



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF CONVEYOR TOWER LIGHT ALARM SIGNAL AND  
MONITORING SYSTEM IN FACTORY USING LABVIEW**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronic Engineering Technology (Bachelor's Degree in Electronics Industry Technology with Honours)

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MONITORING SYSTEM IN FACTORY USING LABVIEW**

**SESI PENGAJIAN: 2016/17 Semester 1**

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## APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Department of Electronics & Computer Engineering Technology) (Bachelor's Degree in Electronics Electronics Industry Technology with Honours). The member of the supervisory is as follow:



(IR. MOHAMMAD'AFIF BIN KASNO)

## **ABSTRAK**

Projek tahun akhir bertujuan mendedahkan pelajar menjalani kajian teknikal yang lebih tinggi kepada pemikiran dan logik yang perlu dibangunkan untuk memastikan sesuatu yang dapat mengintegrasikan / idea beliau menjadi sesuatu yang berguna. Ini dimulakan dengan permulaan idea atau konsep, yang bukan sahaja bertujuan untuk membangunkan produk (Hardware Perisian), tetapi juga kajian yang mendalam mengenai produk yang sedia ada sebelum ini dalam kategori yang sama dan kekurangan mereka. Oleh itu pendekatan yang diambil untuk mencadangkan penyelesaian, yang lebih baik dari yang sebelumnya dari satu segi atau yang lain. Dengan pendekatan yang sama dalam fikiran, saya, pelajar tahun akhir Sarjana Muda Teknologi Kejuruteraan Elektronik (Industri Elektronik), telah mengambil tajuk projek **PEMBANGUNAN PENGHANTAR TOWER LIGHT ISYARAT PENGGERA DAN SISTEM PEMANTAUAN DI KILANG MENGGUNAKAN LabVIEW** sebagai projek tahun akhir saya. Sistem ini adalah berguna untuk mengurangkan perbelanjaan penyelenggaraan. Projek ini menyediakan penghantaran data ralat isyarat ke dalam excel untuk membantu jurutera untuk mengurangkan masa penyelenggaraan. Tambahan pula, ini adalah suku-manual log data ke dalam excel dengan menggunakan webcam untuk menangkap warna sebagai isyarat masukkan untuk menghantar isyarat ke dalam sistem LabVIEW.

## **ABSTRACT**

The final year project aims at exposing the students undergoing higher technical studies to the thoughts and logic that must be developed to ensure that one is able to integrate his/her ideas into something useful. This generally is initiated by the inception of an idea or a concept, which not only aims at developing a product (Hardware or Software), but also the in-depth study of the earlier existing products in the same category and their deficiencies. Accordingly an approach is taken to propose a solution, which is better from the previous ones in one respect or the other. With the same approach in mind, I, the final year student of Bachelor of Engineering Technology Electronic (Electronic Industry), have taken up project title DEVELOPMENT OF CONVEYOR TOWER LIGHT ALARM SIGNAL AND MONITORING SYSTEM IN FACTORY USING LABVIEW as my final year project. These systems are useful to reduce time of maintenance. This project is providing data logging error signal into Microsoft Excel and this project is to monitoring machine working hour by monitoring tower light. Furthermore, this is semi-manual logging data into excel by using webcam to capture color as input signal to send the signal into program LabVIEW.

## DEDICATIONS

I would like to dedicate this project to my supervisor, IR. MOHAMMAD'AFIF BIN KASNO that assists me develop this project. I also want to thank to my family members, lectures and friends that help me in developing this project.





