SPECTRO SOLUTIONS

Mohamed Hussien
Sales & Marketing Director

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WHO WE ARE

Spectro Systems is a leading provider of devices, software and solutions for a smarter and more connected world. Depending on unique talented team members we research and inhouse develop our solutions to provide a world class IoT end to end solutions.

In Spectro Systems, we realized the potential of IoT since its early days. Accordingly, during the past few years we have built our internal capabilities and ecosystem to gear up for the evolution of IoT with a great focus on R&D and our team have successfully led mega size IoT projects in the EMEA region.

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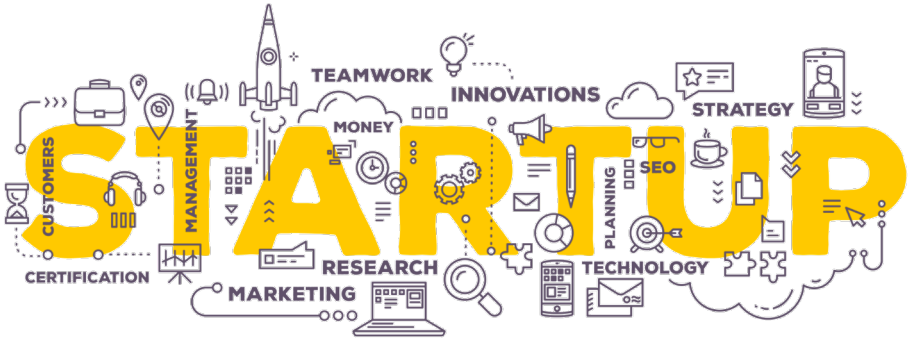
WHY SPECTRO

Born Mature



Global Vendor

End To End Solution Provider

In House Development

Collective Diverse & Passionate Team Experience

Deep Technology Knowledge

Customer Acknowledged, Accepted, & Trusted on Kick Off

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WHAT WE DO

Our solutions combine the best IoT sensor technologies and the most comprehensive IoT Cloud Based software platform. Spectro Systems Solutions covers different market segments and market demands with extended reach to customers in various geographical locations, in Far East, Middle East, and Africa.

Currently We have successfully developed, tested and implemented sensors in three main use cases:

SPECTRO TANK® — Fluid & Solid Tank Live Monitoring using Ultrasonic Sensors for Fuel Tanks Monitoring and **Solid Waste Collection** Management

SPECTRO COLD® — Temperature & Humidity Live Monitoring Sensors for Medical & FB Fixed and Mobile Coolers with Incorporated Location tracking

SPECTRO PALM® — Agriculture Threats and Asset Tracking Sensor Specialized for Palm Tree Plantations Incorporating sophisticated RPW detection

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SPECTRO **TANK®**

SPECTRO TANK ® is wireless tank monitoring solutions that lets you check fluid levels in multiple tanks, across multiple sites, all from your computer or smartphone for real time access to data you can use to reduce your costs, improve your efficiency and expand your customer base.

As a Spectro Tanks user you will have 24X7 access to your tanks critical data to make the smartest management decisions. Specifically, Spectro Tank© takes raw data such as tank level, temperature other storage criteria captured from Spectro tank sensors and translates it into actionable information.

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SPECTRO TANK®

The Challenge

Real time monitoring of tanks levels is crucial for efficient operations and business continuity.

The main challenges are; lacking the real time visibility over consumption, refilling activities, fraud and network performance which hinders effective decision making and future planning.

Petrol Stations

Agriculture

Industrial

Telecommunication

Water Utilities

Fuel Transport

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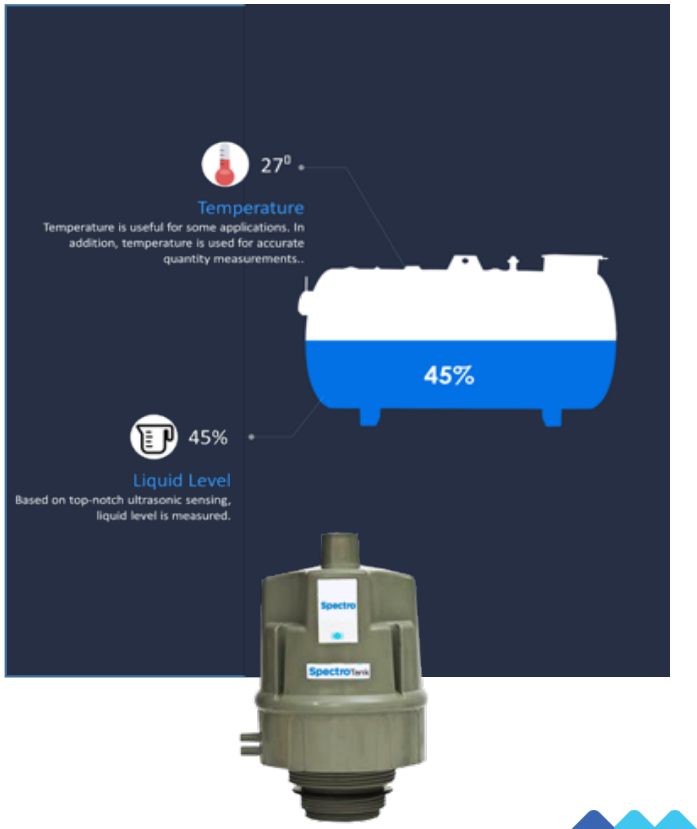
SPECTRO **TANK®**

The Solution

An Innovative IoT-based tank level monitoring solution that provides 24/7 monitoring of your tanks and provides insights and alerts based on sophisticated algorithms to help efficient management and decision making.

