MUHAMMAD ZARIF B. KAMARUDIN
Bachelor of Engineering (Hons) (Mechanical) (EM220)
Faculty of Mechanical Engineering
2006130869
Advisor: **MR. NOR FADZLI ADULL MANAN**

Development Of Cost Efficient Vision System For Defects Detection

1.0: ABSTRACT

Vision system is one of the most approached systems in industrial automation for replacing manual inspection procedure done by human inspector. A machine vision system is use in many applications such as parts sortation, defect detection, object recognition and parts counting. A vision system consists of image acquisition and image analysis procedure to obtain and manipulate the image into a decision. In this project, MATLAB platform is used to program the entire algorithm furthermore implementing Graphical User Interface to communicate between the vision system and the user. The vision system developed is fully operational with human as communicator between parts inspected and results displayed through GUI. Enhancement on image processing algorithm can greatly contributes to improvements. The further improvements can be made through lighting design, adding image enhancement algorithm and decision algorithm.

2.0: OBJECTIVES

The objectives of the project are:

1. **To develop vision system with webcam as image acquisition and using MATLAB as coding platform**
2. **To develop Graphical User Interface so that it is easy for operator to operate**

3.0: APPLICATION

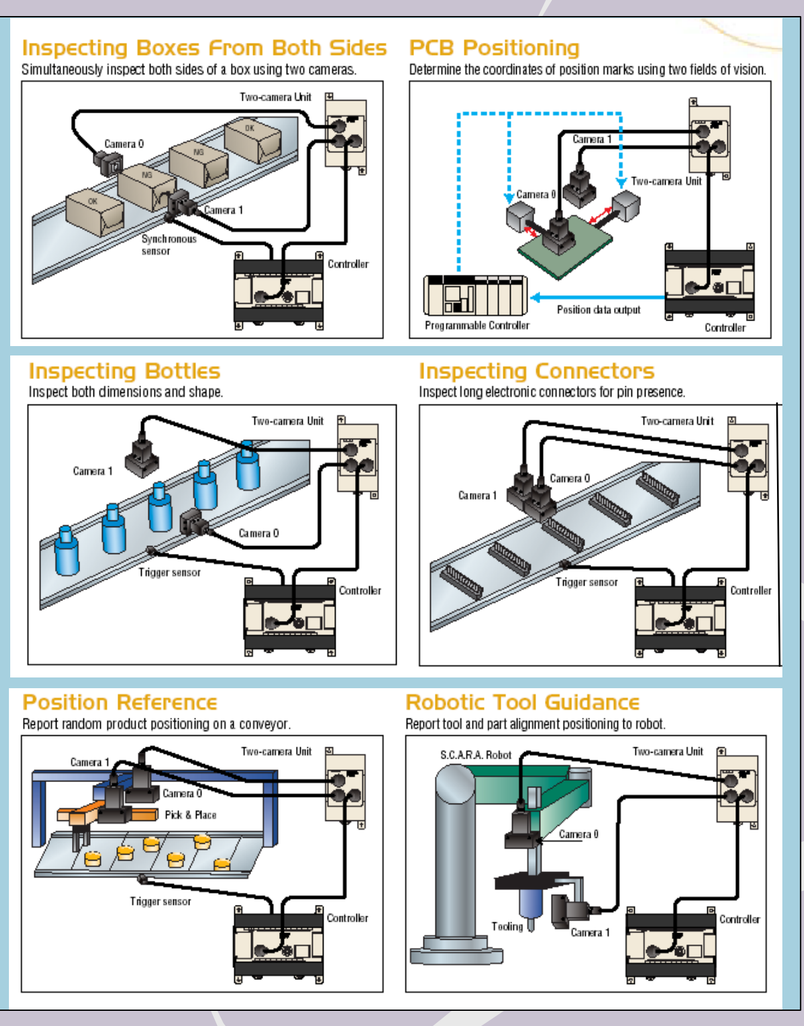

Figure 3.0: Machine Vision Application

