

# Plugin Edition 3

The Plugin program focuses on select vertical industries, namely manufacturing / industrial, retail, healthcare and banking. The program offer support to India's technology startup ecosystem through the Plugin program to spur innovation amongst early stage startups focused in these areas. Hardware & software development kits, reference boards, design collaterals, test & debugging equipment will be provided free-of-cost to all selected participants. In addition, selected startups would get need-based access to the Intel India Maker Lab at Bengaluru and/or SINE incubation facility at Mumbai.

We have provided examples of use cases in the vertical and horizontal technology domains of Artificial Intelligence / Machine Learning, Internet of Things, Vision, Speech, Block Chain that are relevant across the four vertical industries. This however, is just and indicative set and we are open to any other use cases that your organizations have addressed based on customer's needs.

Do note that this is a "Hardware and Systems" accelerated incubator and any use case needs to have a physical manifestation of a prototype / product.

## Industry Problem Statements

This section provides the challenges shared by Plugin Edition 3 industry collaborators as well as technology challenges faced by other customers within these industries. This however, is just and indicative set and we are open to any other use cases that your organizations have addressed based on validated customer's needs

## Plugin Edition 3: Industry Collaborators Challenges

The logo for HAX, consisting of the letters 'HAX' in a bold, dark blue, sans-serif font.

## Retail

### P&G

#### 1. Predictive algorithm using retail analytics to enable store level targeting and personalized selling recommendations

- P&G is looking at developing a robust predictive algorithm using Machine Learning and Analytics on its secondary sales data combined with other external data sources to enable personalized selling recommendations and targeted assortment/promotion for Kirana stores. This can help us provide more effective service related to retailer needs and minimize push-based sales not relevant to stores.
- The solution can include areas like personalized store-level assortment, smart list and right sell-in quantity ensuring always on availability of P&G products in store, targeted promotion chassis etc. We are looking for solutions integrating right external data sources with our internal data to provide algorithms which are accurate and scalable. If selected, we will run agile pilots to refine your solution with the end goal of scaling it up across markets.

#### 2. Leverage “voice” to enable voice-based ordering & voice assisted selling and simplify the end to end ordering process

- P&G is looking at leveraging voice technology to automate base orders by retailers, combine voice and image to improve product search/navigation and use voice to text conversion for simplifying the ordering process. This can help us make the end to end ordering cycle faster and more convenient as well as provide multiple touchpoints of order closure for both retailers and sales representatives.
- The solution can include but not be restricted to areas like voice to text conversion, combination of voice and image, integrating voice with chatbots/social platforms, quick search capabilities using voice, personalized voice-based recommendations, voice as a selling enabler etc. We are looking for unique ideas which are scalable, and it is alright not to have a full solution ready. If selected, we will run agile pilots to refine your solution with the end goal of scaling it up across markets.

### Future Group

#### 3. Monitoring, control and deviation escalation of energy and temperature parameters, along with predictive maintenance of electrical equipment inside the store - analog and digital

- Monitoring & control of energy and temperature parameters, along with predictive maintenance of electrical equipment inside the store. Currently there is no efficient solution to manage energy consumption, reduce cold storage wastage & predict equipment breakdown. The current challenges that the store and business faces - HVACs

consume 60-65% of total energy. Currently their operation is manual; no way of optimizing and scheduling their operation.

- There are escalations regarding tampering with freezers: temperature not being maintained at the stated set point. No alarm or ticket could be raised before the complete breakdown. Data regarding fuel usage by Diesel Generators & their runtime is based on manual entry from the staff

#### **4. AI based Store Operation application with components of Computer Vision, Image Processing, OCR features to automate the verification process.**

- Managing store operations at a scale of 1000 stores is manually / humanely not possible. Currently every store manager has to perform 40 tasks on a daily basis. For example, the store manager has to make sure that store opens every day in the morning at 6:30 AM & has to click an image of the front part of the store through the app on his smartphone which gets uploaded to the store operation platform. To complete each of these 40 tasks: the store manager has to click the relevant pic at a specified time. But currently the store associates click random images in their own leisure time. There is no certain way to raise alarms / tickets or detect anomalies in case of discrepancy with stipulated time & standard image. We are looking for AI based Store Operation application with components of Computer Vision, Image Processing, OCR feature embedded with it to automate the verification process. Imagine manually verifying  $40 \times 1000 = 40,000$  images on a daily basis. A lot of manpower will be required just to validate these images along with the timestamp.

