In smart cities, a network of sensors, cameras, wireless devices, and data centres form the key infrastructure, which allows civic authorities to provide essential services in a faster and more efficient manner. Smart cities are also far more environmentally friendly as they use sustainable materials for building facilities and reduce energy consumption. Efficient use of technology helps create an efficient pollution monitoring system, transport management system, improve healthcare facilities, and develop a robust communication network to connect all businesses and people beyond the relationships between central and sub-national levels of governments.

A smart city can create an efficient and smart service delivery platform for public and municipal workers by installing sensors in the city. Platforms can be created that allow the sharing of information and be given to the public, city managers, businesses, and professionals. The platform can have a common data warehouse where different sensor systems store their information. Sensors can help make optimal use of resources with connectivity to tell us when and where to save. These sensors can control, detect and manage unnecessary use and make certain adjustments as needed.
**Environment Sensors** collect data from specified Env-Sensor equipment and then store, aggregate and display the data on a secure internet connection for multi-user remote access. Sensor Types:

- Temperature
- Humidity/ Dewpoint Sensors
- Flood Sensing Unit
- Water level / Rainfall Sensors
- Airflow Gas Sensors
- Sound and Noise Sensors
- Light Sensors
- UV Sensors
- Electricity / Power Failure Sensors

Sensors gather data about pollution, temperature, rain, levels of gases in the city (pollution), and any other events on a daily basis. It is very useful and important information for citizens and administration to further take appropriate actions during the daily course / causes of any event. These environmental sensors connect via 3G or 4G wireless network.

Sensors sense the prevailing environment conditions and send the data to the control system where real time data resides and the same is available to various other departments and applications for further decision making.

BioEnable offers a full kit of environmental sensors. These sensors rely on dedicated mechanical structures that guarantee the best performance, even in challenging environmental conditions. They are adopted in many wearable devices to monitor health and for fitness programs, in smart home or other industrial applications to monitor weather conditions.

**System Architecture**

![System Architecture Diagram]
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wind Speed &amp; Direction</td>
</tr>
<tr>
<td>2</td>
<td>Solar light &amp; UV sensors</td>
</tr>
<tr>
<td>3</td>
<td>Temperature &amp; Humidity sensors</td>
</tr>
<tr>
<td>4</td>
<td>Gas Sensors - O2, O3</td>
</tr>
<tr>
<td>5</td>
<td>PM 2.5 &amp; PM10 sensors</td>
</tr>
<tr>
<td>6</td>
<td>Rain gauge</td>
</tr>
<tr>
<td>7</td>
<td>Flood monitoring sensor</td>
</tr>
<tr>
<td>8</td>
<td>Sound &amp; Noise sensors</td>
</tr>
<tr>
<td>9</td>
<td>Gas Sensor NO, NO2, NOX</td>
</tr>
<tr>
<td>10</td>
<td>Gas Sensors - CO, CO2</td>
</tr>
</tbody>
</table>

