ALBERTA INNOVATES

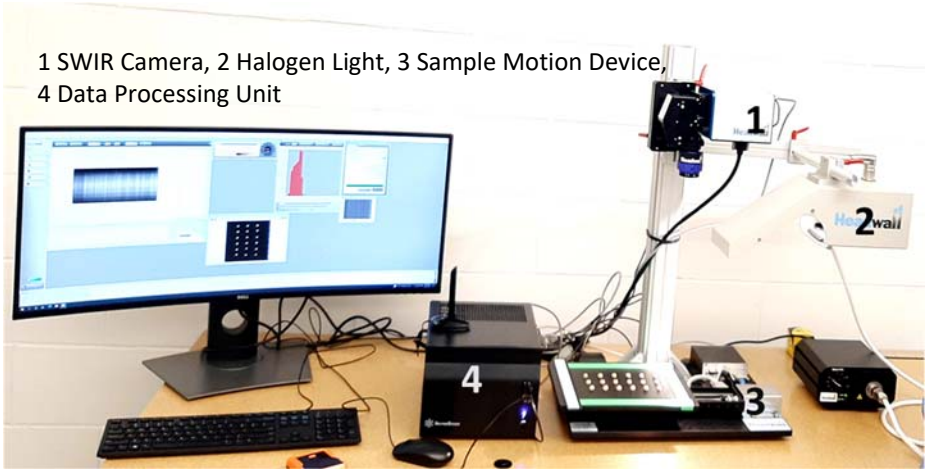
CLEAN RESOURCES

SMART AGRICULTURE AND FOOD

AGRI-FOOD INNOVATION – DATA AND DIGITAL SOLUTIONS

Non-Destructive Quality Testing of Potatoes Using NIR Hyperspectral Imaging and Machine Learning

Potatoes are an important part of a balanced human diet and a major contributor to the Alberta economy. Alberta is the second largest potato producer in Canada, accounting for 22.5% of the total Canadian production in 2020. Potato production, handling, transportation, and storage is associated with several quality issues which results in food safety risks, low market acceptability, and economic losses. While external quality issues/defects can be visually detected, internal defects are usually detected through destructive sampling which is labor-intensive, subjective, expensive, and time-consuming. The project aims to develop near infrared (NIR) hyperspectral imaging system for in-line, automated, and non-destructive detection of quality defects in potatoes thereby overcoming the challenges associated with destructive sampling.



1 SWIR Camera, 2 Halogen Light, 3 Sample Motion Device, 4 Data Processing Unit

FUNDING DETAILS

RECIPIENT:

Lethbridge College

PI: Dr. Chandra Singh

PARTNERS:

Potato Growers of Alberta

Lamb Weston

Old Dutch Foods

Edmonton Potato Growers

TOTAL BUDGET:

$523,200

AI FUNDING:

$250,000

PROJECT DATES:

MAR 2022 – FEB 2025

PROJECT TRL:

Start: 4

End: 7

APPLICATION

The NIR hyperspectral imaging system to be developed by the project is to be used for in-line, automated, non-destructive quality testing of potatoes in commercial potato processing facilities. This will contribute to improved processing efficiency and end-product quality.

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PROJECT GOALS

- Determine the appropriate NIR sensing mode (reflectance vs transmittance) for detection of internal damage in potatoes.
- Identify the appropriate NIR wavelength to detect defects and measure the composition and quality attributes of potatoes.
- Develop damage detection and composition calibration models using various image processing and machine learning techniques taking into consideration different potato types, end-use, and storage durations and conditions.
- Design, develop and calibrate an imaging system prototype for damage detection and measurement of quality in potatoes.

BENEFITS TO ALBERTA

- The project will result in significant digitization of Quality Assurance in the potato processing industry.
- Automated and non-destructive analytical tools will contribute to improved processing efficiency and end-product quality.
- The rapid and accurate quality measurements proposed by this project will be of immense benefit to potato growers as they are usually paid based on mutually agreed specifications in contracts.

2-3 Publications

1 Patent

1 New Product

3 Students Trained

2 Project Jobs

CURRENT STATUS

Apr 2021

The project team has commenced work on the selection of the appropriate sensing mode for the NIR imagery.