### **Industry Use cases**

#### **5. Enhancing sales promotion by purchase history analysis & sales promotion by shopper clustering using POS data**

- Objective is to gain shopper's insight from each shopper's purchase history. The insight could be contribution (potential as royal customer), prediction of next visit, next purchase items and estimation of interest items which haven't purchased. This helps in developing infrastructure to realize 1to1 marketing (such as product planning, campaigns, ads and merchandising) and customer transfer which is based on shopper's purchase history.

Cluster shoppers into some segments by similarity of purchased items using POS data. Recommendation items for shoppers in each segment would be estimated. Features of each segment would be also analyzed by features of purchased

items. This helps in developing an infrastructure to realize optimized marketing (such as product planning, campaigns, ads and merchandising) and customer transfer for each shopper segmentation.

#### **6. Enhancing sales promotion by shopper attribute analysis using image and data analysis**

- Estimate shopper's personal attributes from the retail company's dataset. The attributes could be but not limited to shopper's home address area, financial situation, preference and lifestyle (It depends on data content). This helps in developing an infrastructure to realize 1to1 marketing (such as product planning, campaigns, ads and merchandising) and customer transfer which is based on shoppers attributes. The retailer is looking for an amalgamation of user location, image based object recognition, personal attributes estimation and sentiment analysis for the complete solution to be delivered

#### **7. Face recognition and voice technology for automated checkout with no risk of masquerade, loyalty program and enhanced customer experience**

- Make the payment system using each shopper's registered phone number and his/her face photo. Shopper can pay by only saying his/her phone number in front of a camera. The face recognition system would make an alert in case of masquerade.

#### **8. Smart shelf with inventory management, real time update of stock in the shelf with alerts**

Real-time tracking of inventory stock situation, Provides real time analysis of data, Enables retailers to stock larger quantities of fast moving products, Reduces the number of slow moving items, Enables manufacturers and retailers to reward shopper loyalty. They also trigger the back-end system about items that do not belong to certain shelves - misplaced items.

#### **9. Reduction of customer servicing time by instant welcome notification to mobile for the customers to pick & avail service upon Branch entry**

Solutions that can be used in conjunction with the branch processes that would make the branch agile in responding to different requests upon entry into the bank branch.

#### **10. Customer retention strategy by identifying loyal & preferred customers of the Bank and recognition & rewards plan**

Solutions that can assist in identifying select registered customers and provide necessary updates to the branch officials to recognize and provide a differentiated service experience.

**11. Eliminating frauds by introducing vision and/or bio metric based authorization at Branch transactions**

Technology solutions that can help reduce or eliminate wrong practices that could use vision based Behavioural analysis coupled with other relevant technologies at the branch location.

## **Industrial/Manufacturing**

### **Industry Use cases**

**12. Inspection: Reflective surface / Textile surface / automotive parts / engine block/ pipes / Industrial parts**

Vision based inspection solution which is able to compensate for highly reflective surfaces eg. Glossy paint, chrome coating, polished metal etc. The solution should identify and classify defects for the above categories individually.

**13. OCR-Handwriting (English / Hindi) / printed docs**

Vision based optical character recognition solution for both handwritten and printed documents. The solution should understand English and/ or Hindi. Other languages are good to have. The solution have contextual understanding and should be able to work on low quality printed paper or prints on different surfaces (either straight or partially curved) environment.

**14. Autonomous weight carrying robots /segmentation support /Collision avoidance and detection**

Motor and motion control based solution with vision based segmentation and collision avoidance system for use in warehouses. System should be able to map the path and communicate / hand off with other robots or shelves. System should support 2D and 1D bar code scanning (vision based)

**15. Terrain mapping and analysis / multi camera stitching / rendering**

Ability to develop maps from drone / satellite / front facing camera based imagery. The solution should be able to segment and classify vegetation, render and create a 3D Point

cloud. Additional feature could be rendering additional parameters (depth, heat map etc.) along with 3D point cloud.

#### **16. Facial recognition / worker safety / worker compliance**

Solution should be able to classify and identify individuals with least profile pictures with an accuracy of > 98% in multiple environmental conditions (Outdoor, Indoor, Sunny, Overcast, Night). Solution should detect tail gating with occlusion. Additional features would include people counting, compliance and behavior detection.

