

The logo for GadgEon, with 'Gadg' in blue and 'Eon' in orange.

Engineering Smartness

BOTTLING LINE CAPPER HEAD CALIBRATION AND MONITORING SYSTEM

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Version 02



Bottling line capper head calibration and monitoring system



North American leader in integrated packaging solutions, has a bottling plant where the capping process is critical and was looking for improving efficiency and quality of the current capping process with calibration being done manually.

Solution Description

- Gadgeon designed the Dummy bottle with electronics and firmware, that is based on WIFI microcontroller and integrates various sensors, WIFI module, battery level fuel gauge and RFID reader for capper head identification and communicates wirelessly to Gateway
- Mechanic is able to calibrate the capper head using a dummy bottle.
- Gateway displays the data in Real-time on intuitive GUI, enabling mechanic to make adjustments to capper head and observe the changes within a second on the Gateway.
- Uploads all data to cloud for storage, analysis and reports
- Enables clients to upload mathematical models to cloud platform to analyse the sensor data and make inferences on the quality of the capping operation.

Outcome and Benefits Delivered

- Developed a “Dummy Bottle” with 9 different force and position sensors and Wi-Fi interface
- By leveraging Gadgeon’s Delpheon platform, we were able to reduce development effort by 50% and development schedule by 40%
- The solution is used for calibrating the Capping Machine before and during production to ensure all parameters are within acceptable limits.
- Significantly reduced the QA rejection rate of the finished bottles by more than 75%



The Business Context and Challenges of the Customer

- North American leader in the integrated packaging solutions, has a bottling plant where the capping process is critical for ensuring the quality and life of the products in the bottles.
- Current manual process is time consuming and error prone.
- There is no real-time monitoring possible during 'Live Run' of the plant.
- As a result the number of bottles rejected by QA was very high resulting into financial lose.
- The customer was looking for a solution that helps them to:
 - To automate the real-time monitoring of the calibration of the capper heads through a Mechanic console
 - To improve the current manual calibration process through maximum automation .

The Solution / System Description

Gadgeon developed a complete system based on its Delpheon platform, which is built on Azure IoT.

Dummy Bottle DAQ system

- A dummy bottle with electronics to measure the different forces applied on the bottle during the capping process.
- Measuring the forces provide valuable insights to calibrating the production line and also enables analysis of the quality of the capping operation.
- The System is designed to start the data acquisition automatically, once the top load force crosses a pre-set threshold.
- Gadgeon designed the bottle electronics and firmware. The system is based on WIFI microcontroller and integrates about 9 sensors, WIFI module, battery level using fuel gauge and RFID reader for capper head identification. It communicates wirelessly to Gateway

Capper Head Calibration Process Automation

- Embedded Linux based Gateway application, communicates with bottle and collects the data in real time.
- For the calibration process, the mechanic with the help of local HMI, can calibrate the different forces in order, one at a time, by tuning the capper head.
- Once the sensor is within range, data will be send to cloud by pressing a 'DONE' button on the local HMI.
- After a sensor is done, the next sensor in specified order is fine tuned, and this procedure is continued till all sensors are within range.