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# TABLE OF CONTENTS

| Chapter                                  | Page |
|------------------------------------------|------|
| ABSTRAK .....                            | i    |
| ABSTRACT .....                           | ii   |
| DEDICATIONS .....                        | iii  |
| ACKNOWLEDGMENTS .....                    | iv   |
| TABLE OF CONTENTS .....                  | v    |
| LIST OF TABLES .....                     | viii |
| LIST OF FIGURES .....                    | ix   |
| CHAPTER 1 .....                          | 1    |
| INTRODUCTION .....                       | 1    |
| 1.0 Introduction .....                   | 1    |
| 1.1 Project Background .....             | 1    |
| 1.2 Project Objective .....              | 2    |
| 1.3 Problem Statement .....              | 2    |
| 1.4 Project Scope .....                  | 2    |
| CHAPTER 2 .....                          | 3    |
| LITERATURE REVIEW .....                  | 3    |
| 2.0 Introduction .....                   | 3    |
| 2.1 Background History .....             | 3    |
| 2.1.1 Monitoring System .....            | 4    |
| 2.2 Related Project .....                | 6    |
| 2.2.1 Color Image Processing .....       | 6    |
| 2.2.2 Data Storage .....                 | 8    |
| 2.2.3 Application Camera .....           | 9    |
| 2.4 Comparison Image Processing .....    | 9    |
| CHAPTER 3 .....                          | 11   |
| METHODOLOGY .....                        | 11   |
| 3.0 Introduction .....                   | 11   |
| 3.1 Work Flow to Implement Project ..... | 11   |
| 3.1.1 Planning .....                     | 12   |
| 3.1.2 Analysis .....                     | 12   |

|         |                                                                  |    |
|---------|------------------------------------------------------------------|----|
| 3.1.3   | Design .....                                                     | 13 |
| 3.1.4   | Test.....                                                        | 13 |
| 3.2     | Flow Chart of Conveyor Tower Light Alarm Signal.....             | 13 |
| 3.2.1   | Flow Chart .....                                                 | 13 |
| 3.2.2   | Explanation of Flow Chart.....                                   | 15 |
| 3.3     | Block Diagram Monitoring Tower Light Conveyor Alarm System ..... | 15 |
| 3.4     | Explanation of Block Diagram .....                               | 17 |
| 3.4.1   | Tower Light .....                                                | 17 |
| 3.4.2   | Webcam .....                                                     | 17 |
| 3.4.3   | Laptop .....                                                     | 17 |
| 3.5     | Software Project.....                                            | 18 |
| 3.5.1   | Color Image Processing Design.....                               | 18 |
| 3.5.1.1 | IMAQdx Open Camera VI .....                                      | 18 |
| 3.5.1.2 | IMAQdx Configure Grab VI .....                                   | 19 |
| 3.5.1.3 | IMAQdx Grab2 VI.....                                             | 19 |
| 3.5.1.4 | IMAQdx Close Camera VI.....                                      | 20 |
| 3.5.1.5 | IMAQ Create VI .....                                             | 20 |
| 3.5.1.6 | IMAQ Dispose VI.....                                             | 20 |
| 3.5.1.7 | IMAQ ColorLearn VI .....                                         | 21 |
| 3.5.2   | Data Storage Design .....                                        | 21 |
| 3.5.2.1 | Open/Create/Replace File Purpose .....                           | 22 |
| 3.5.2.2 | Write to Text File Purpose.....                                  | 22 |
| 3.5.2.3 | Close File Purpose .....                                         | 23 |
| 3.5.2.4 | Concatenate Strings Purpose .....                                | 23 |
| 3.5.3   | Condition Design .....                                           | 23 |
| 3.5.3.1 | Case Structure .....                                             | 24 |
| 3.5.3.2 | Format Date/Time String Purpose .....                            | 25 |
| 3.5.3.3 | In Range and Coerce Purpose .....                                | 25 |
| 3.5.4   | Real Time and Time Elapsed Design .....                          | 25 |
| 3.5.4.1 | Get Data/Time in Second.....                                     | 26 |
| 3.5.4.2 | Get Date/Time String Purpose .....                               | 26 |