#### **17. Freight or parcel dimensioning with barcode / QR code reading capabilities**

Vision based solution to identify and measure the parcel and its dimension. The solution should be able to read 1D – 2D barcode. The solution should be able to create a stacking plan based on the parcel type, dimension and loading / unloading criteria.

#### **18. Process or industrial automation and physical modeling / digital twin**

Edge based AI solution to model multiple factory assets (motors, boilers, compressors, machines etc.). Solution should support digital twin creation, linking of assets and provide simulation capabilities with > 95% accuracy. The solution to provide remaining life estimates with > 95% accuracy.

#### **19. Robotic pick and place with occlusion (homogenous and non-homogenous)**

Robots with collaborative capability and vision based solution to identify objects with occlusion for homogeneous and non-homogeneous parts Eg. Nuts, bolts, parcels etc. The solution identify the best segregation, pick and place mechanism.

### **HPCL**

#### **20. Development of Real time manufacturing intelligence system in lubes filling plants/LPG bottling plants**

OCR based reading of LPG cylinder Kerb (empty) weight and read the current weight with intelligent system to detect the right amount of LPG to be filled. The solution should interface and control the filling station. The solution should also cater to Lubes filling plant.

**21. Fraud Detection using AI/ML and Analytics – all SBUs, Refineries, Support Functions.  
Safety SOP Compliance – No Safety No Operations**

Vision based solution for people counting, compliance and behavior detection. The solution to identify compliance (Personnel – location – timestamp) and notify deviations. Solution to provide behavior analysis to detect frauds.

**22. Brand Protection / Counterfeit detection**

A cost optimized counterfeit detection solution.

**23. Procurement Platform using Blockchain Technology – all SBUs**

Intelligent and automated, federated procurement system with support for smart contracts, payment integration and distributed ledger.

**24. Document Management System - Fast digitization of physical documents and categorization / contextualization**

Vision based optical character recognition solution for both handwritten and printed documents. The solution should understand English and/ or Hindi. Other languages are good to have. The solution have contextual understanding and should be able to work on low quality printed paper or print. Document management system for ease and secure storage and retrieval

**25. Smart Contracting and Logistics management**

Logistics and asset management solution for compliance (Cold chain, tankers, Hazardous chemicals, Catalysts etc.). Intelligent and automated, federated procurement system with support for smart contracts, payment integration and distributed ledger.

## Healthcare

### Industry Use cases

**26. AI based disease screening and diagnostic (Preferably multi-modal or single modal with high compute complexity) for use cases in primary health & wellness centers, diagnostic labs and hospitals**

Modalities includes: Imaging (2D/3D), video (mono, stereo), discrete signals, speech, text, genomic, demographic.

### **27. Security of AI models and applications deployed at the edge**

Solution should be able to protect the privacy of AI models and the data of the customers for deployments in the edge during run time, idle time and transit time.

### **28. Immersive medical simulation technologies**

Combining hardware and software to generate next generation simulation platforms for training on health and allied health practices.

### **29. AR and VR in Healthcare and Medicine**

Augmented and Virtual Reality applications covering but not limited to (1) Visualization of things that are not easy to see with naked eye (2) Audio visual analytics to aid visually impaired (3) Chronic pain management (4) Aids for Autism, Mental health and Anxiety disorders.

### **30. Elderly assist applications with video and / or speech analytics**

Audio-Visual monitoring of the elderly that satisfy their independence, participation, care, self-fulfillment and dignity.

### **31. Continuous monitoring of patients (ICU and In-patients) post operation**

Audio-Visual monitoring of patients in hospitals (ICU/NICU and In-patients).

## **Banking**

### **ICICI Bank Limited**

#### **32. CV scoring solution to score the CVs (Text, Video, Audio) and tag them with relevant job profiles for quick retrieval of most relevant CVs as per job description**

The Bank receives several thousands of resume/CV every month in response to the recruitment drive that is conducted throughout the year to fulfill the human resource requirements of the Bank. The CV received by the Bank are maintained in a repository for future requirements. On receiving a new recruitment requirement, the Bank conducts a keyword search on the CV repository to retrieve suitable CVs before inviting fresh CVs from external sources. The Bank wishes to create a CV scoring solution to score the CVs

and tag them with relevant job profiles for quick retrieval of most relevant CVs as per job description.