**Wind Speed & Direction Sensor**

**Rain Gauge Temperature & Humidity Sensors**
Inside the Panel

PM 2.5 & PM 10
Particulate Matter / Dust Sensors

Air IN

Air OUT

Electrochemical gas Sensor

CO, CO2
O2, O3
NO, NO2
NOX
SO4
We help Municipalities, Government and People to make better environmental decisions by providing real-time reliable and valuable air quality information. We leverage our robust and simplistic product to be deployed across every street in a city without worrying about maintenance.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gases</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO2</td>
<td>0 – 10 ppm</td>
<td>1 ppb</td>
<td>±2%</td>
<td>1 ppb</td>
</tr>
<tr>
<td>SO2</td>
<td>0 – 500 ppm</td>
<td>1 ppb</td>
<td>±2%</td>
<td>9 ppb</td>
</tr>
<tr>
<td>CO</td>
<td>0 - 1,000 ppm</td>
<td>1 ppb</td>
<td>±2%</td>
<td>20 ppb</td>
</tr>
<tr>
<td>O3</td>
<td>0 – 1,000 ppb</td>
<td>1 ppb</td>
<td>±2%</td>
<td>1 ppb</td>
</tr>
<tr>
<td>CO2</td>
<td>0 - 5,000 ppm</td>
<td>1 ppm</td>
<td>±3%</td>
<td>10 ppm</td>
</tr>
<tr>
<td><strong>Particulates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM 1</td>
<td>0 – 200 μg/m3</td>
<td>1 μg/m3</td>
<td>±5 μg/m3</td>
<td>1 μg/m3</td>
</tr>
<tr>
<td>PM 2.5</td>
<td>0 – 500 μg/m3</td>
<td>1 μg/m3</td>
<td>±5 μg/m3</td>
<td>1 μg/m3</td>
</tr>
<tr>
<td>PM 10</td>
<td>0 – 1,000 μg/m3</td>
<td>1 μg/m3</td>
<td>±5 μg/m3</td>
<td>1 μg/m3</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>-40 – 125 °C</td>
<td>0.1°C</td>
<td>±0.3°C</td>
<td>0.1°C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 100 % RH</td>
<td>1%</td>
<td>±1%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Pressure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>540 – 11,000 hPa</td>
<td>1 hPa/mb</td>
<td>±2%</td>
<td>540 hPa/mb</td>
</tr>
<tr>
<td><strong>Wind Speed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Speed</td>
<td>0 – 60 m/s</td>
<td>1 m/s</td>
<td>±2%</td>
<td>1 m/s</td>
</tr>
<tr>
<td><strong>Wind Direction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Direction</td>
<td>0° - 360°</td>
<td>1°</td>
<td>±3°</td>
<td>1°</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>0 – 120 dB (A)</td>
<td>0.1 dBA</td>
<td>±2%</td>
<td>0.1 dBA</td>
</tr>
<tr>
<td><strong>Rainfall</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainfall</td>
<td>0 – 99.99” (daily)</td>
<td>0.1”</td>
<td>±2%</td>
<td>0.1”</td>
</tr>
</tbody>
</table>
## Technical Specifications