The solution allows you to access real time fluid level information and temperature remotely.



Spectro Tank Level Sensor

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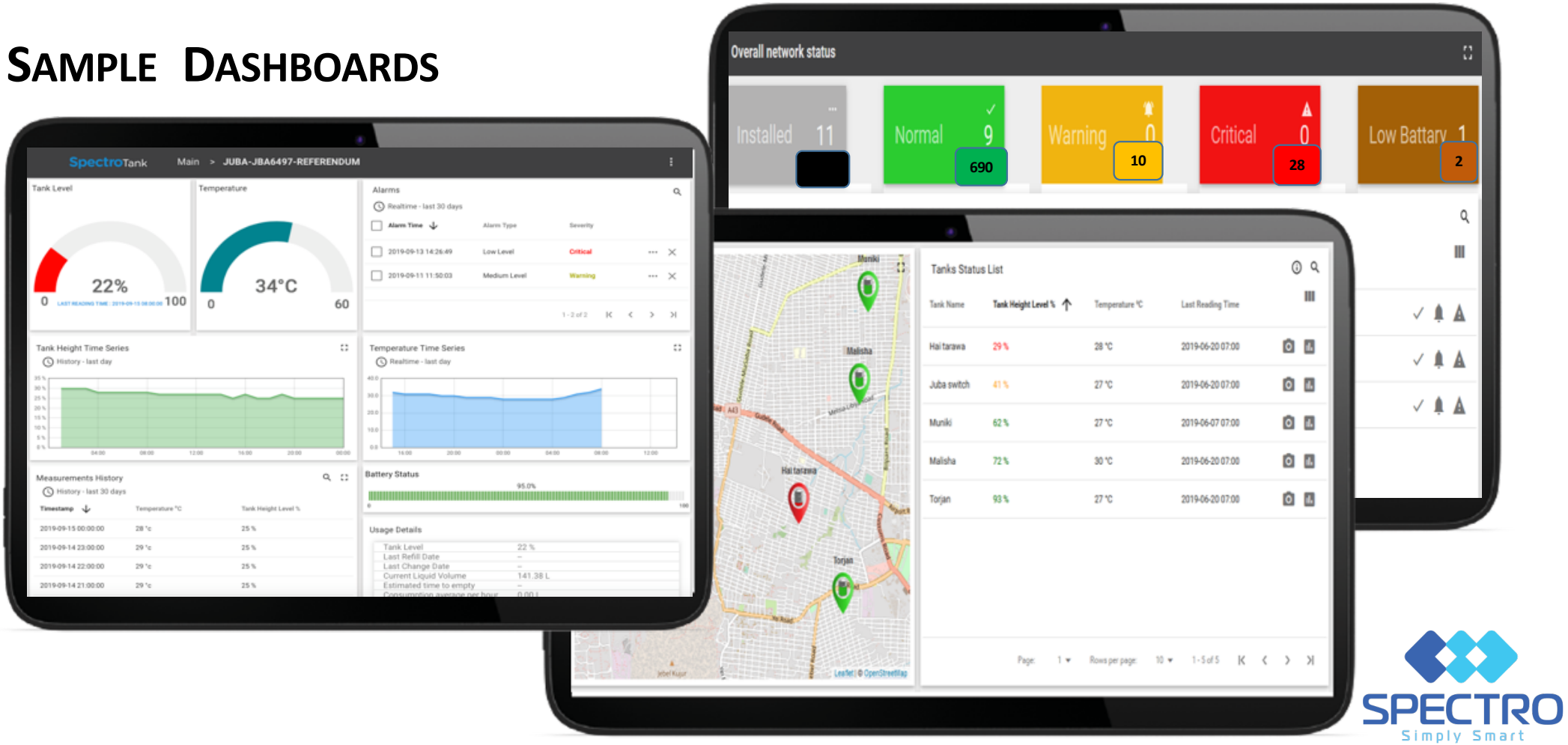
SPECTRO TANK®

Dashboard

SAMPLE DASHBOARDS



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SPECTRO **CLEANCITY®**

THE CHALLENGE

Solid Waste Management is a system required and developed to help City Authorities track the real time status of Solid Waste collected from across the city by the vendors associated with the Collection & Transport of Solid Waste.

The Challenge lies on two main aspects:

- Environmental: Related to Waste Bins biological and environmental hazard might result from delayed collection or mishandling the bins contents. Also, the carbon emissions of collection trucks in manual planned collection trips.

