MANUFACTURING INNOVATION CHALLENGE 2020

India’s First of a Kind Innovation Platform for Manufacturing

Industry Partners

Challenges
- Worker Productivity
- Shop floor management
- Energy optimization
- Process automation
- Quality Inspection
- Demand Forecasting & Inventory Management
- Logistics Tracking

Industry Use-cases
Ideation
Proof Of Concept
Partnership Engagement Proposal

Shri Saurabh Gaur, IAS – Joint Secretary, Ministry of Electronics and Information Technology, “Startups have the necessary knowledge and intelligent minds to create innovative solutions for a number of challenges we face today. We, through NASSCOM CoE, want to keep the focus on providing them opportunities to work on real-world use cases with the manufacturing firms.”

Shri Hareet Shukla, IAS – Secretary, Department of Science & Technology, Gujarat, “This initiative by NASSCOM CoE provides the perfect opportunity to our manufacturers, while also nurturing the deep-tech startups. I would call it a win-win for all.”
FUSION 4.0 – Forum Uniting Startups & Industries On New technologies

- 6 Winning Startup Presentations
- 18 Senior Industry & Government Speakers
- 200+ Attendees

Fusion 4.0
Redefining Enterprise Entrepreneurship-Engagement

DATE: 11th December 2020
TIME: 3:00 PM to 5:30 PM

Virtual Conference to bring together senior industry and government leaders, deep-tech startups and researchers to discuss how Industry 4.0 can help in improving efficiency, productivity and safety in factories.
Manufacturing Innovation Challenge 2nd Edition

Use Cases and Winning Presentations
MANUFACTURING INNOVATION CHALLENGE 2020

2nd Edition (12th Oct - 11th Dec)

USE CASE CATEGORY #1

RESOURCE OPTIMIZATION - MAN & MATERIAL

- Smart Energy Management
- Real-Time Quality Inspection with AR

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# Real Time AR Based Inspection & Quality Control

## Problem Statement

- Lot of time is spent in designing quality checklist to ensure that there are no miss outs during process, this consumes significant resources for preparing and executing quality control workflows.

- Need for skilled resources to understand parts, applicable quality parameters, statutory requirements and record keeping makes the job very niche and prone to errors

## Solution Approach

### Solution Architecture/ Technologies Used

- AR based workflow automation solution that leverages AI-ML for part scanning, identification and real time analysis of the defects,
- Front end architecture on Unity platform to integrate 3D asset models and workflow instructions. Mobile application for both iOS and Android
- Push services managed through Firebase to enable real-time database updates
- SaaS based remote assistance platform, ARMS enables 24x7 collaboration between workers and experts

### Measurable KPI / Results / Outcome

- **Simplified processes** – Workflows, Reports, intuitive quality checks
- **Elimination of paper-work and human errors in data feeding**
- **Reduction in product returns**
- **Productivity Improvement**
  - New Hire Onboarding time by 40%
  - Quality Inspection time by 30%
  - Remote resolution rate by 50%

## Solution Approach Diagram

1. Scanning & Part Identification - QR Scan/ 3D Model/ AI & ML Tracing
2. Guidance – AR based Checklist Creation on Actual Part
3. Past Trends and Data Visualization
4. Faster Decision Making with 24x7 Expert Guidance from Any Location

## USP: AR & AI based solution to transform the inspection & quality control processes by reducing dependency on skilled resources, error proofing, enabling real-time decision making and 24x7 remote assistance

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Plutomen Technologies Private Limited  
An AR-VR Solutions Provider to Enterprises  
https://pluto-men.com
**Problem Statement**

- Currently energy is consumed from three sources: Renewable, Electricity Board, and DG set. The consumptions readings are taken manually and updated in the ERP system.
- This is a tedious process and prone to human error also there are no real-time insights to act upon.
- The need is to have automated Energy data collation and derive insights to help save cost and hence improve profitability.

**Technical Summary**

- Edge devices based on raspberry pi OS running on ARM Cortex – A72 are used to process data.
- Cloud-based IOT hub along with ML models (Power BI and Azure ML studio) helps in fetching important insights.
- Top layer of proprietary software provides aggregated data which will support important decision making.

**Solution Summary**

- **Connect & Monitor Data**
  - Install Measurement Devices
  - Install Gateway to transmit input energy and output data to System

- **Analytics & Identify losses**
  - Benchmark the System
  - Identify & Quantify losses
  - Identify Root Causes

- **Innovate & Engineer Actions**
  - Build solution to improve System by combining power of data analytics and Energy Engineering

- **Implement the actions**
  - Reduce losses and drive energy consumption in machines

**Measurable KPI / Results / Outcome**

**Business KPI**

- Specific Energy Consumption and energy analytics in real-time.
- Average coefficient of energy can improve by 25%.
- Average energy consumption can improve by over 30%.

**USP:** Combining the power of Digital technologies (IoT & ML) with energy engineering to produce financially prudent energy saving solutions.
MANUFACTURING INNOVATION CHALLENGE 2020
2nd Edition (12th Oct - 11th Dec)

USE CASE CATEGORY #2

IMPROVE THROUGHPUT
- High Speed Machine Vision Inspection in Tyre Manufacturing
- AI Based Yarn Grading

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INDUSTRY PARTNERS:

PLATFORM PARTNER:
Problem Statement

• Tyre industry, has inherent challenges in ensuring consistency around product quality, both from the aesthetic point of view as well as functional performance.

