

Enabling Predictive Maintenance in the Laboratory

Using computer vision to maintain complex machinery

Client: A leading global pharmaceutical manufacturer of enhanced medicines with over 140 years of business experience

Industry: Healthcare

Project Type: Proof of concept delivered to two of our client's research labs

Overview

1 Challenge:

Our client is a leading pharmaceutical manufacturer that produces the latest medicines. To test medicines they create, our client utilizes a special dissolution machine that dissolves medicines in a water-like medium.

In order to test accurately, the dissolution machine needs to be calibrated; if the machine isn't calibrated, medicine experiments are potentially inaccurate. Later, if the client finds out the machine wasn't calibrated, they then must manually check all previous experiments, which is a very tedious and expensive process.

Also, since the machine was being monitored via human observation at all times during experiments, this resulted in a high percentage of human error.

2 Solution:

Luxoft implemented an artificial intelligence (AI) solution to replace the majority of time-consuming and potentially erroneous human observation. This semi-automated solution helps avoid hours of manual inspection freeing up the resource for other work.

Using a visual sensor to analyze the wobbling and rotation speed, this solution uses computer vision to "visualize" the process, frame-by-frame. Deviation from the correct amount of wobbling and rotation speed is calculated automatically. Afterwards, if the machine is in an incorrect state, the AI alerts our client to the situation via a user-friendly dashboard.

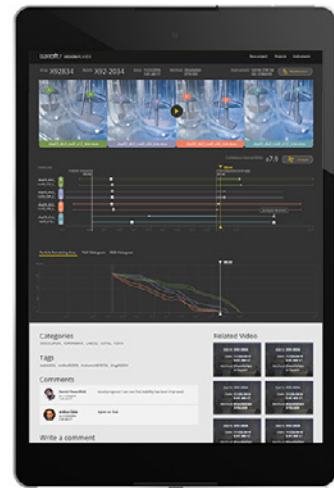
3 Result:

This solution:

- Saves time by accurately notifying when the machine is not in its correct state, cutting out the guesswork. This allows employees to avoid bottlenecks in their workload and finish tasks quicker
- Eliminates the possibility of human error by letting AI handle the observation task
- Helps save money by decreasing the amount of manual labor, enabling workers to focus on more important tasks
- Is scalable – adding a new smart camera to accommodate future changes is easy

Thanks to predictive maintenance, our client is now free from unexpected delays caused by machine faults, ensuring a dependable testing environment.

Solution Dashboards



Challenge

Calibrating a complex machine for accuracy

Our client, a leading pharmaceutical manufacturer, has been in business for over 140 years. To comply with strict FDA regulations, they have to gauge in which way, and how quickly, their medicines dissolve in the body. To test new medicines, our client uses a special dissolution machine that dissolves them in a water-like medium, mimicking how medicines dissolve naturally in the human body.

To test accurately, the dissolution machine must be calibrated, otherwise the results of medicine experiments could be inaccurate. In some cases, the client might not know when the machine isn't working and could be testing medicines incorrectly, in all good faith. And if the client then finds out the machine wasn't calibrated, they have to check all previous experiments manually (potentially disregarding some experiments) – a tedious and expensive process that can take days.

Also, since the machine is monitored by technicians during the experiments, human error creeps in. Human observations are regarded as unreliable, being merely the opinion of the reporter.

So, the client needed a surefire way to verify the machine is functioning properly to ensure precision during use.