- Economical: Related to consumed fuel for collecting trips @ half full bins or empty bins. Also, misdistribution of bins based on missing filling and utilization rates / zones

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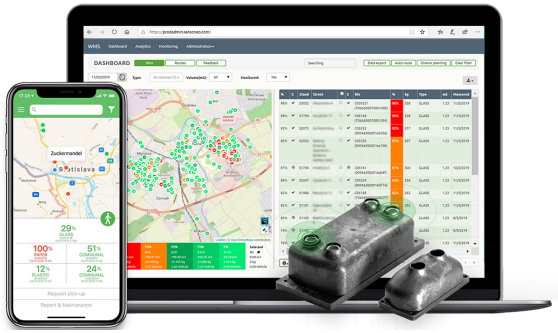
SPECTRO **CLEANCITY®** Solution Concept

Spectro provides an end to end Solid Waste Management Solution that incorporates the sensors and the management cloud based platform required to monitor, plan and optimize Solid Waste collection process. The solution aims at resolving both environmental and economical impacts of Solid Waste Mismanagement.

Solution Components:



- **Ultrasonic contactless sensors that provide:**
  - The most accurate reading on Waste Bin fill level
  - Inside Bin Temperature
  - Bin Location and Movement Detection
  - Bin Shock / Knockdown Detection

- **Cloud / On Premises SW Platform that Provides:**
  - Bin Fill Level monitoring and expected full time based on fill pattern analysis
  - Bin position and relocation on deployment location map
  - Collection Route Optimization considering Bin Fill Level at time of collection analysis
  - Shock, Knockdown and Overheating Alarms

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SPECTRO **COLD®**

SPECTRO COLD ® is a family of sensors aimed at measuring, monitoring and communicating number of parameters that are vital to any temperature and humidity sensitive product storage units.

This family of sensors incorporates a base unit and number of modular probs that provide Temperature, Humidity, Location, Compressor Health, Light Check, Door Sensors, and Maintenance / Service request button. Also includes the communication module to allow multiple types of data communication based on network availability and facility type.

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The Challenge

Temperature and Humidity of the facility are critical factors in the business process. Unattended issues may result in huge damages and losses in stored or displayed material

They should be continuously monitored and maintained within the standards.

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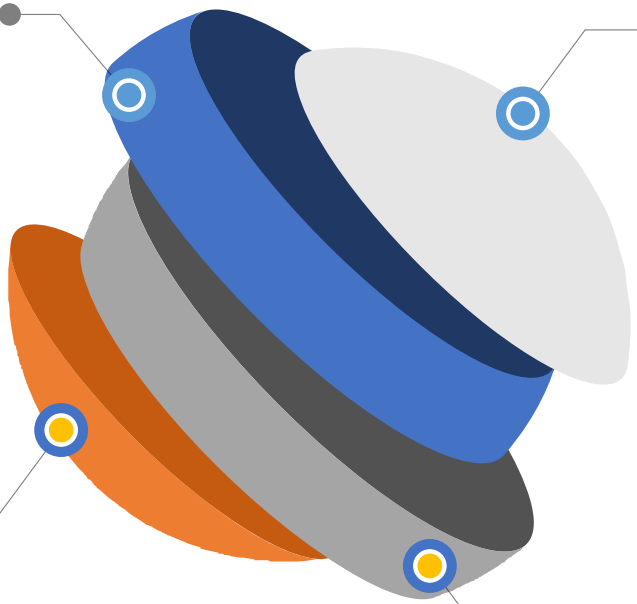
SPECTRO COLD®

The Challenge



3 Temperature Mismanagement

Coolers should maintain the product at an ideal temperature.

4 Unmanaged Malfunction

There is no forecast for malfunction and coolers maintenance is reactive. This leads to extended downtime.

1 Assets are Stolen

Coolers should not be moved or unaccounted for.

2 Lack of Asset Visibility

Coolers and their operating conditions should be visible to ensure efficient operations.

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SPECTRO **COLD®**

The Solution

The Solution gathers temperature and humidity data of the facility. Data is sent live to Spectro Platform which uses intelligent algorithms to detect abnormal behavior. In addition, more modules are added to the sensor for additional parameter monitoring like location, light, and compressor health. This in turn increased solution benefits to end user.

Identifying malfunctioning and quickly flag them for servicing. Thereby, significantly reducing the average downtime.

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Solution Architecture

Things

1. Fridge Temperature
2. Fridge Humidity
3. Door Access Open/Close
4. GPS
5. Accelerometer
6. Power On/Off
7. Power Consumption
8. Light Level
9. Service Button
10. Device Tampering
11. Camera
12. Motion Detection
13. Compressor Temperature
14. Compressor Vibration
15. RFID Reader

Connectivity

Protocols

1. GSM

Edge Gateway

Gateway

1. Data Aggregation
2. Data Filtration
3. Edge Analytics
4. Edge Computing

Data Analytics

Analytics & Intelligence

1. Alerts & Notifications
2. Assets Activity Insights
3. End User Activity Insights
4. Predictive Models
5. Comparisons & Benchmarking
6. KPIs

Application

Dashboards
Reports
Web Application

People and Process

Admin and Management Tools

1. User Roles
2. Users Privileges
3. Work Flow
4. Operational Management
5. Integration with 3rd Party Software

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SPECTRO COLD®

Solution Benefits

1. **Theft Protection**
   A combination of accelerometers & highly accurate, real-time GPS are used to successfully assess when a cooler is moved or stolen.