|                                      |                                                  |    |
|--------------------------------------|--------------------------------------------------|----|
| 3.5.4.3                              | Wait until millisecond Multiple Purpose .....    | 27 |
| 3.5.5                                | Expected Result without Count Product .....      | 27 |
| 3.5.6                                | Improvement Progress Product Detect Design ..... | 28 |
| 3.5.6.2                              | Vision Acquisition Purpose .....                 | 29 |
| 3.5.6.3                              | Vision Assistant Purpose .....                   | 30 |
| CHAPTER 4                            | .....                                            | 31 |
| RESULT AND DISCUSSION                | .....                                            | 31 |
| 4.0                                  | INTRODUCTION .....                               | 31 |
| 4.1                                  | GUI SOFTWARE .....                               | 31 |
| 4.1.1                                | Product Scale .....                              | 33 |
| 4.1.2                                | Result Count Output Product .....                | 34 |
| 4.2                                  | Cause of Equipment Failure .....                 | 34 |
| 4.3                                  | Result of Monitoring Graph.....                  | 35 |
| 4.3.1                                | Date 21.8.2016.....                              | 36 |
| 4.3.2                                | Date 7.12.2016 – 8.12.2016.....                  | 37 |
| 4.4                                  | Result of Output Monitoring Graph.....           | 39 |
| 4.5                                  | Accuracy of Capture Output Product.....          | 41 |
| CHAPTER 5                            | .....                                            | 43 |
| CONCLUSION AND FUTURE RECOMMENDATION | .....                                            | 43 |
| 5.1                                  | Conclusion .....                                 | 43 |
| 5.2                                  | Future Recommendation.....                       | 44 |
| APPENDIX                             | .....                                            | 1  |
| REFERENCE                            | .....                                            | 1  |

## LIST OF TABLES

| Table                                                   | Page |
|---------------------------------------------------------|------|
| Table 1: Comparison Image Processing .....              | 9    |
| Table 2: IMAQdx Open Camera VI .....                    | 18   |
| Table 3 IMAQdx Configure Grab VI .....                  | 19   |
| Table 4: IMAQdx Grab2 VI .....                          | 19   |
| Table 5: IMAQdx Close Camera VI .....                   | 20   |
| Table 6: IMAQ Create VI .....                           | 20   |
| Table 7: IMAQ Dispose VI .....                          | 20   |
| Table 8: IMAQ ColorLearn VI .....                       | 21   |
| Table 9: Open/Create/Replace File Purpose .....         | 22   |
| Table 10: Write to Text File Purpose .....              | 22   |
| Table 11: Close File Purpose .....                      | 23   |
| Table 12: Concatenate String Purpose .....              | 23   |
| Table 13: Case Structure .....                          | 24   |
| Table 14: Format Data/Time String Purpose .....         | 25   |
| Table 15: In range and Coerce Purpose .....             | 25   |
| Table 16: Get Date/Time in Second .....                 | 26   |
| Table 17: Get Date/Time String Purpose .....            | 26   |
| Table 18: Wait Until millisecond Multiple Purpose ..... | 27   |
| Table 19: Vision Acquisition Purpose .....              | 29   |
| Table 20: Vision Assistant Purpose .....                | 30   |
| Table 21: Time (Hour) .....                             | 36   |
| Table 22: Time (second) .....                           | 37   |
| Table 23: Time (Hour) .....                             | 38   |
| Table 24: Time (Hour) .....                             | 39   |
| Table 25: Output Product Detect .....                   | 40   |
| Table 26: Minute of Running Process (Green Light) ..... | 40   |
| Table 27: Time (minute) and Output .....                | 41   |

