Development of Reconfigurable Automated Inspection Systems

Project Overview

- **General Objectives:** The development of a methodological framework that would make possible the automated development and reconfiguration of automated inspection Systems for surface mounted devices (SMDs).

- **Specific Objectives: a)** Development of an algorithmic approach for the inclusion-exclusion of features into the classification vector **b)** Development of an algorithmic approach for the independent and multivariate optimization of the parameters of the feature extraction algorithms. **c)** Evaluation-categorization of the sensitivity of the resulting inspection algorithms .

- **Practical Importance:** The lack of flexibility, combined with the rapid introduction and retirement of electronic products, has deterred equipment manufacturers from investing in the development of AVI systems more convenient for process improvement.

- **Methods:** We are using a vector classification approach in conjunction with a hierarchical classification, to obtain the framework that will make possible the automated generation of inspection routines for SMD components.

- **PI:** J. Rene Villalobos

- **Sponsors:** National Science Foundation

Energy

Correlation

Diffusion

$$R_1 : -\frac{1}{2}\mathbf{x}'\left(\mathbf{S}_1^{-1} - \mathbf{S}_2^{-1}\right)\mathbf{x} + \left(\mu_1'\mathbf{S}_1^{-1} - \mu_2'\mathbf{S}_2^{-1}\right)\mathbf{x} - k \geq c$$

$$R_2 : -\frac{1}{2}\mathbf{x}'\left(\mathbf{S}_1^{-1} - \mathbf{S}_2^{-1}\right)\mathbf{x} + \left(\mu_1'\mathbf{S}_1^{-1} - \mu_2'\mathbf{S}_2^{-1}\right)\mathbf{x} - k < c$$

$$k = \frac{1}{2}\ln\left(\frac{|\mathbf{S}_1|}{|\mathbf{S}_2|}\right) + \frac{1}{2}\left(\mu_1'\mathbf{S}_1^{-1}\mu_1 - \mu_2'\mathbf{S}_2^{-1}\mu_2\right)$$

$$c = \ln\left[\left(\frac{c(1|2)}{c(2|1)}\right)\left(\frac{p_2}{p_1}\right)\right]$$

Result

Presence or Absence of Component

FULTON
school of engineering

Industrial Engineering