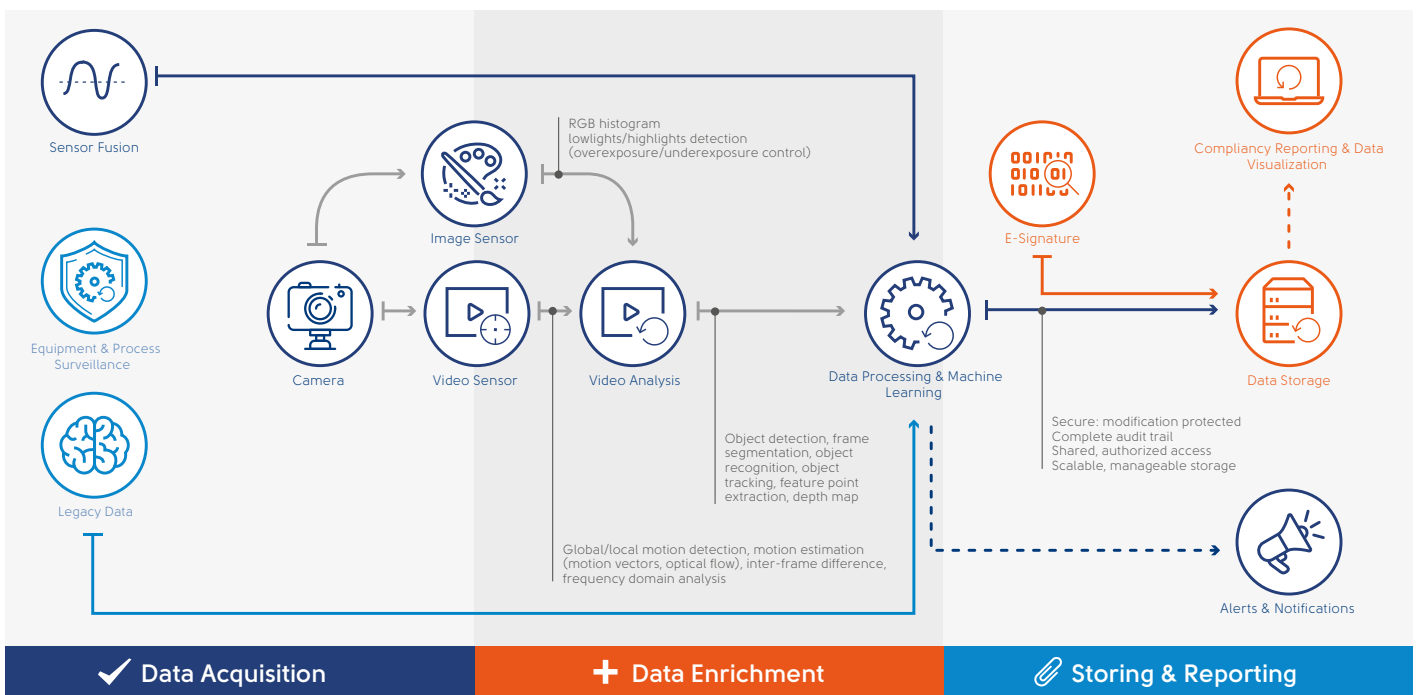
Solution


Predictive maintenance through AI, deep learning, and computer vision

Having many experts in AI and healthcare gave us the relevant expertise needed to implement the project effectively. Also, Luxoft offers customized solutions, providing the client with an outcome that works best for their particular situation, as opposed to the approximate fit you get with an off-the-shelf product.

We implemented an AI solution to eliminate the majority of time-consuming and potentially erroneous human observation. To do this, the team ran experiments and then compared the live results to video footage of the machine's behavior. Luxoft associates developed a program (in just five months) that understands when the machine's state is correct or incorrect via computer vision, AI, and deep learning. This semi-automated solution avoids hours of human observation.

With a visual sensor that analyzes wobbling and rotation speed, the team used computer vision to "visualize" the process, frame-by-frame. Any deviation from the correct amount of wobbling and rotation speed is then calculated automatically. Afterwards, if the machine is in an incorrect state, the AI alerts our client via a user-friendly dashboard. The program alerts users to anything out of the ordinary, such as when something in the machine isn't aligned correctly or is running at the wrong speed. This way, our client is guaranteed to know when the machine needs maintenance, without the use of manual labor.





“Working with unexpected delays due to their machinery faulting is now a thing of the past. Computer vision and AI are digitizing the lab, making it a more intuitive and productive environment.”

Gianni Piccininni, Senior Director of Healthcare & Life Sciences, Luxoft

Result

An accurate and scalable solution

Business outcomes of the solution:

- **Productive:** saves time by accurately notifying the client when the machine is not in a correct state – cutting out the guesswork. This allows employees to avoid bottlenecks in their workload and finish tasks quicker.
- **Safe:** eliminates the possibility of human mistakes by letting AI handle the observation task. Thanks to predictive maintenance, our client is free from unexpected delays caused by machine faults, ensuring a reliable testing environment.
- **Cost-effective:** helps save money by decreasing the use of manual labor, allowing workers to focus on more important tasks.
- **Scalable:** adding a new smart camera to accommodate future changes is easy.

The dissolution machine’s maintenance solution is perfect for all types of machinery. It helps users to understand future maintenance, how to work uninterrupted and prevent future issues, as well as how to improve safety (certain improper movements can be dangerous for many machines).

Ready for the lab of the future?

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