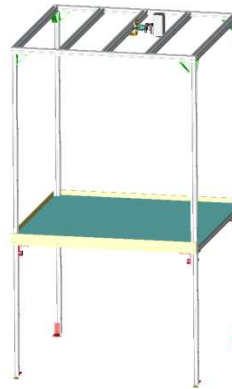# Chile/Trash Quantifying Status Report Sandia National Laboratories

By Jon R. Salton

December 2002

Overview

- **Distinguishing between chile and trash**
  - **Identify feature metrics**
  - **Design and build test stand**
- **Quantifying chile/trash**
- **Red chile industry survey**
- **Goals for 2003**

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Feature Metrics for Vision Systems

<u>Potential Methods for Differentiating Chile from Trash</u>

1. Spectral Frequency Analysis
2. Image Processing Analysis
   A. Shape
   B. Texture
3. 3-D Analysis*
4. Density Analysis*
5. Acoustic Spectral Analysis*
6. Capacitance Analysis*
7. Ion Mobile Spectroscopy*
8. Chemical Sensing*

* - potential metrics to be investigated in the future if necessary

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Spectral Frequency Analysis

- **Reflectance Testing (all using Ikegami camera)**
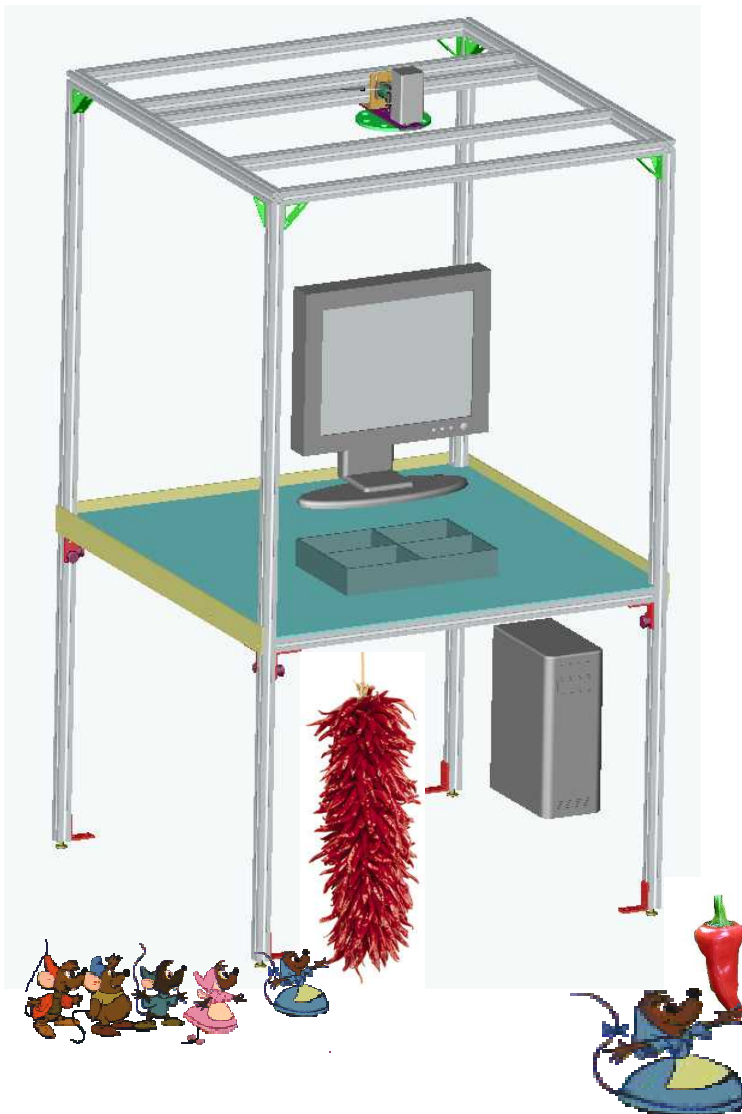 - **Visible Spectrum**
    - **400 nm to 700 nm ±10 nm (50 nm increments)**
    - **400 nm to 700 nm ±40 nm (50 nm increments)**
    - **400 nm to 700 nm ±80 nm (50 nm increments)**
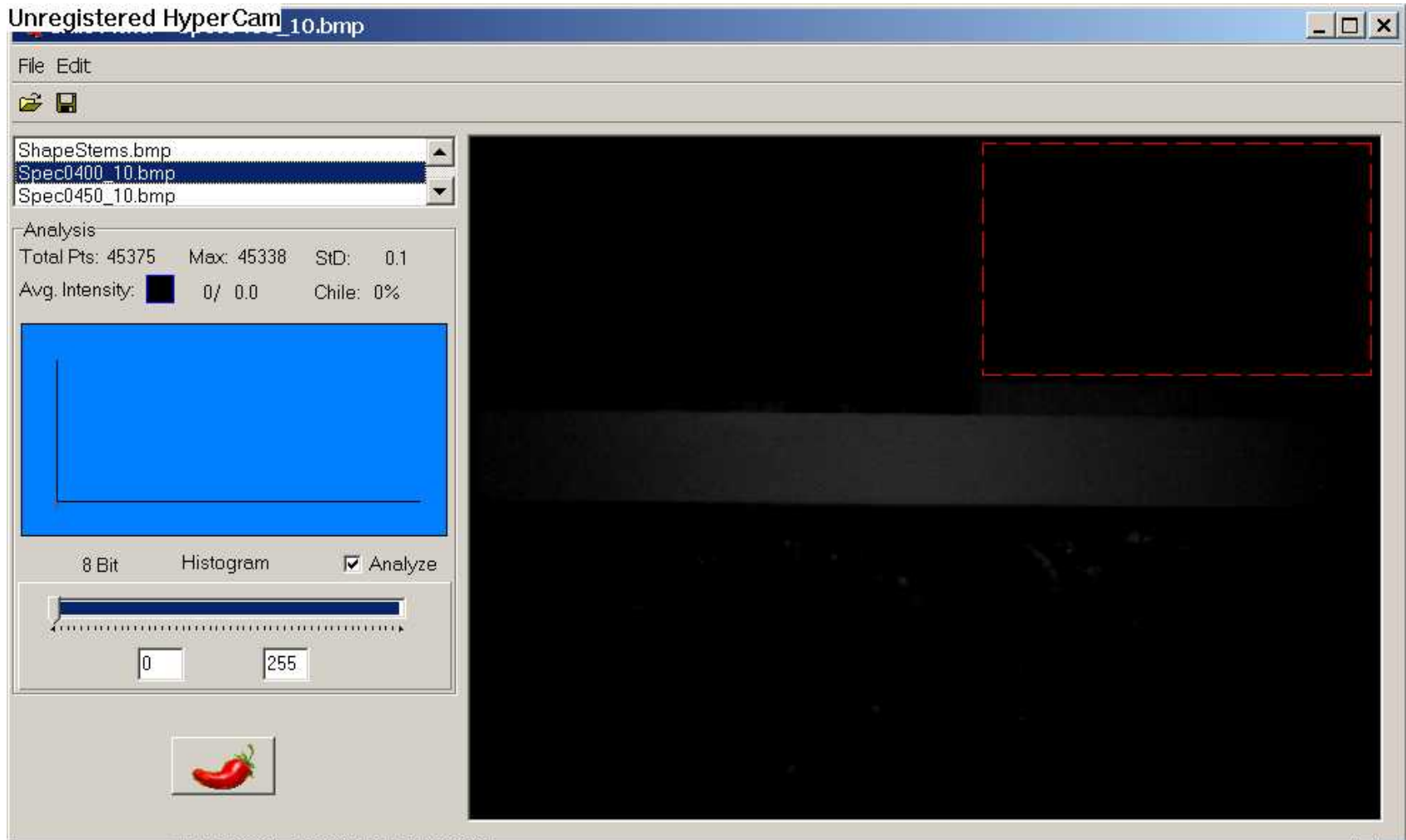 - **Infrared**
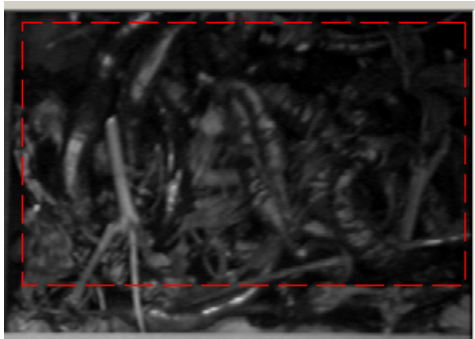   - **750 nm to 1100 nm ±10 nm (50 nm increments)**