2. **Live Monitoring & Alerts**
   The Solution gathers temperature data from the cooler & the software uses intelligent algorithms to detect abnormal cooler behavior.

3. **Recommendations**
   Smart network rollout based on network intelligence & cooler utilization data through the number of door openings & power-on hours/day is used to provide recommendations on under-utilized coolers.

4. **Predictive Maintenance Insights**
   Identifying malfunctioning coolers & quickly flag them for servicing. Thereby, significantly reducing the average cooler downtime.

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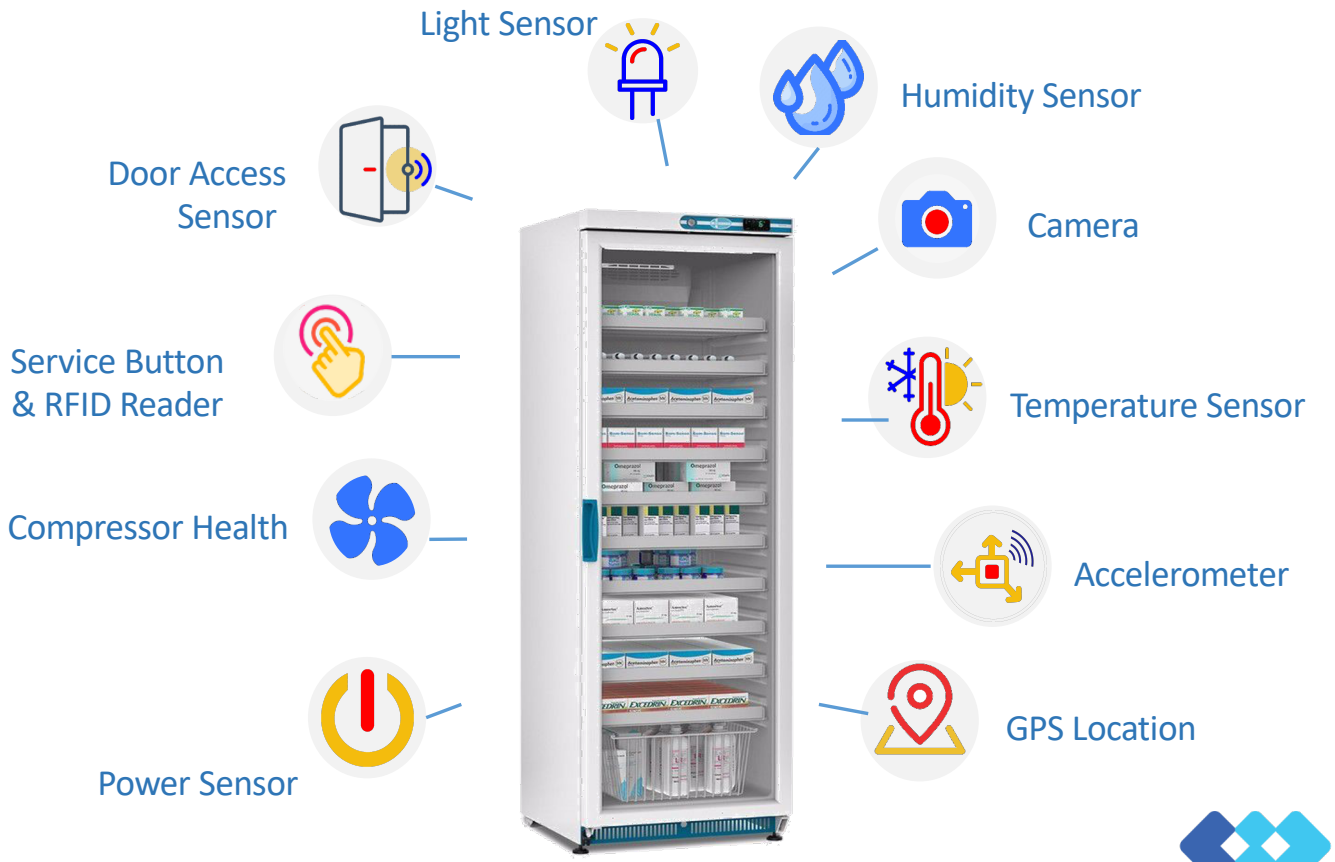
SPECTRO COLD® - Medicine Coolers — Solution Elements

Hardware Components

A combination of environmental sensors to collect relative data which is used to feed the analysis module in the platform to analyze the cooler's performance and deduce the business results and insights related to its utilization, sales volumes, etc..



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SPECTRO COLD® - Commercial Coolers Solution Elements

Hardware Components

A combination of environmental sensors to collect relative data which is used to feed the analysis module in the platform to analyze the cooler's performance and deduce the business results and insights related to its utilization, sales volumes, etc..