| **Carbon Monoxide (CO) Sensor** | **Units of Measurement:** ppm  
|                                | **Range:** 0 to 1000 ppm  
|                                | **Resolution:** 0.001 ppm  
|                                | **Lower detectable limit:** 0.020 ppm  
|                                | **Linearity:** 1% of full scale reading  
|                                | **Response time:** 30 sec.  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Zero Drift:** ± 2.0 % FS per month  
|                                | **Span Drift:** ± 1.0 % FS max per three month  
|                                | **Operating temperature:** -50°C to 60°C  
|                                | **Operating Pressure:** 80kPa to 120kPa (±20%)  
|                                | **Operating Humidity:** 15% to 90% RH  |
| **Ozone (O3) Sensor** | **Units of Measurement:** ppm  
|                                | **Range:** 0 to 1000 ppb  
|                                | **Resolution:** 1 ppb  
|                                | **Lower detectable limit:** 1 ppb  
|                                | **Linearity:** 1% of full scale reading  
|                                | **Response time:** 30 sec.  
|                                | **Zero Drift:** ± 1.0 % FS per month  
|                                | **Span Drift:** ± 1.0 % FS max per three month  
|                                | **Operating temperature:** -20°C to 60°C  
|                                | **Operating Pressure:** 80kPa to 120kPa (±20%)  
|                                | **Operating Humidity:** 15% to 85% RH  |
| **Nitrogen Dioxide (NO2) Sensor** | **Units of Measurement:** ppm  
|                                | **Range:** 0 to 10 ppm  
|                                | **Resolution:** 0.001 ppm  
|                                | **Lower detectable limit:** 0.001 ppm  
|                                | **Linearity:** 1% of full scale reading  
|                                | **Response time:** 30 sec.  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Zero Drift:** ± 1.0 % FS per month  
|                                | **Span Drift:** ± 1.0 % FS max per three month  
|                                | **Operating temperature:** -50°C to 60°C  
|                                | **Operating Pressure:** 80kPa to 120kPa (±20%)  
|                                | **Operating Humidity:** 15% to 90% RH  |
| **Sulfur Dioxide (SO2) Sensor** | **Units of Measurement:** ppm  
|                                | **Range:** 0 to 100 ppm  
|                                | **Resolution:** 0.001 ppm  
|                                | **© 2017 Phoenix Robotix Pvt. Ltd. 4**  
|                                | **Linearity:** 1% of full scale reading  
|                                | **Response time:** 30 sec.  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Zero Drift:** ± 2.0 % FS per month  
|                                | **Span Drift:** ± 1.0 % FS max per three month  
|                                | **Operating temperature:** -50°C to 60°C  
|                                | **Operating Pressure:** 80kPa to 120kPa (±20%)  
|                                | **Operating Humidity:** 15% to 90% RH  |
| **Temperature Sensor** | **Range:** 40 to 125 °C  
|                                | **Resolution:** 0.1°C  
|                                | **Accuracy:** ±0.3°C  
|                                | **Response Time:** 5 sec.  
|                                | **Repeatability:** ± 0.5 % FS  |
| **Ambient Light** | **Unit of Measurement:** Lux  
|                                | **Range:** upto 10,000 Lux  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Response Time:** 10 sec  |
| **Relative Humidity Sensor** | **Unit of Measurement:** %  
|                                | **Range:** 0 to 100 %RH  
|                                | **Resolution:** 1%  
|                                | **Accuracy:** ±1%  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Response Time:** 5 sec.  
|                                | **Sensor Drift:** ±0.2% per year  |
| **Noise Sensors** | **Unit of Measurement:** dBA  
|                                | **Range:** 0 to 120 dBA  
|                                | **Resolution:** 0.1 dBA  
|                                | **Repeatability:** ± 0.5 % FS  
|                                | **Response Time:** 10 sec  |
| **UV Sensor** | **Unit of Measurement:** mW/cm2  
|                                | **Range:** 0-15 mW/cm2  
|                                | **Resolution:** ± 0.5 % FS  
|                                | **Response Time:** 10 sec  |
| **Wind Speed Sensor** | **Unit of Measurement:** km/h  
|                                | **Range:** 0 to 60 m/s  
|                                | **Resolution:** 1 m/s  
|                                | **Accuracy:** ±2%  
|                                | **Update Interval:** 60 sec.  |
| **Wind Direction Sensor** | **Unit of Measurement:** Degree  
|                                | **Range:** 0 to 360°  
|                                | **Resolution:** ±1°  
|                                | **Accuracy:** ±1°  
|                                | **Update Interval:** 2 sec.  |
| **Barometric Pressure Sensor** | **Unit of Measurement:** hPa  
|                                | **Detection Range:** 500 to 1150 hPa  
|                                | **Elevation Range:** ±1080m to 5570m  
|                                | **Uncorrected Reading Accuracy:** ±0.2 hPa  
|                                | **Equation Source:** NA  
|                                | **Equation Accuracy:** NA  
|                                | **Elevation Accuracy:** ±2.9 m  
|                                | **Update Interval:** 30 sec.  |
| **Connectivity** | **GPRS or Wi-Fi or RF**  |
| **Mounting** | **Device can be mounted on a Pole or Wall using Worm Drive Hose Clamp from Klipco**  |
| **Power Supply** | **External Power Supply – 220 to 240V, 50Hz**  
|                                | **Aurassure Device Power Supply – 12V DC, 5A (Meanwell LRS25-12)**  
|                                | **SMPS**  |
| **Physical Properties** | **Enclosure:** IP 65  
|                                | **Dimension:** 200 x 200 x 250 mm  
|                                | **Weight:** 800 grams  |
Environment Monitoring System - Indoor

An Indoor Environmental Monitoring System organization provides a suitable environment for mission critical equipment. It is also used to provide healthy environments at public facilities. Systems equipped with a wide range of sensors can monitor and generate alerts for any unexpected event.

Applications

- Data centers
- Server Rooms & Office
- Hospitals & Public Facilities
- Factories

Product Overview

Plug-n-Play Sensors:
Temperature
Humidity/Dew Point
Airflow Gases (CO, CO2, SO2, N02,o3))
Light Sensors
Analog-to-Digital Converter (A2D)

Analog / Dry Contact Sensors:
Smoke Detector (NO/NC)
Flood Sensor (Conductivity)
Power Failure Sensor (0-5V)
Isolated Voltage Sensor (0-5V)
60 VDC Sensor (0-5V)

Optional Accessories:
5-Port Splitter
PoE Splitter
PoE Injector
In-line Power Meter 15A
In-line Power Meter 20A
Current Transducer 30/60/120A (0-5V)
-48 VDC Power Supply
PSTN Auto-Dialer (Analog)
GSM Auto-Dialer (SIM card required)
Rack Shelves Blanking Panels

Air Flow  Humidity/Dew Point  Sound  Temperature  Water Leaks/Floods  Power Failure  Video Surveillance

Our customer

Customers may use this product for their specific applications and environments, ensuring a secure and optimal operating condition.