### 33. Vehicle Detection and Classification based on vehicle attributes from different sources at FASTag toll booth

The Bank receives thousands of images from FASTag toll booth operators for reconciliation due to improper classification of vehicle in FASTag records and the actual image clicked at toll booth. The Bank employs executives to manually inspect each image, detect if the image clicked has vehicle in it or not and classify the type of vehicles based on number of axle and other different parameters. If the vehicle axles are not quantified from the image, they Check all the History of the given data and try to simulate to the closest option available based on Agency Tag, Registered Hex Tag number and more. The bank wishes to create an automated system to identify, classify vehicles based using vision and data, analyze and share deviations for corrective action.

## HAX Focus Areas

A large chunk of HAX's B2B investments use some combination of sensors, connectivity, electro-mechanics and, occasionally, material science to unlock value for enterprises. The 7 big industries we are focused on investing in are:

1. Energy
2. Communications
3. Logistics and Warehousing
4. Agriculture and Food Supply
5. Construction and Facilities Management
6. Manufacturing
7. Mining

Why? First, these are the core drivers of an economic engine. Economies are built on the things people make, the resources they use to make those things and how they move what is produced. If we want to create lasting, impactful change we have to focus on the foundations. Second, these industries need software intelligence built on data gathered from the physical world to solve their problems. Digital only solutions are incomplete.

We like companies that are focused on problems first and technology second. Our founders build solutions to gather data that was previously difficult to acquire, to enable speed and efficiency gains in industrial processes, to help organizations make and save money in their operations and to reduce waste.

A few examples of B2B investments we've made:

[Amber Agriculture](#): Amber's wireless sensors monitor grain condition inside storage bins to prevent spoilage and ensure the maximum price per bushel for the farmer.

[Simbe Robotics](#): Simbe's robots conduct autonomous shelf auditing in large retail locations to create process efficiencies in store logistics.

[Smartex](#): Smartex's network of cameras enable real time quality control in textile manufacturing to reduce faults in production.

[Rockmass](#): Rockmass' scanners rapidly map rock features to help mining crews work faster and cheaper.

[Avidbots](#): Avidbots' fleet of autonomous cleaners help maintain massive floor areas at airports, malls and other facilities.

[Unbox Robotics](#): Unbox provides robots for warehouse systems in India to enable rapid parcel sorting.

[Mesh++](#): Mesh++ builds wireless mesh infrastructure for high throughput wifi connectivity in outdoor areas.

[Volt Storage](#): Volt Storage has created miniaturized vanadium redox flow batteries with the end vision of building connected mini grids and energy-sharing networks.

All of these companies first identified clear customer pain points. They then productized technology to solve these problems. Most of our startups use off the shelf sensors, chip sets and communication protocols. The real defensible innovation lies in how they use the sensor data to create a unique software value add.

We are not impressed by AI for AI's sake or Blockchain just because it's a hot space. Hopefully, the examples above give you a sense of our investment philosophy. If you have

a validated problem area that you're building the right, innovative solution for, we want to hear from you

# Technology Focus Areas

## AI / ML

- Inferencing and accelerating inferences at the Edge and in the cloud
- Advanced recommendation engines
- Computer Vision
- Speech and NLP / NLG / NLU for Local languages

## IoT

- Workflow consolidation at the edge
- Utilizing video and computer vision to drive autonomous decision making at the edge
- Personalization and analytics

## Block chain

- Supply Chain use case
  - Blockchain integration with IoT edge devices such as temperature and other sensor data, RFID, QR Code, bar coding, etc.
  - Pharma supply chain that could include spurious medicine identification by IoT or track and trace
  - Supply chain for other use cases e.g. Aviation, etc.
- Loyalty points
- IoT integration with Blockchain for Healthcare record management and/or Digital Records Management

## Cross Industry Technology Platform

Any innovative core horizontal technology platform that is cross industry that can be used across vertical industries (Video analytics, Surveillance, AR/VR, Security, Manageability etc.)

## Hardware platform / solution

Any hardware technology product, preferably using higher order of compute, being developed in India (Made in India) that is part of a solution that you are building to solve an industry problem in the 4 vertical industries (Retail, Health, Industrial/Manufacturing, Banking) For enhancing customer experience or improving operational efficiencies