## LIST OF FIGURES

| Figure                                                                                                                                                                                                 | Page |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Figure 1: Iris Recognition System.....                                                                                                                                                                 | 4    |
| Figure 2: Web-Based Student Attendance System.....                                                                                                                                                     | 5    |
| Figure 3: Attendance List Menu.....                                                                                                                                                                    | 5    |
| Figure 4: Synthesis Algorithm Extraction Result: (a) Single Color Factor Image Threshold Segmentation. (b) Morphology Processing Result with Graph (a). (c) Wand Extraction Image with Graph (b) ..... | 6    |
| Figure 5: Front Panel (Blue Ball) .....                                                                                                                                                                | 7    |
| Figure 6: Front Panel (Red Ball) .....                                                                                                                                                                 | 7    |
| Figure 7: Data Logging using MS-Excel Sheet Generated using TDMS File Format.....                                                                                                                      | 8    |
| Figure 8: Top: Three Image Taken over Two Days from a Webcam at the (Quiet), Stuttgart Airport Bottom: A frame From a 1 Minute Synopsis of This Period.....                                            | 9    |
| Figure 9: Flow Chart of Implement Project.....                                                                                                                                                         | 12   |
| Figure 10: Flow Chart .....                                                                                                                                                                            | 14   |
| Figure 11: Hardware Block Diagram .....                                                                                                                                                                | 15   |
| Figure 12: Software Block Diagram.....                                                                                                                                                                 | 16   |
| Figure 13: Camera Design Imaq ColourLearn .....                                                                                                                                                        | 18   |
| Figure 14: Data Storage Design.....                                                                                                                                                                    | 22   |
| Figure 15: Excel Design Case Structure.....                                                                                                                                                            | 24   |
| Figure 16: Time/Date Format and Elapsed Time Design.....                                                                                                                                               | 26   |
| Figure 17: Expected Result MS-Excel .....                                                                                                                                                              | 28   |
| Figure 18: Product Detect Design .....                                                                                                                                                                 | 29   |
| Figure 19: Green Light GUI Design with Good Product (Save into Excel PD) .....                                                                                                                         | 31   |
| Figure 20: Green Light GUI Design with Not Good Product (Not save into Excel PD) .....                                                                                                                 | 32   |
| Figure 21: Yellow Light GUI Design with Good Product (Not save into Excel PD) .....                                                                                                                    | 32   |
| Figure 22: Red Light GUI Design with Good Product (Not save into Excel PD) .....                                                                                                                       | 32   |
| Figure 23: Not Good Product .....                                                                                                                                                                      | 33   |
| Figure 24: Good Product .....                                                                                                                                                                          | 33   |
| Figure 25: Match ColourLearn (Score 800 above).....                                                                                                                                                    | 33   |
| Figure 26: Excel store the Good Product .....                                                                                                                                                          | 34   |
| Figure 27: Table cause of Six Big Losses .....                                                                                                                                                         | 35   |
| Figure 28: Time in Second .....                                                                                                                                                                        | 36   |
| Figure 29: Graph Time (second) VS Condition (reason) .....                                                                                                                                             | 36   |
| Figure 30: Graph Time (hour) VS Condition (reason).....                                                                                                                                                | 37   |
| Figure 31: Graph Time (second) VS Condition (reason) .....                                                                                                                                             | 38   |
| Figure 32: Graph Time (hour) VS Condition (reason).....                                                                                                                                                | 38   |
| Figure 33: Graph Time (hour) VS Condition (reason).....                                                                                                                                                | 39   |
| Figure 34: Graph Output (product) VS Time (minute) .....                                                                                                                                               | 40   |
| Figure 35: (a) Time (second), (b) Output (product) .....                                                                                                                                               | 41   |
| Figure 36: Graph Output (product) VS Time (minute) .....                                                                                                                                               | 41   |

# **CHAPTER 1**

## **INTRODUCTION**

### **1.0 Introduction**

This project is about the Development of Conveyor Tower Light Alarm Signal and Monitoring in factory using LabVIEW. This project is developed for industry which monitoring the tower light alarm usually has at the production line. Basically, tower light is purposing to remain or alert worker weather the machine is running or stop. Propose of tower light monitoring system is to minimize the cost of rejecting product and reduce time maintenance for machine.

