I2.03– Beverage Monitoring and Tracking Improvements

Collin Kaase, Seth Minter, Jackson Guerry, Nathan Docherty, Walid Riachi
Ingram School of Engineering

Sponsor Information


- 31 Degrees provides beverage dispensing machines and beverage product for customers.
- Special events
  - Louisiana State Fair, the Fort Worth Livestock Show & Rodeo and various music and margarita festivals.
- Longer-term partnerships
  - Schlitterbahn, the Dallas Cowboys, Typhoon Texas and FC Dallas.

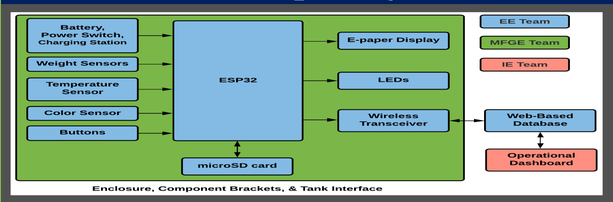
Project Background

1. Up to 100,000 seat capacity venues.
2. Up to 100 machine/tanks in over 80 locations.
3. 1-2 operators to manually check each supply tank.

Project Purpose

Create a smart scale and dashboard system to:
1. Enable event workers to remotely monitor the volume, weight, temperature, and flavor of beverage at each machine;
2. Reduce manual inventory checks by operators;
3. Provide detailed product usage data to 31 Degrees and their customers.

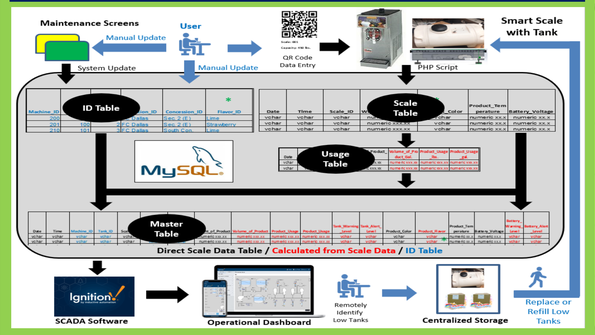
Multi-Disciplinary Team



- IE sub-team responsible for the database and operational dashboard.
- EE and MFGE sub-teams responsible for the scale system.

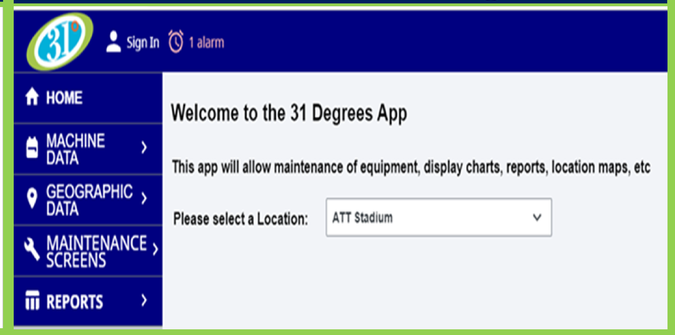
Project Schedule

System Architecture



Process flow for new beverage monitoring system.

Dashboard Home Page



The **HOME** page directs users to screens for a specific location.

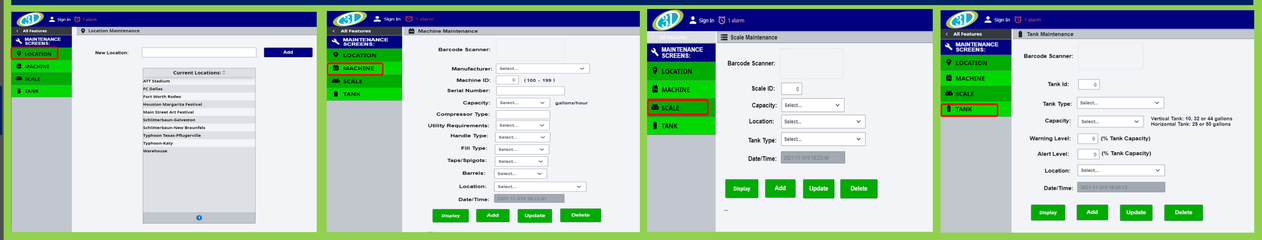
Operational Dashboard Views

Machine Overview Table

Machine Detail Table

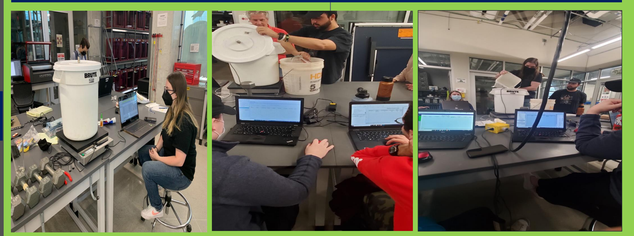
Power Status Table

Maintenance Screens



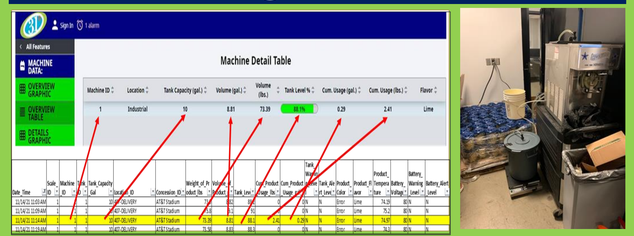
Maintenance screens are used to add, delete or update system information such as location, concession, machine, and tank IDs.