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SPECTRO COLD®

Solution Elements

Platform

State of the art platform which collects the sensors' telemetry and uses the advanced algorithms to enhance decision making and drive the business

Executive Dashboard

Administrative tools

Detailed Reporting

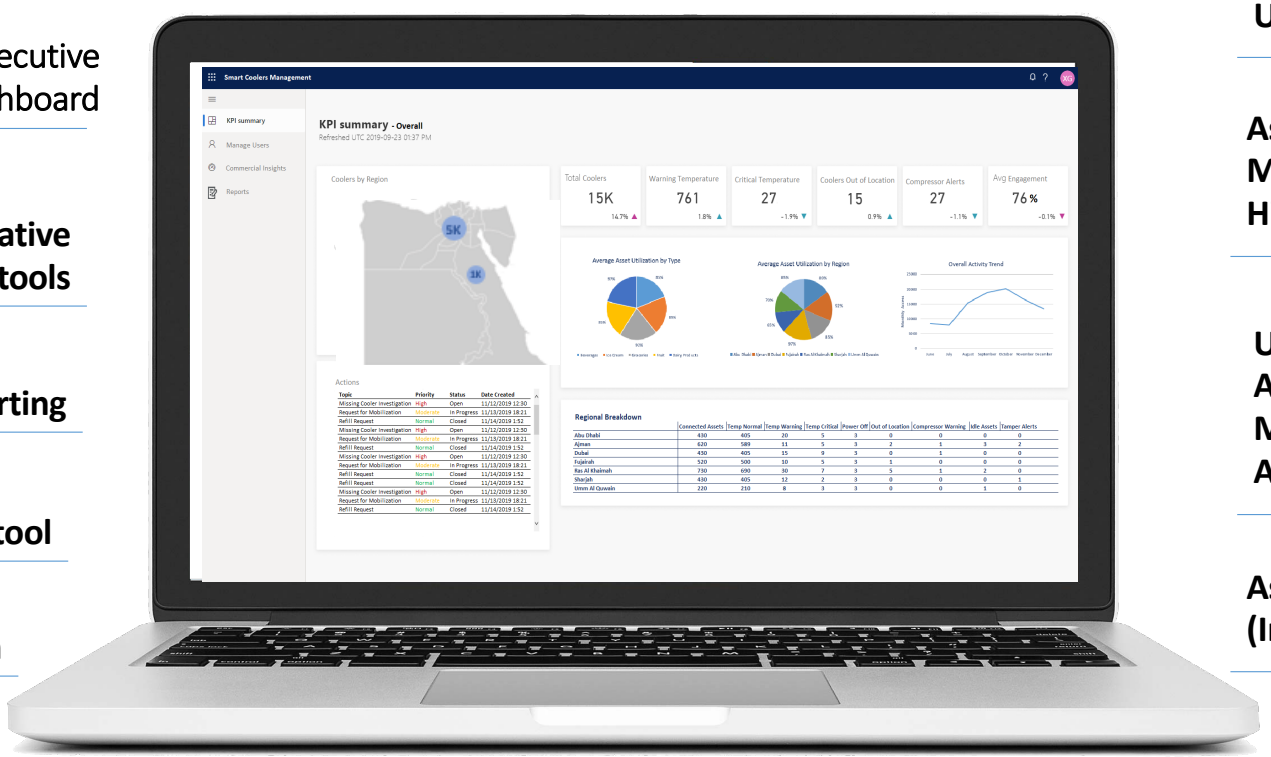
Data Export tool

Asset Easy Search

Cooler Dashboard

Fault Alerts

Asset Health and Maintenance



Asset Utilization

Asset Movement History

Unauthorized Asset Movement Alerts

Asset Card (Info)