### **1.1 Project Background**

The project here is about Conveyor Tower Light Alarm Signal with a combination of LabVIEW software. In this project I have planned to develop a logging system for detecting signal error into Microsoft excel by using a webcam. The webcam will act as the input of the system which is detecting color of tower light signal (RED, GREEN, YELLOW) by following the LabVIEW program. Once the webcam is detecting signal, the data will send into Microsoft excel to record the data. There is other program that helps engineers to solve the problem by referring reason of the error signal. The program will continuously record 12-hour working conveyor. This system not just can use in Conveyor Tower Light Alarm Signal, but it also can be practically used in system monitoring.

## **1.2 Project Objective**

The objective of this development are:

1. To study of solution for efficiency of the Conveyor Tower Light Alarm Signal.
2. To design circuit for monitoring of Conveyor Tower Light Alarm Signal.
3. To develop a data logging system referring to the previous study.
4. To analyze output Conveyor Tower Light Alarm Signal using developmentally monitoring system.

## **1.3 Problem Statement**

The problem statement is the information causes and reason machine breakdown is not store for future reference. There is problem when output target is no achieve. A lot of time is used to identify the problem. Therefore, this project is to monitoring machine working hour by monitoring tower light.

## **1.4 Project Scope**

The scope for this project is to build data logging system which is to record real time and causes of error by using LabVIEW software platform. Furthermore, this project is for tower light system and to record output of product into Microsoft Excel. The data logging will then be analyzed in order to improve the productivity.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter will discuss about finding and analysis of previous project that related with Monitoring Conveyor Tower Light Alarm Signal. All the detail is taken from various resources such as journal, thesis, book and valid websites. Monitoring Conveyor Tower Light Alarm Signal is similar with system attendance monitoring by using sheet to record machine problem. The idea to create Monitoring Conveyor Tower Light Alarm Signal because to help engineer fix problem or maintenance the machine. The system maybe a problem to who are responsible to record signal error by manually. Base on Murizah Kassim, Hasbullah Mazlan, Norliza Zaini, and Muhammad Khidhir Salleh in 2012 have done research of a system called Student Attendance, there are few disadvantage by using sheet, because record data sheet maybe missing or time error and problem error is not properly write down in record sheet (Kassim et al. 2012). Therefore, Monitoring Conveyor Tower Light Alarm Signal is a semi-automated system that related with monitoring system and color image processing. This project is to Monitoring Conveyor Tower Light Alarm Signal for every second and record the error signal by using LabVIEW software. This project is using combination of IMAQ and Input / Output file LabVIEW platform to capture color of tower light signal and record data into Microsoft Excel.

#### **2.1 Background History**

For a long time, industry has been searching for acceleration in speed of development and reduce costs of experiment to store the data for future plane. The conveyor tower light system is the best achievement in this search for monitoring system.

### 2.1.1 Monitoring System

Base on Teh Wei Hsiung and Shahrizat Shaik Mohamed in 2011 show development for a system called Performance of Iris Recognition using Low Resolution Iris Image for Attendance Monitoring. The purpose of this project is to upgrade system attendance manually to the automation system and to achieve good quality performance of iris recognition using low resolution image for the attendance monitoring system. Two methods had been analysis, which is Hough Transform and Daugman's Integro Differential. Method of Hough Transform can recognize the low resolution iris with the accuracy of 100% and 86.88% Daugman's Integro Differential method. Hough Transform is technique that uses vertical and horizontal to detect iris boundary, pupil boundary and determine the eyelids and Daugman's technique, the techniques will search for maximum change if the pixel values on the circular path (Hsiung & Shaik Mohamed 2011). The benefit of this project is the security is not reliable such as the password may be forgotten or hacked and ID card may be lost or forged. For limitation of this project is system may be problem cannot purpose well, therefore no other choice to wait maintaining the system.



