Aquaculture 4.0
Digitalization for the SME
Aquaculture 4.0
Overview of entire Fish Farm Eco System

Hatchery
Baby fishes

Fish Food
Multiple suppliers (e.g. Evonik)

Fish Farm
No automatic detection of antibiotics
No monitoring system for chemicals
Feeding is done manually
Reactive disease control only
Supply chain is not transparent

Covered by current project

Retailer
Restaurants, supermarkets etc.

Transport and packaging process
Time of harvest

Consumer

Trusted Origin
(Harvested and not live fishing)
Transparency on antibiotics dosages
Consistent size/mass of fish

Transport and packaging process
Freezing process
Time of Harvest

Live
pre-packed
Aquaculture 4.0
Challenges & Market information

Trusted Food Source
Consumers want to know the origin of food source and all relevant information during the harvesting process.

Optimized Fish feed
Fish pallets is a main source of feed. A sustainable system that matches the feeding cycles to optimal growth rate will increase profits for farmers.

Less Antibiotics
Excessive antibiotics and/or growth hormones administration is a major threat to world health as it can lead to increased antimicrobial resistance.

Predictive Disease Control
Effective data driven disease control to limit the spread of infectious diseases/pathogens.

Environmental Pollution
Wastewater discharge containing feces, nutrients and chemicals released into the ocean results in algae bloom which removes dissolved oxygen.

Top 10 Countries for Aquaculture Production

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Production MMT*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>63.70</td>
</tr>
<tr>
<td>2</td>
<td>Indonesia</td>
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</tr>
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<td>3</td>
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<td>4</td>
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<td>8</td>
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<td>9</td>
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<tr>
<td>10</td>
<td>Japan</td>
<td>1.10</td>
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</tbody>
</table>

Source: Food & Agriculture Organization of United Nations (FAO)
Aquaculture 4.0
Leveraging Industry 4.0 to tackle the challenges of fish farming

1. IoT Gateway together with integrated cybersecurity
   - IoT Gateway
   - DO Meter
   - Water Quality & Water Flow
   - Energy Meters
   - Video Images
   - Feeder

2. Machine Learning Algorithm applied on video images for live stock detection and analysis of swimming behavior for hunger scoring and early warning of disease
   - Video Images
   - Artificial Intelligence
   - Database

3. Aquaculture 4.0 MindApp Dashboard
   - Automated reports
   - Automated alerts

4. Data Analytics of sensor, process, equipment and lab sample data with preset alerts helps to improve farming practices and yield with improved labor productivity
   - Data Analytics

5. Data Engineering & Automation, optimize feeding cycles / intervals to reduce feed consumption and ensure optimized yield
   - Feeder
   - Database
   - Artificial Intelligence

MindSphere

Fish Farm technicians
MindApp User Interface:
Plant Manager Dashboard

ALARMS

• Indicates the alarms and notifications based on preset threshold limits
• User are allowed to set the limits for various measured / input parameters

OVERVIEW

• Indicates the overall condition of individual tanks
• Flow rates (inlet/outlet), and relevant sensor data such as dissolved oxygen level will be reflected
• Color coding of each tanks for indication of statuses
MindApp User Interface:
Feed Dashboard

**VIDEO FEED**

- Reflects relevant batch related data as well as video feed streams of each tank
- Weather forecast is also displayed in this stream with the overall equipment status reflected in different color coded elements
Thank You!

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