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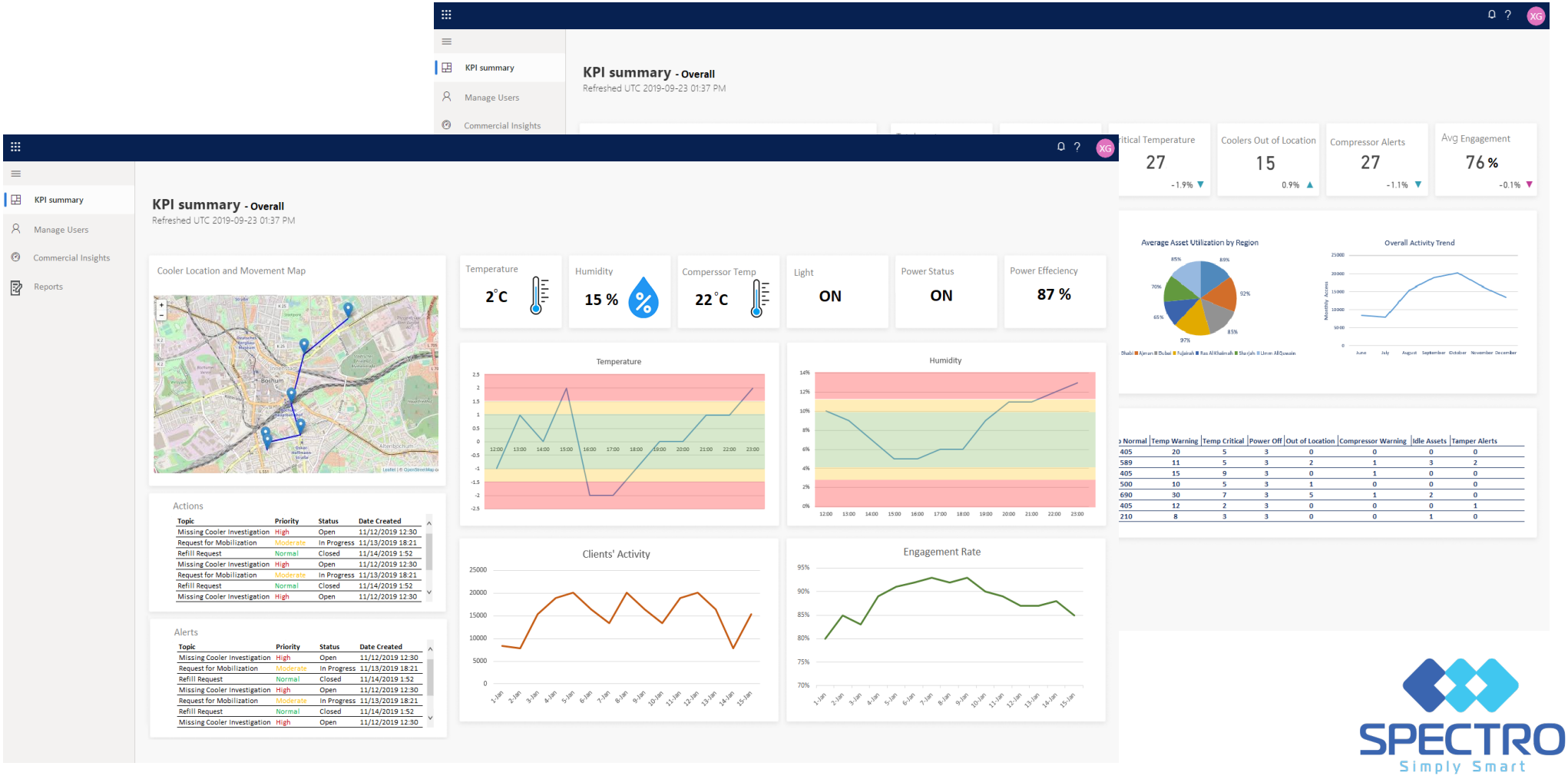
Dashboard



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Dashboard – Coolers Movement

Hierarchy Level: Date Range From: To:

Movement & Relocation Report

Region Level - Nasr City From: 1/6/2019 to: 1/7/2019 Extracted on: 1/8/2019

#	Cooler ID	Brand	Type	Region	Facility	Address	Permission	Initial location	Current Location	Distance	1st move timestamp	Last location timestamp	Alert status	Days open
1	10235	Brand 1	XV1	Cairo	Carrefour	Makram Ebeid	Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	1-Jun-19 12:00:00 PM	1-Jun-19 12:00:00 PM	In progress	60
2	56151	Brand 1	SD2	Cairo	Metro	Abbas Elakkad	Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	5-Jun-19 12:00:00 PM	5-Jun-19 12:00:00 PM	In progress	55
3	56515	Brand 1	SD2	Cairo	Metro	Abbas Elakkad	Not Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	9-Jun-19 12:00:00 PM	9-Jun-19 12:00:00 PM	Open	51
4	54658	Brand 2	LO5	Cairo	Carrefour	Makram Ebeid	Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	13-Jun-19 12:00:00 PM	13-Jun-19 12:00:00 PM	Closed	7
5	21354	Brand 2	LO5	Cairo	Metro	Abbas Elakkad	Not Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	17-Jun-19 12:00:00 PM	17-Jun-19 12:00:00 PM	Closed	10
6	78612	Brand 3	PU8	Cairo	Carrefour	Makram Ebeid	Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	21-Jun-19 12:00:00 PM	22-Jun-19 12:00:00 PM	In progress	39
7	65233	Brand 2	LO5	Cairo	Carrefour	Makram Ebeid	Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	25-Jun-19 12:00:00 PM	27-Jun-19 12:00:00 PM	Open	35
8	54681	Brand 2	LO5	Cairo	Carrefour	Makram Ebeid	Not Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	29-Jun-19 12:00:00 PM	2-Jul-19 12:00:00 PM	Closed	2
9	53654	Brand 3	PU8	Cairo	Metro	Abbas Elakkad	Not Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	29-Jun-19 12:00:00 PM	7-Jul-19 12:00:00 PM	In progress	31
10	45123	Brand 3	PU8	Cairo	Metro	Abbas Elakkad	Not Authorized	30.0444° N, 31.2357° E	31.2001° N, 29.9187° E	2Km	29-Jun-19 12:00:00 PM	12-Jul-19 12:00:00 PM	Closed	5