In-House Testing



- Multi-disciplinary, in-house testing of the smart scale and dashboard was performed in the Makerspace to confirm functionality, identify design problems, and identify opportunities for improvement.

Field Testing – AT&T Stadium



- In-house and field testing compared scale data in the Master Table with that displayed on the dashboards.
- The scale and dashboard met all requirements.

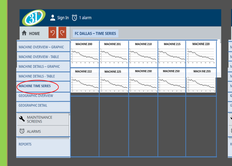
Results

Feature	Owner	Parameter	Min	Max	Comments	Joint Evaluation
Database	Seth Minter	Scale ID	n/a	n/a	Uniquely identifies scale device	
		Date	n/a	n/a	Month, Day, and Year at which data is taken	
		Time	n/a	n/a	Time of day at which data is taken	
		Weight of Product in Tank	4 lbs	400 lbs	Weight of available product taken by sensor	
		Volume of Product in Tank	0 gal	44 gal	Calculated volume of available product based on sensed weight	
		Volume of Product Dispensed from Tank	0 gal	44 gal	Calculated volume of dispensed product based on sensed weight	
		Temperature of Product in Tank	20 °F	80 °F	Temperature of product taken by sensor	
		Voltage Level of Battery		0 TBD	Determine available battery capacity	
		Tank Warning Level	n/a	n/a	Signal to user when tank level is low	
		Tank Alert Level	n/a	n/a	Signal to user when tank level is empty	
Supported Operating Systems	Collin Kaase	Windows	n/a	n/a	Needs to work on windows operating system	
		IOS	n/a	n/a	Needs to work on ios operating system	
Supported Concurrent Sessions	Collin Kaase	Number of Concurrent users.	1 user	5 users	This is based on the pricing of software from Inductive Automation.	
Update Frequency	Seth Minter	Update Frequency	60 min	5 min	A user defined update system	
Customization	Jackson Guerry	Ease	n/a	n/a	Should feel very intuitive to view and change as necessary	
Monitors & Alarms	Jackson Guerry	Product at full or near full capacity	51%	100%	Dashboard displays amount of product in green; no alarm necessary	
		Product at half capacity	21%	50%	Dashboard displays amount of product in yellow; no alarm necessary	
		Product at low capacity	0%	20%	Dashboard displays amount of product in red; sends visual and audio signal to dashboard and sorts tank to the top of the list for ease of viewing	
Dashboard Views & Drill-Down Capability	Jackson Guerry	All-In-One View	n/a	n/a	Shows general overview of all available tanks; default sorting by least amount of product to most amount of product	
		Geographical View	n/a	n/a	Syncs locations of each of the tanks to their relative positions at the site	
		Drill-Down Capability	n/a	n/a	Can click on a specific tank to display the amount of product, battery life of scale, approximate location, and temperature of product	
Reports	Jackson Guerry	Segmented Period Report	n/a	n/a	Able to have a breakdown of a specific tank, or group of tanks, broken down to a small, discrete time period. Information can be displayed in charts and graphs	
		Overall Report per Tank	n/a	n/a	Takes an overall report of all variables, as they change throughout time, for each container. Could pull a report for a group of tanks as well. Information can be displayed in charts and graphs	
		Overall Report	n/a	n/a	Takes an overall report of all variables, as they change throughout time, for all containers. Information can be displayed in charts and graphs	

Proposed vs. Actual System Features

Future Work

Additional Dashboard Views

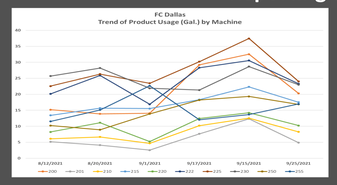


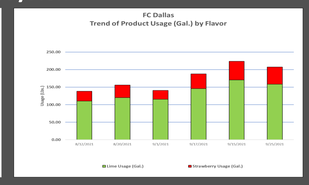
Time Series View

Geographic Overview

Geographic Detailed View

Reporting System





Design Team

From left to right:
- Walid Riachi
- Jackson Guerry
- Seth Minter
- Collin Kaase
- Nathan Docherty

Acknowledgements

Special thanks to our mentors in this project:
- Mr. Wes Lange, 31 Degrees
- Ms. Willi Thomas
- Dr. Patrick Thomas