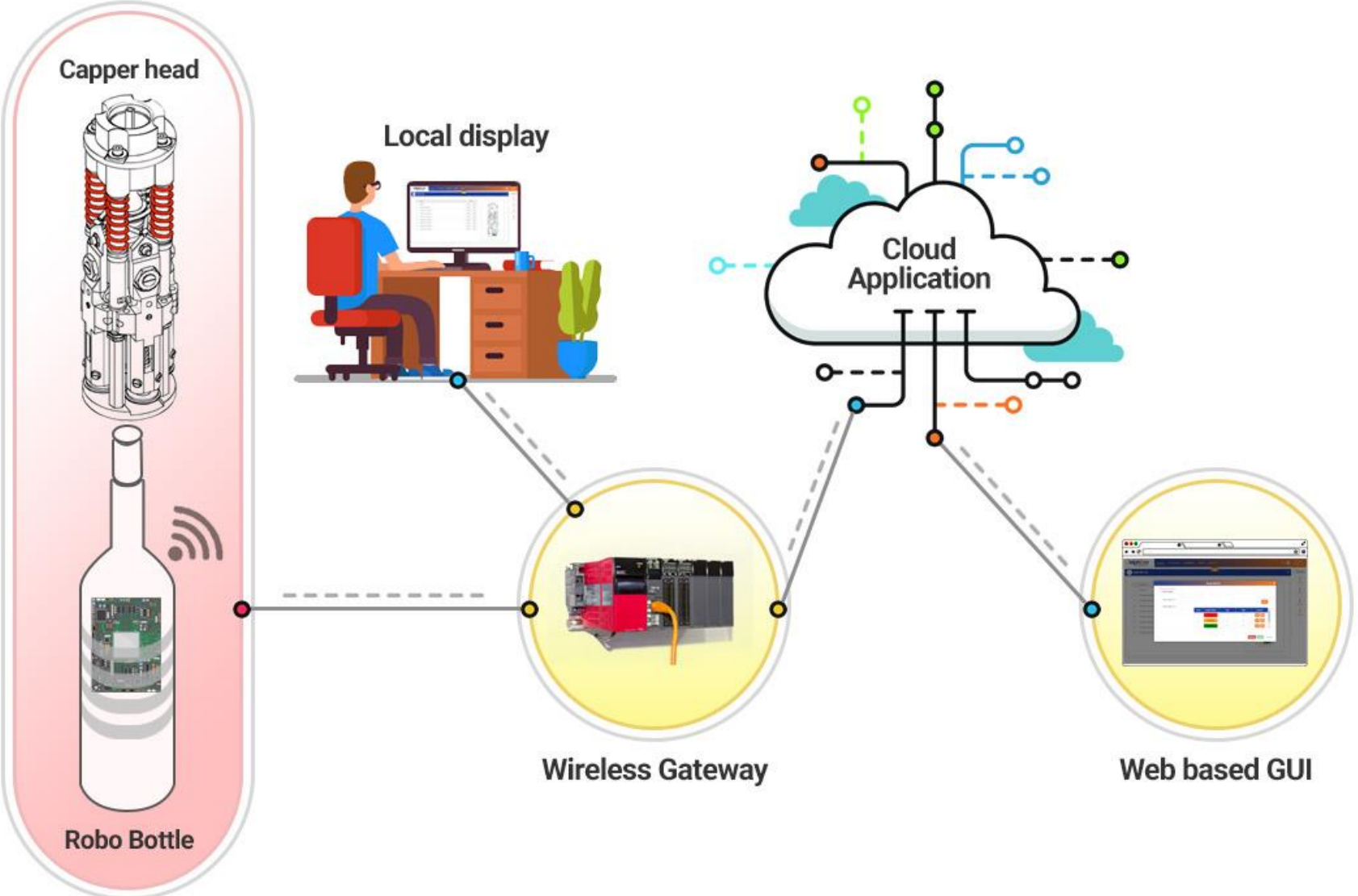
The Solution / System Description

Cloud Application

- The Cloud UI is used by Admin user to create users and assign roles to each user.
- The Dummy Bottle product provisioning with the configuration of sensor thresholds is done using the Cloud UI.
- The Production Manager can provision the Dummy Bottle and alter the pre-configured thresholds if necessary.
- The Cloud application receives the sensor data from the Gateway during the 'Bottling Line Run' procedure and displays at the Cloud UI.
- The same is also stored in Cloud storage and once the sensor data is available at the Cloud UI, the same is applied to predictive mathematical models.
- Dashboards to display the results of 'Run' procedure were customized based on the user profile.
- Existing SignalR .net library used for live updates to Cloud GUI, abstracted as a docker in DelCloud. Flexible data model which can be tailored to suit customer needs, MongoDB used as database to cater to varying customer requirements

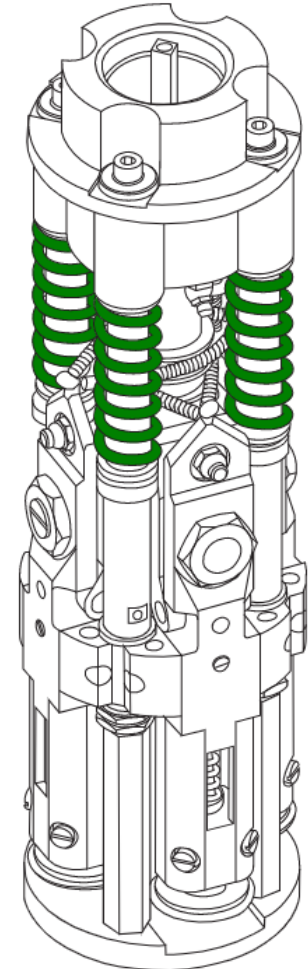
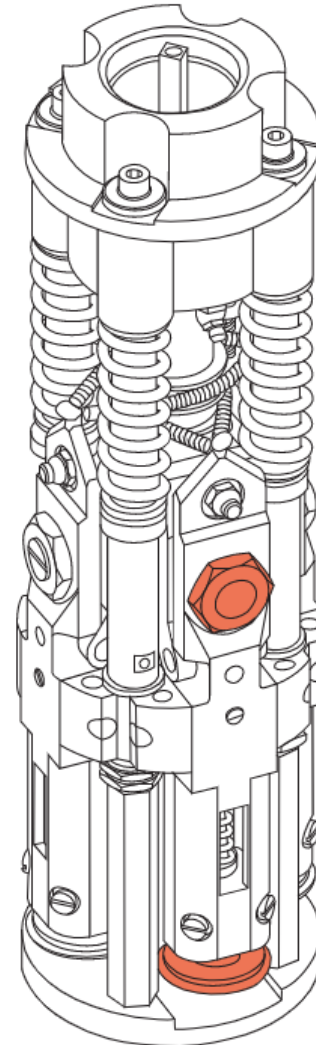


The System Description – Block Diagram





System Description – Copper Head Calibration Display



THANK YOU



For More Details, Let's Connect



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