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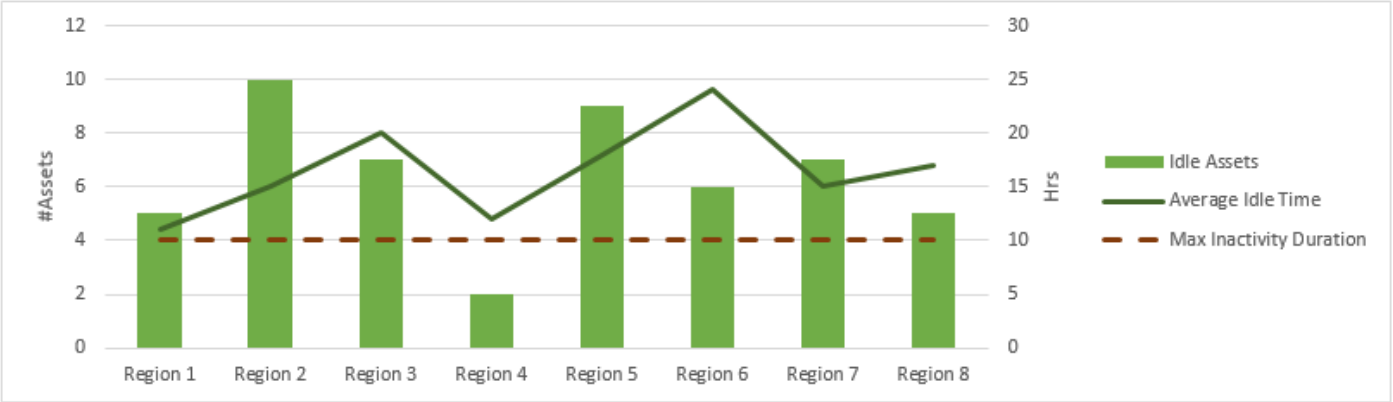
Dashboard – Asset Utilization

Max allowed Inactivity Duration | Hierarchy Level: | Date Range From: | To:

Overall Idle Assets Report

Assets inactive for more than 10Hrs | Network Level | From: 1/6/2019 | to: 1/7/2019 | Extracted on: 1/12/2019



Region	Idle Assets	Average Idle Time	Idle % from Total Installed
Region 1	5	11	50
Region 2	10	15	40
Region 3	7	20	25
Region 4	2	12	15
Region 5	9	18	10
Region 6	6	24	2
Region 7	7	15	27
Region 8	5	17	13

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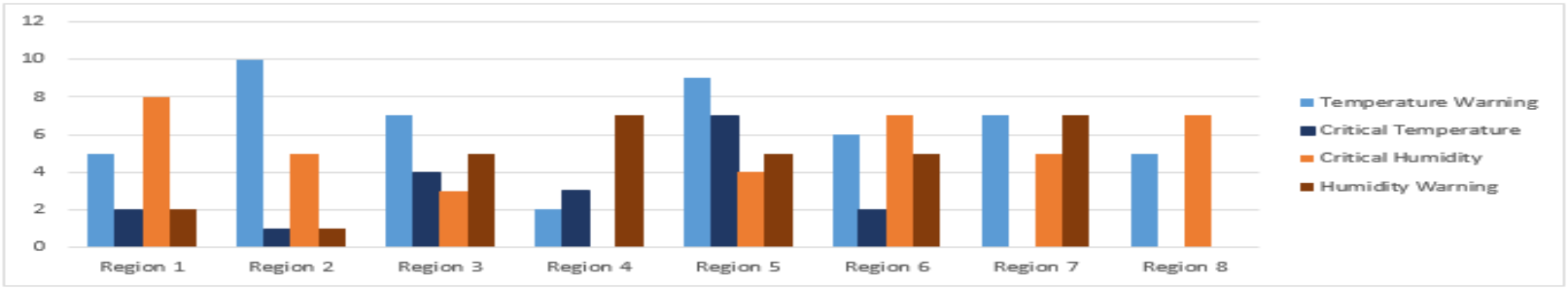
SPECTRO COLD® Dashboard – Quality Management

Hierarchy Level: Date Range From: To:

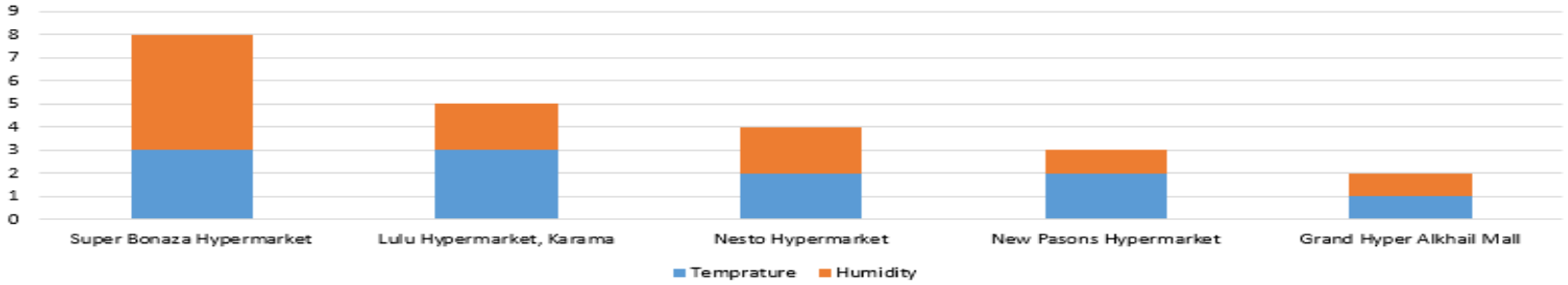
Merchandise Quality Incompliance Report

Network Level From: 1/6/: to: 1/7/2019 Extracted on: 1/12/2019



Region	Temperature Warning	Critical Temperature	Critical Humidity	Humidity Warning
Region 1	5	2	8	2
Region 2	10	1	5	1
Region 3	7	4	3	5
Region 4	2	3	0	7
Region 5	9	7	4	5
Region 6	6	2	7	5
Region 7	7	0	5	7
Region 8	5	0	7	0

