

# Sensor Improvement for Automation

# Rockwell Automation

## Applications

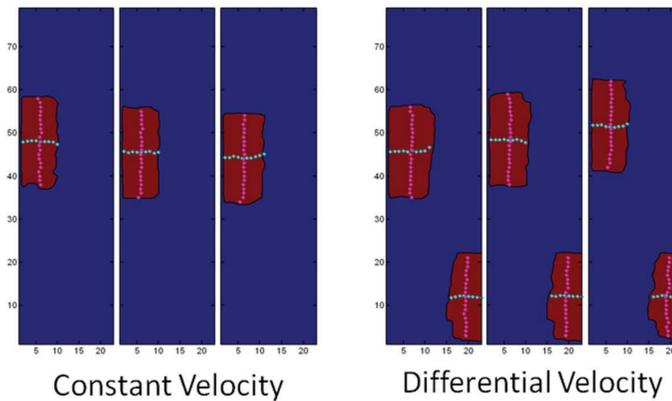
**SCOPE**  
Senior Consulting  
Program for Engineering

### Overview

The Rockwell Automation SCOPE team focused on improving a new out of the box sensor in three areas: illumination, muting, and marketing. The team created a brighter, more focused illumination pattern which was closer to the desired sensor's illumination pattern and developed a tool set to enable Rockwell to expand on our research. Muting work created an algorithm for use in factories to stop factory processes when unsafe conditions arise. Finally, the team looked into potential markets for the sensor by interviewing companies in various industries.

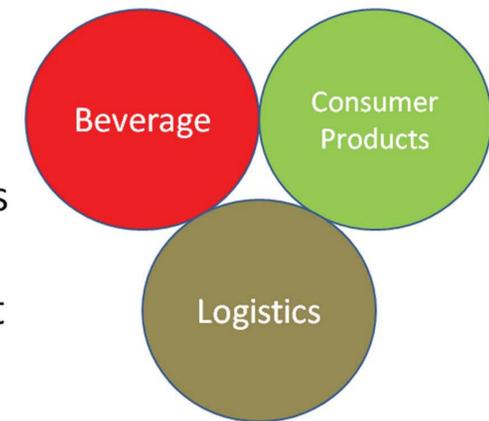
### Muting

For automated lines, distinguishing between objects can be difficult. We developed an algorithm that can distinguish between boxes and objects that move with different relative velocities. The algorithm calculates a center of 'mass' of the object for each line of the image and compares them between frames to determine their velocities. By determining the magnitude of variation of these velocities we can determine if the entire object is moving at a constant relative velocity or if different parts of the object are moving at different relative velocities.

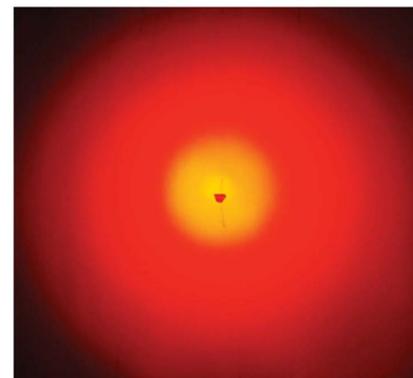


### Marketing Research

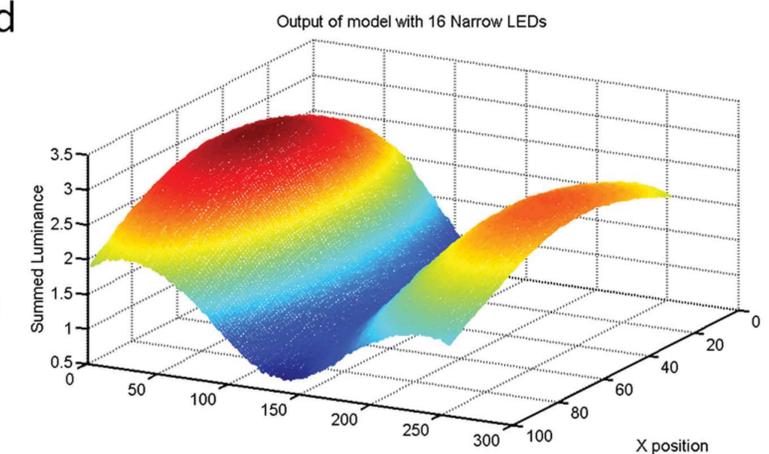
Every new product needs supporting research to determine target markets, profitable applications, and production volumes. We talked to companies in the beverage, consumer products, and logistics industries and found who would value the product the most.



### Illumination



We created a mathematical model that allowed us to input illumination patterns and then place them in a coordinate system to create other more complex illumination patterns. These new patterns can be tailored to the needs of a sensor. We also investigated various quantitative and qualitative measurements of light to track our progress and compare different LEDs and lenses.



### Team

Michael Ducker, Kevin Bretney, Kathleen Towers, Ashley Walker, John Mathai  
Advisor: Dr. Chris Lee  
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