Figure 1: Iris Recognition System

Base on Murizah Kassim, Hasbullah Mazlan, Norliza Zaini, and Muhammad Khidhir Salleh in 2012 show development of a system called Student Attendance System Using RFID Technology. The productive of this project is to improve the current manual attendance record to semi-automated system by using RFID system and to help raise academic of student. RFID system has two type of reader, one is active reader that need internal battery 12 voltage power

supply and other one is passive reader that no need internal battery, that are main difference of active and passive reader. There are six methods that relate to RFID processing, which are RFID reader and tag, Data reporter, Web Server, Data Collector, Database and Graphical User Interface (GUI). There are two purpose of Database, one is store the information capture by a RFID reader and store information assembled from online web-interface and can controlled the record data(Kassim et al. 2012). The weakness of this system is the cost of installation and unsettling influence from other electronic gadgets will diminish the force as separation get substantial.

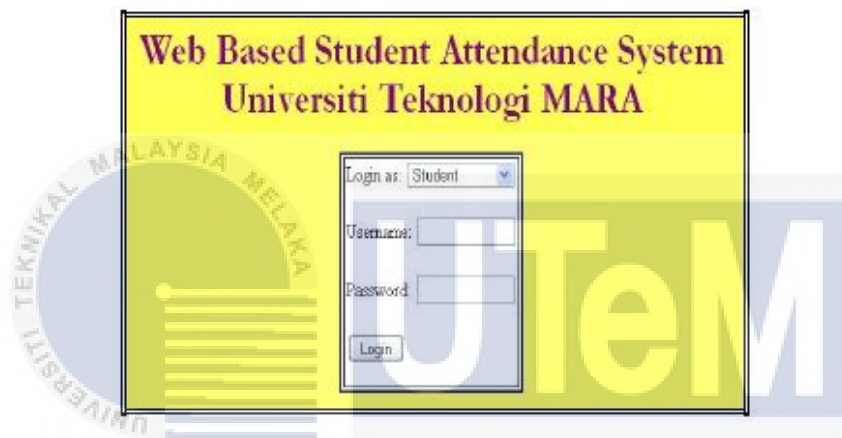


Figure 2: Web-Based Student Attendance System

| # | Student Name         | Student ID | Attend                              | Late                                | Absent                              | Overall % | Comment |
|---|----------------------|------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------|---------|
| 1 | Ikhsan Bin Hassan    | 200546721  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | 100       |         |
| 2 | Farhana Bt. Mohd Ali | 200545705  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | 50        |         |
| 3 | Husniah Bin Madun    | 200545345  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | 0         |         |

Figure 3: Attendance List Menu

## 2.2 Related Project

The related project is about reference of application or system in used that related with project. This project is used Color Image Processing, Data Storage and Application Camera. Three of the processing is to capture color of tower light (RED, YELLOW, And GREEN). Tower light is purpose to alert surrounding about the machine.

### 2.2.1 Color Image Processing

Base on Mao Xiaobo, Yang Jing, 2011. Have done research on Product-Background Segmentation of Color Image Base on LabVIEW. Research is about benefit, limitations and recommendation in combination of three methods are threshold segmentation, magic wand processing and morphological image. The purpose of this research is to extract image from a complex background by using LabVIEW and NI - IMAQ Vision software platform. There are benefits of this research is to realize color image target and background separation (Xiaobo & Jing 2011). For the limitation, this three combination is quite complicated to program and to extract from the background need to adjustable HSL (hue-saturation-lightness) to show the result.