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Test Stand

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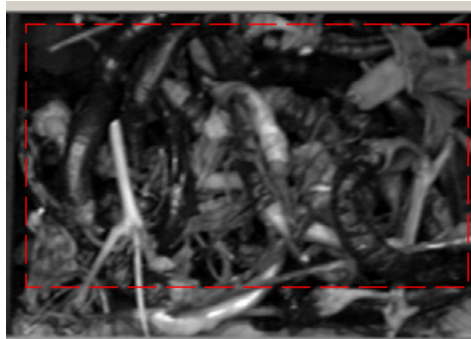
Spectral Frequency Analysis

Spectral Frequency Analysis
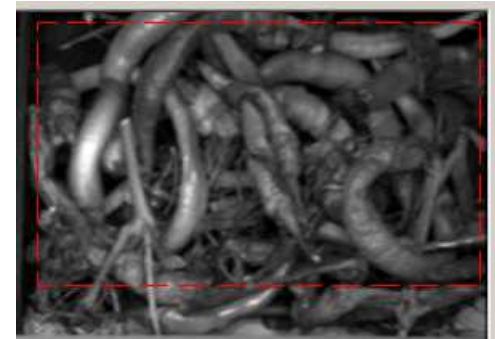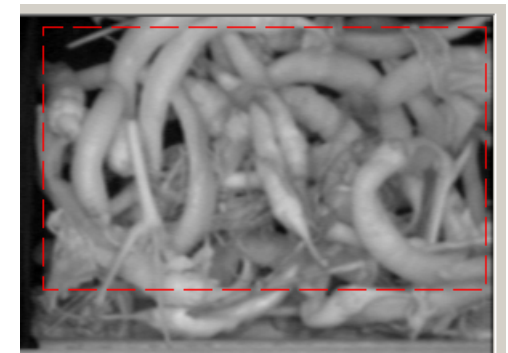
Spectral Analysis