• Manual QC process is not only tedious but also highly prone to human error due to fatigue (~900+ tyre per person per shift are inspected)

Solution Summary

• An automatic, ML based inspection system where tyres of different sizes move through the inspection area on a conveyor and a ball transfer system.

• Laser triangulation sensors and cameras capture 360° profile of the tyre that gets evaluated by AI based computer vision system

Technical Summary:

• Laser triangulation sensors captures the profile of the tyre up to 12µm accuracy

• AI/ML algorithms compare the profile of the tyre with a master profile and classify the tyre based on the defects.

Measurable KPI / Results / Outcome

• Inspection Accuracy – >95%

• Inspection Time – 10 to 20 s/tyre (Reduction by ~30% - 60%)

• Escape Rate – <1%

USP: Ergonomically Designed Mechanical System with Laser and Self Improving AI/ML Algorithms
## Problem Statement:

- Presently 45,000 cones are manufactured daily that gets manually inspected and separated, this makes them prone to human error.
- Grasim is looking to automate this QC process to reduce human dependency, hence reducing the error count of finished cotton yarn spindles.

## Solution Summary:

- An AI based QC check automation system which can detect defects like dirt particles, bad winding, polyester mix, colour variance etc. without any human intervention.
- Segregation of the cones based on weight and cone colours.

## Technical Summary:

- Cotton cones passes through UV Chamber via the conveyor belt for first level data capture.
- Weight measurement is done and AI/ML based algorithm uses the data points to detect the defects.
- System rejects the unfit cones via Pneumatic Rejection Arm for further human inspection.

## Measurable KPI / Results / Outcome:

- Throughput of 30 cones/minute.
- Zero false positive., i.e. no bad cone will be passed from the system.
- Control panel to adjust the threshold of rejections or acceptance.

**USP**: A Real-time, AI based System for 360-degree QC of Cotton Yarn Cones.
MANUFACTURING INNOVATION CHALLENGE 2020

2nd Edition (12th Oct - 11th Dec)

USE CASE CATEGORY #3

BUILDING PREDICTABLE AND RESILIENT SUPPLY CHAIN

- Automated Surface Area and Volume Prediction of Raw Materials
- Cost-Efficient and Robust eLock for Perishable Goods Carrying Carts

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<table>
<thead>
<tr>
<th>Problem Statement</th>
<th>Solution Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Limestone, basic raw material used in cement plant is stored in open field which makes it difficult to assess the quality and quantity</td>
<td>• Laser line scanning for conveyor belt</td>
</tr>
<tr>
<td>• This approach doesn’t provide any real time feedback for upstream processes and estimating the raw material to stock is a challenge</td>
<td>• Lidar solution for stockpile Measure</td>
</tr>
<tr>
<td>• Need an automated solution for measurement of volume and surface area in storage yard and conveyer belt</td>
<td>• 3D viewers, Image processing for material identification.</td>
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<table>
<thead>
<tr>
<th>Technical Summary</th>
<th>Measurable KPI / Results / Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Laser triangulation methods using line laser and camera for conveyor belt scanning.</td>
<td>• Accuracy of alerts and dependability &gt; 95 %</td>
</tr>
<tr>
<td>• Image processing/machine learning use for material volume identification.</td>
<td>• Low latency Design</td>
</tr>
<tr>
<td>• Lidar based 2D servo platform with multiple observation stations, to measure point cloud of the heap.</td>
<td>• Real time estimation for fast running conveyor belt</td>
</tr>
</tbody>
</table>

**USP**: High Accuracy, Low Latency, Ease of Use, Best Quality
Problem Statement:

- Current locking mechanism used in Container on Wheels (tricycle with milk container) has milk adulteration/theft opportunity if there is no supervision.
- Low cost smart locking system is required which can provide supervised access to the containers.

Solution Summary:

- The solution will consist of a smart lock similar in shape of a padlock, which can be remotely controlled, provide real time theft alerts with geo-fencing feature and be mechanically sturdy.
- Constant monitoring for any malfunction or misbehavior.
- Mobile and feature phone enabled, low power consumption leading to more run time.

Technical Summary:

- Linear actuator based locking mechanism with sensors like accelerometer, gyroscope, temperature etc. with GSM(SMS) connectivity and GPS tracking.
- GPRS connection to the cloud through MQTT protocol and mobile application for monitoring and control.

Measurable KPI / Results / Outcome:

- Estimate cost of the lock less than Rs 2500
- Milk transport process through CoWs would become transparent which will help in improving customer satisfaction.
- No chances of milk adulteration/theft with the smart lock.

USP: Extremely Low Cost Solution, Flexible Features and Made in India.
Launching Industry 4.0, Smart Manufacturing Competency Center

Integrated Platform Connecting Enterprises, Solution Providers and Academia

Showcase of digital solutions for Manufacturing Leaders
For more details please view these videos
MIC - https://youtu.be/4tryF7Xu4sY
SMCC - https://youtu.be/qk-L4QglZos

Contact: NASSCOM Center of Excellence, Gandhinagar
Visit: http://gujarat.coe-iot.com/