4.0: MACHINE VISION PROCESS

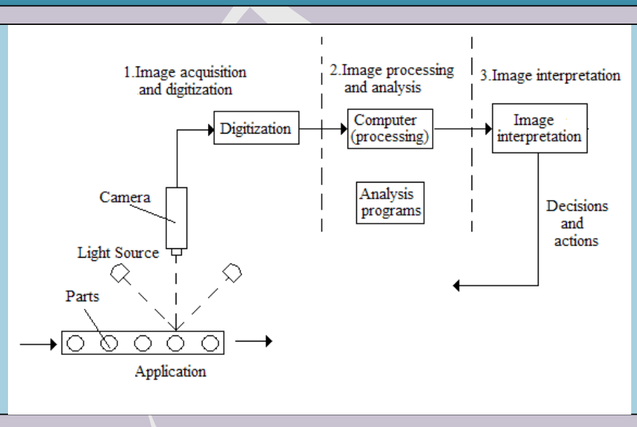

Figure 4.0: Machine Vision Process

4.1: DIGITIZATION

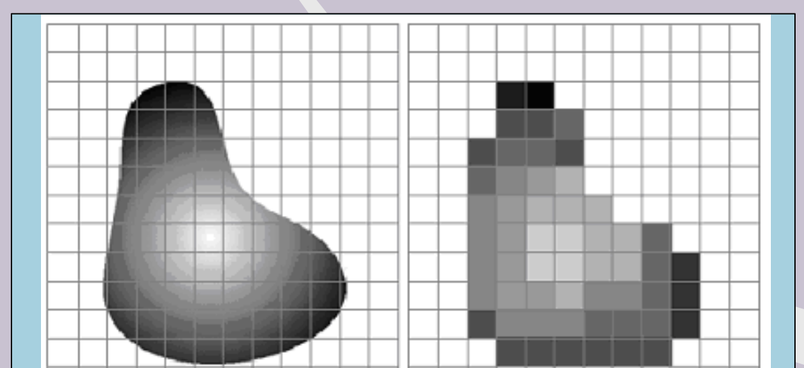

Figure 4.1: Digital Image Processing

4.2: Image Processing

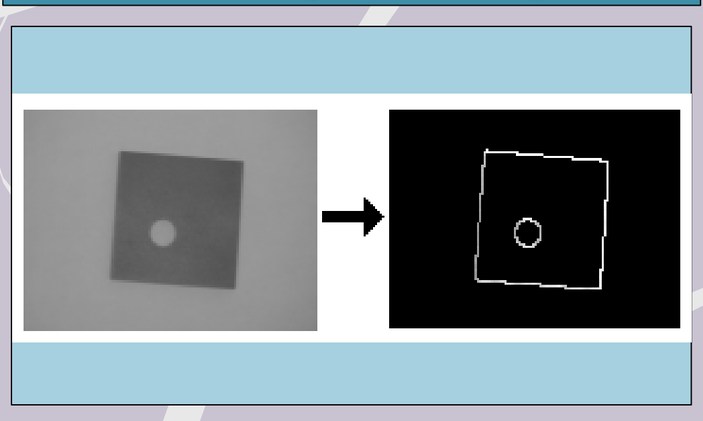

Figure 4.2: Canny Edge Detector

4.3: Image Interpretation

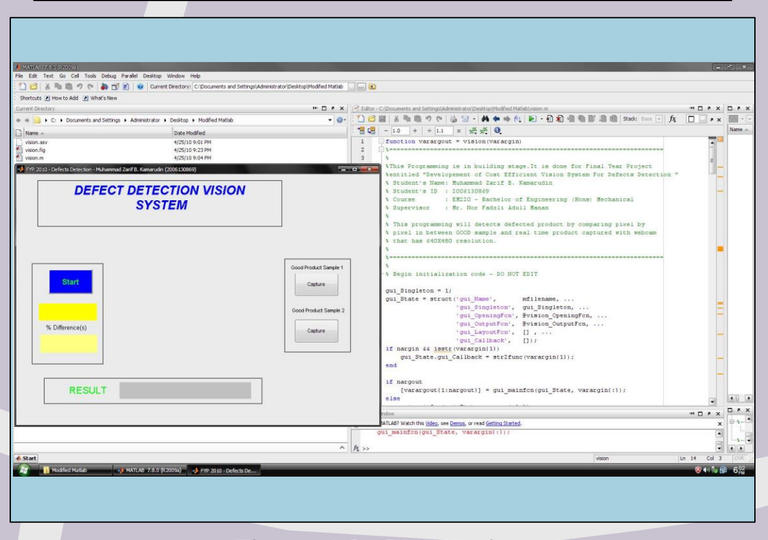

Figure 4.3: GUI Design

5.0: Process Flow

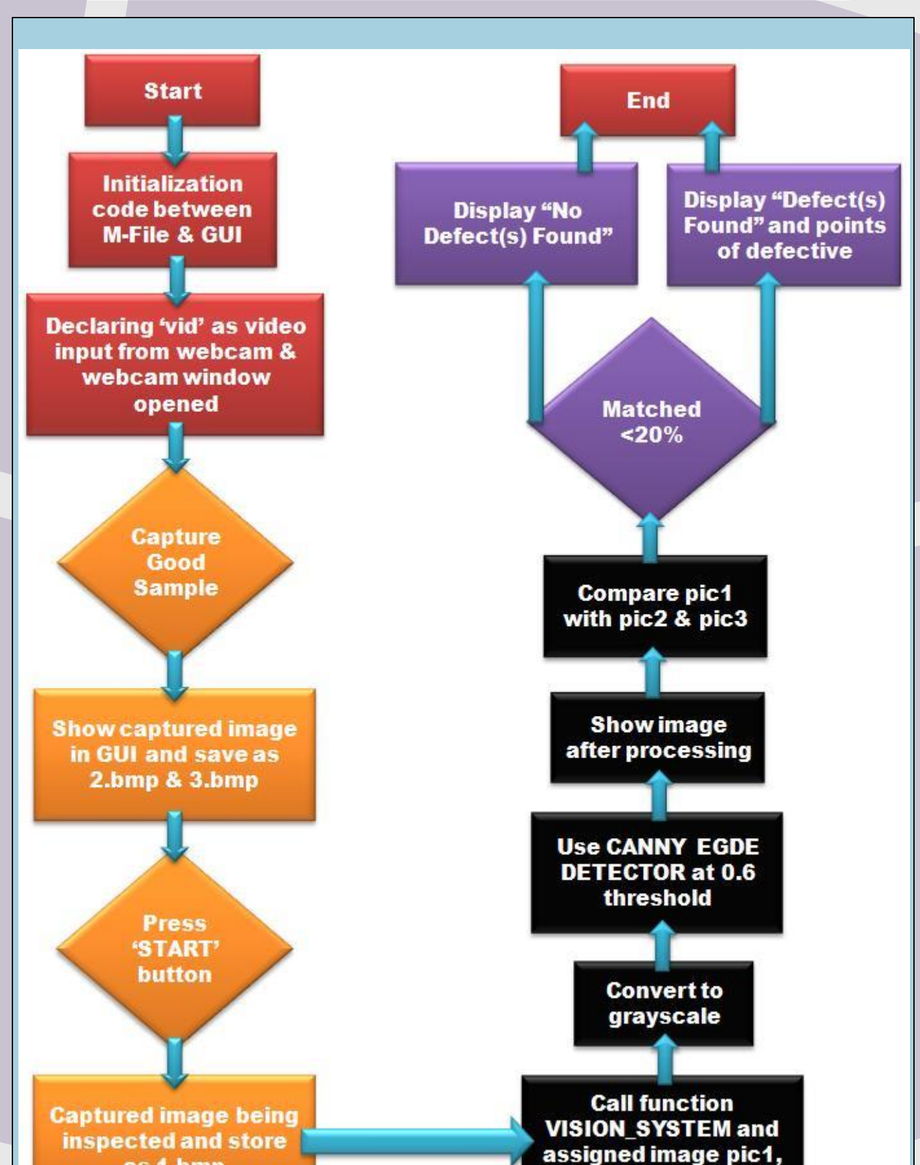

Figure 5.0: Process Flow

6.0: RESULTS

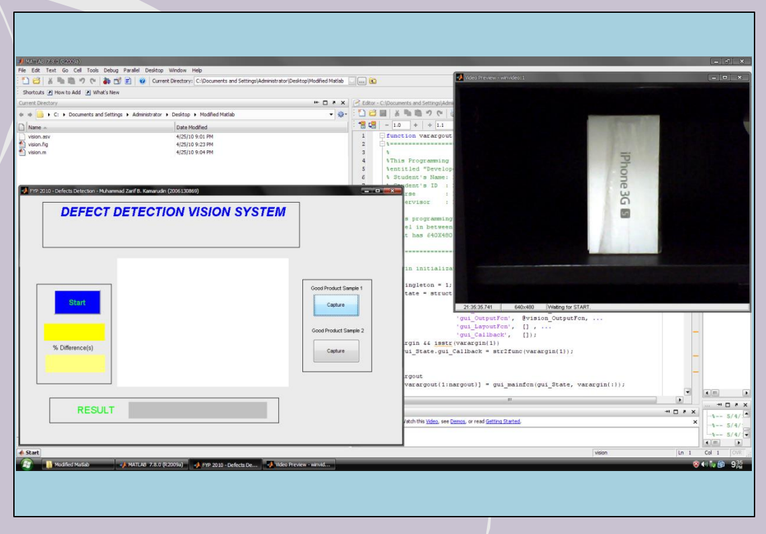

Figure 6.0: Starting

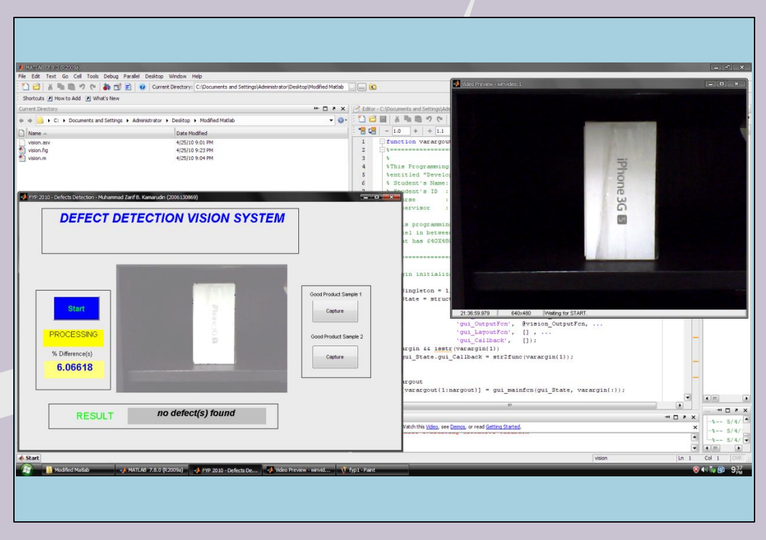

Figure 6.1: No Defects

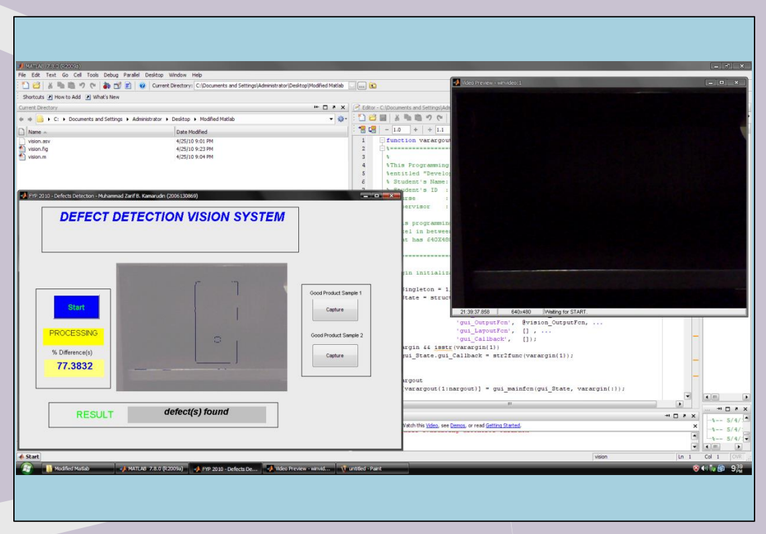

Figure 6.2: Defects at 77%

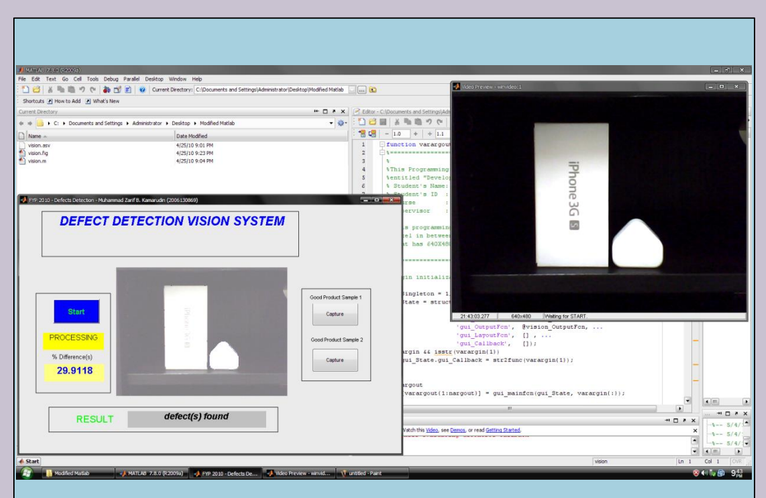

Figure 6.2: Defects at 30%

7.0: CONCLUSION

In conclusion, throughout completing this project, several keys of developing a vision system programming using MATLAB was recognize which are GUI, communication programming, image acquisition programming, image processing and decision algorithm that combined together to perform the inspection. However, the image processing and the decision algorithm are the major roles in determining the system accuracy and efficiency. The type of camera being used, the lighting design and computer's speed are the external factors that can directly affect the vision system accuracy and efficiency. Even though this vision system is not up to par with industry machine vision system, I managed to develop a vision system with low budget.