Quality Inspection at Manufacturing Industry

Introduction

Today, every process is on the verge of getting automated. Be it painting a car using robots or driving it on streets using softwares, machine vision has been integrated in almost every domain and has been strengthening its roots ever since. Even in manufacturing industries, machine vision was integrated at a very high scale, eliminating human errors and enhancing product quality.

> This case study showcases how Winjit's Machine Vision was adopted in a Meter manufacturing unit for checking the quality of the meters produced at a large scale level.

Customer

The client, is an organization having its core competence in manufacturing, design and development of Test and Measuring Instruments and Industrial Control Products, since the last three decades.

Their Delta Meters, are the conventional energy meters that continuously monitor data about consumption of energy over time. The quality control and monitoring of these meters were particularly dependent on the labours, which is vulnerable to poor accuracy, high time management, unorganised data and processes.

The client sought for a way to automate the process while eliminating human errors.

Requirement

To get the overall view of the scenario, Winjit Technologies MV team communicated with product managers to understand the exact requirements. The team identified key requirements as:

- Energy meters to be interfaced with RS-485
- Calibration of meter's needle with the camera.
- The solution for automating calibration testing of such meters was developed primarily using Python and OpenCV
- Storing Data over the cloud
- Accessing in-cloud data for further analytics

Challenges

Energy meter sends raw 32-bit data for every parameter in IEEE-754 floating point format which needed to be converted into decimal format for analytics.

A major challenge was calibrating the machine camera with the needle of the meters, which in turn was subjected to distance and illumination changes. Detecting the base of the needle was another problem faced.

Also, equipping all meters with ability to connect to cloud increases costs sky high. The cost of implementation to value-addition ratio was a major concern.

Solution

Machine vision for meter testing was achieved by the Winjit MV team with the value addition of accessing in-cloud data for further analysis. Taking in regard all the requirement specifications led array, camera, Raspberry Pi-3 with 4×ARM Cortex-A53, 1.2GHz processor, 1 GB RAM and on-board Wi-Fi was the preferred solution for the implementation.

The primary aim of the solution was to perform 3 tests of Sluggishness, Stickiness and Accuracy. For instance, the Camera would capture cardinal point readings for each of the above tests. While doing so, value captured for each cardinal point during the up to down test was compared with the value captured for the same cardinal point in the down to up test. The difference between these values was the Sluggishness percentage for that cardinal point. In the phase II the Solution Included Multiple Meters (minimum 1 and maximum 4 meters at a time) in a single test run.

The result was colour coded as red and green for ease of user experience

The Solution also included QR Code Printing, wherein the Test Results were stored in a QR Code for each meter.

Achievements & Benefits

- With traditional methods the client was able to test 400 meters in a day. With the help of Winjit Machine Vision, the numbers augmented to 2500 in a day.
- A meter which was earlier tested in a span of 30 secs, was now tested in just 3 secs with the help of machine vision.
- Number of meters getting tested in a day increased by 525%.
- Testing time of a meter decreased by 90%.
- Accuracy and precision increased by significant amounts.
- Ease in inventory management was reported with the help of QR codes.

Conclusion

The solution helped the client to increase its manufacturing capacity by significantly decreasing the quality checking time. Also, few employees were required to conduct the same task which removed the redundancy and led to better management of work force.

Winjit technology is India's leading provider of innovative engineering solutions. Since its inception in 2004, Winjit has built and expanded its expertise in latest trending technologies including Internet of Thing, Artificial Intelligence & Machine Learning, Fintech Solutions, Product engineering and Digital publishing. Winjit provides end-to-end solutions from conceptualization and optimization to providing real-time solutions by developing software systems for any business is these fortes. Over the past decade, Winjit has provided innovative technology and engineering solutions that has resulted in world-class recognition and long standing customers.

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