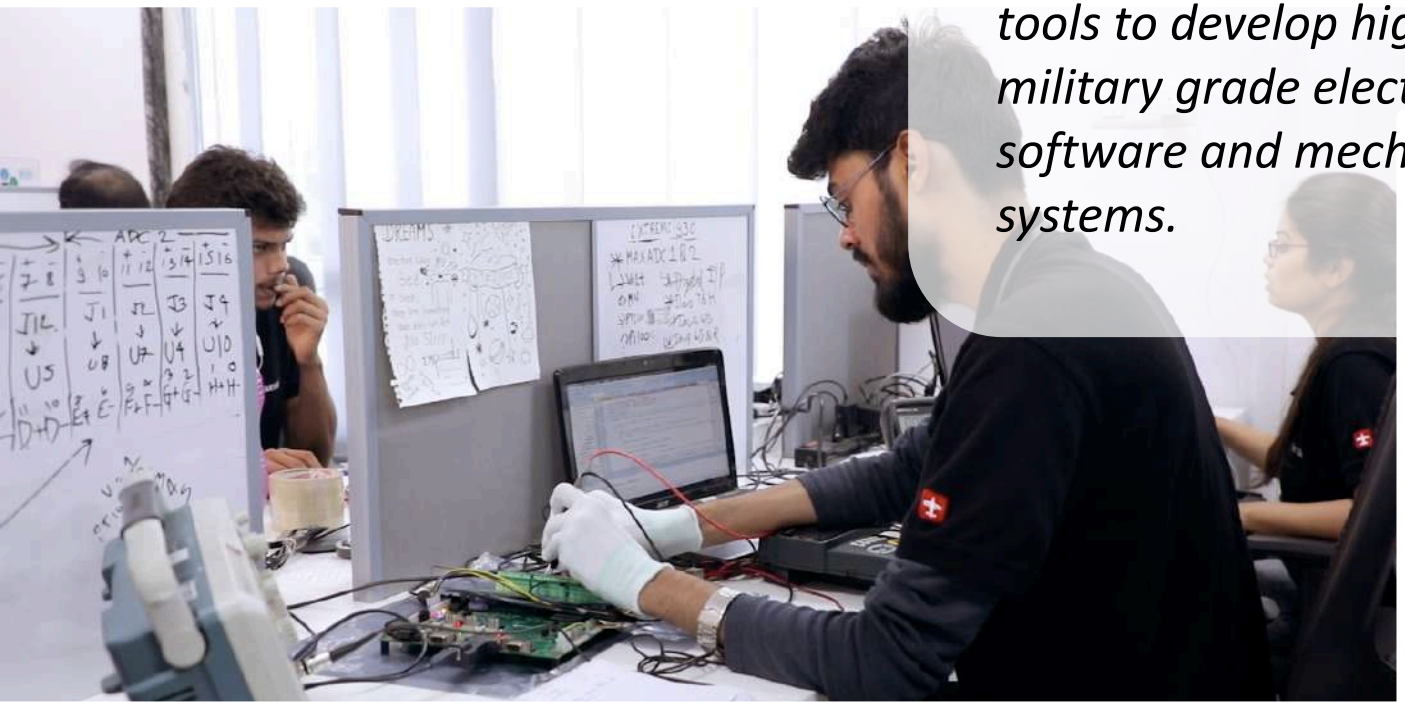


*The production and testing facility certified as per ISO9001-2015 has climatic chamber, rate table and advance equipment for product assembly and testing.*

# DESIGN & DEVELOPMENT FACILITY



*Well equipped design and development facility with tools to develop high speed military grade electronics, software and mechanical systems.*



# WORK CULTURE AT AERON

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# THANK YOU!

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