Top 5 Incompliant Facilities



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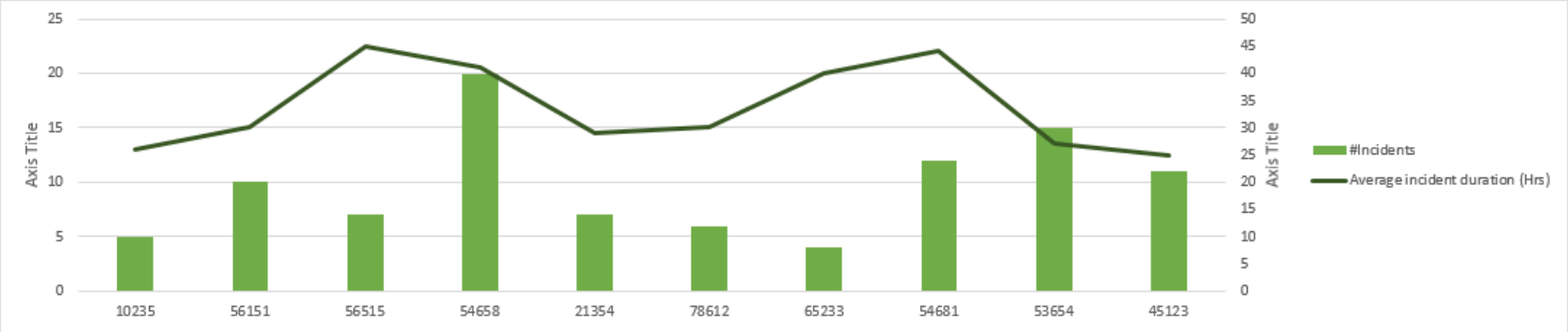
Dashboard – Asset Health

Hierarchy Level | Date Range | From: | To:

Compressor Health Report

Facility Level | Metro - Maddi ElSarayat | From: 1/6/2019 | to: 1/7/2019 | Extracted on: 1/8/2019



#	Cooler ID	Brand	Type	Region	Facility	Address	Last Reading Timestamp	#Incidents	Average incident duration (Hrs)	Alert status	Days open
1	10235	Brand 1	XV1	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	5	26	In progress	60
2	56151	Brand 1	XV1	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	10	30	In progress	55
3	56515	Brand 1	SD2	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	7	45	Open	51
4	54658	Brand 2	LO5	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	20	41	Closed	7
5	21354	Brand 2	LO5	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	7	29	Closed	10
6	78612	Brand 3	PU8	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	6	30	In progress	39
7	65233	Brand 2	LO5	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	4	40	Open	35
8	54681	Brand 2	LO5	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	12	44	Closed	2
9	53654	Brand 3	PU8	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	15	27	In progress	31
10	45123	Brand 3	PU8	Cairo	Metro	Maddi ElSarayat	1-Jun-19 12:00:00 PM	11	25	Closed	5

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SPECTRO **PALM®**

Spectro **PALM®** is a Complete Solution that uses bioacoustics sensors to measure key parameters in palm trees' farms in regular basis, with no need for human intervention.

This data is collected in a central platform that uses sophisticated algorithms and tools to monitor, analyze, and provide early detection and alerts of possible threats.

Red palm weevil is one of the world's major invasive pest species and is the single most destructive pest of some 40 palm species worldwide. RPW exist in more than 60 countries worldwide.

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SPECTRO **PALM®**

The Challenge

Red Palm Weevil (RPW) affects 40 Palm Trees species. It is extremely difficult to detect RPW in the early stages of an infestation.

Visible signs and symptoms of attack appear only when it is too late to save the tree. The development of efficient early detection mechanisms is critical element of RPW pest management systems. The Arab countries alone have around 70 millions palm trees.

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SPECTRO **PALM®**

The Solution

A sophisticated sensor is installed in each tree to record and memorize the slightest movement of the larvae. Analyzes data to find patterns and signs of pest activity.
It can detect larvae as small as 1 cm long with accuracy of 95%. Sends automatic alarms and notifications to the users. Other sensors are used to measure key parameters in real time. This results in:

1. Tree Saving
The solution allows early detection and treatment of the tree before it collapses.

2. Effective and Efficient Treatment
Real time monitoring and alert system gives you a better view of your farm; infected trees, pests' activity, constant and real time treatment follow up, enhancing the effectiveness of pesticides application

3. Reduce Costs
Prevent the loss of trees, optimize pesticides' usage & fertilizers' needs, Decrease manpower needed for continuous physical monitoring

4. Increase profit
Effective treatment and fustigation leading to increased yield and better profits

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Thank You

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