500

550

600

650

700

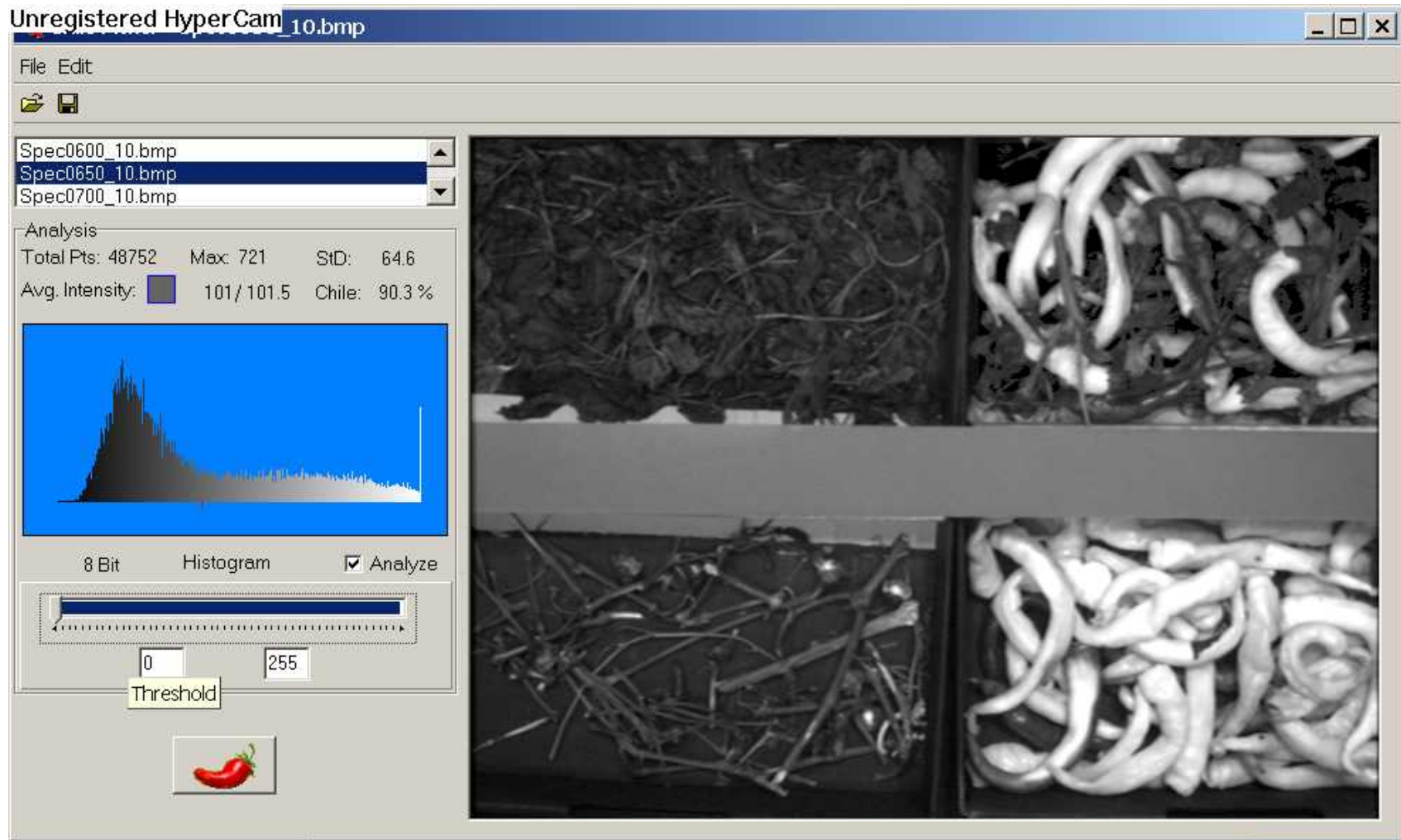

800

Frequency Threshold Analysis

Image Processing Analysis

- **Shape**
  - **Chain code**
  - **2D shape functions**
  - **Eigenvalues and eigenvectors**
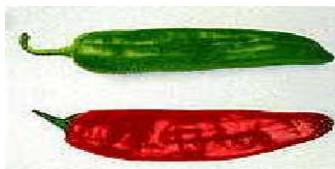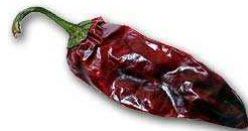 - **Use template matching to identify calyx**

- **Texture**
  - **Determine statistics on intensity for filter design**
  - **Use Fourier or power spectrum to describe texture**

Quantifying Chile/Trash

- **Use knowledge gained from vision analyses to develop a system able to quantify the amount of chile and/or trash in post harvested and pre processed red chile**

Red Chile Industry Survey

- **Establish historical database of knowledge**

- **Need to develop strategy for implementing survey**
  - **Schedule**
  - **Participants**

- **Analysis of results to follow data collection**

- **Other potential surveys in the future**
  - **Green chile, desteming, etc.**

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Goals for 2003

- **Complete spectral analysis evaluation**
  - **Complete initial data collection and analysis Jan. 2003**
- **Complete shape analysis feasibility evaluation**
  - **Early 2003**
- **Develop design options for quantifying chile and/or trash**
  - **Spring 2003**
- **Design and fabricate chile quantifier prototype**
  - **Summer 2003 if feasible**
- **Implement and evaluate red chile survey**
  - **Spring and summer 2003**

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