Figure 4: Synthesis Algorithm Extraction Result: (a) Single Color Factor Image Threshold Segmentation. (b) Morphology Processing Result with Graph (a). (c) Wand Extraction Image with Graph (b)

Base on Roland Szabo, Aurel Gontean and Loan Lie, 2011 show development of Cheap Live Color Recognition with Webcam. The productive of this project is to reduce investment of industry to create system which can recognize color. Two method that can recognize color which

is first method IMAQ USB, with combination of IMAQ USB In it (for initialization), IMAQ USB Grab Setup (for grabbing the configuration), IMAQ USB Grab Acquire (for acquire image) and IMAQ USB Close (close the drive) these combination is for gray background, that represent USB webcam drive. Moreover, combination of IMAQ Create (need for IMAQ USB Grab Acquire) and IMAQ Learn which calculate color spectrum, by using LabVIEW and combination with IMAQ platform, color image can be capture (Roland Szabo, Aurel Gontean 2011). Benefit of this method is can work with any USB webcam and can recognize color in real-time by using color spectrum calculation. Second method LabWindows/cvi ANSI C programming language. This method is including C language to verify third party webcam and vision driver for color image. Benefit of this method is can easily to recognize color by changing the binary value for specific color (Roland Szabo, Aurel Gontean 2011).



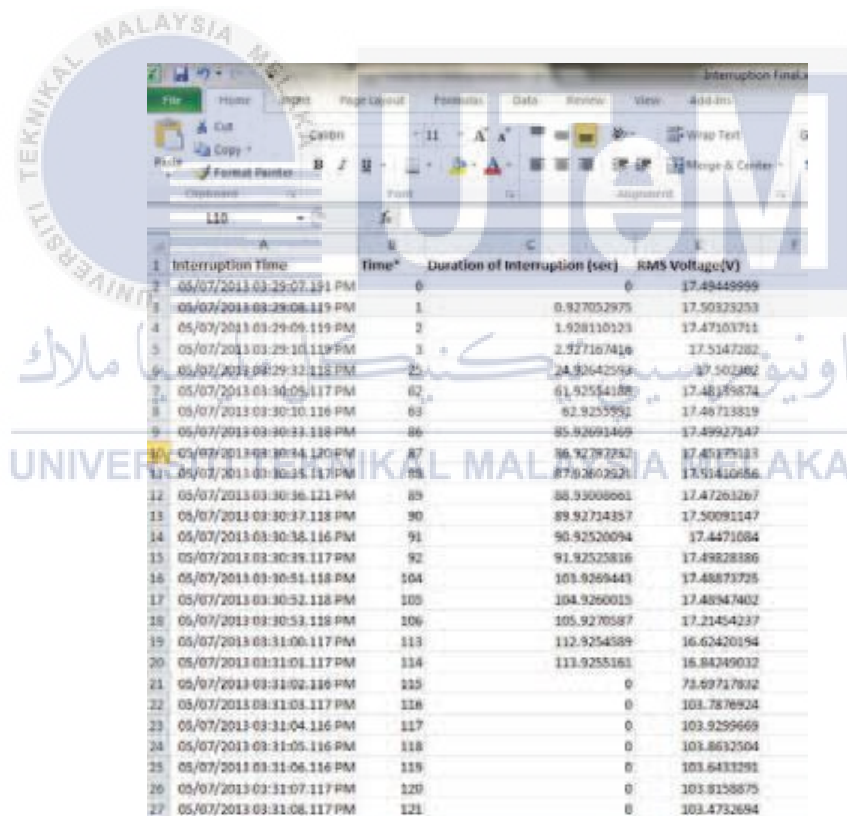
Figure 5: Front Panel (Blue Ball)



Figure 6: Front Panel (Red Ball)

## 2.2.2 Data Storage

Based on Devdutt Pradhan, Lakshmi Lakshminarayanan, Vineeth Patil, 2014 have develop system A LabVIEW Based Power Analyzer. Base Power Analyzer is combination of Power Analyzer, Power Quality Indices and Events (Harmonics) and Event Logging. This system is done because of poor power quality and conventional power equipment are not having the ability to store data for future reference. Event Logging is a process for store the data into MS-Excel. By using Technical Data Management Streaming (TDMS) software file input/output platform. TDMS comprises of two particular file, which are binary file that save and record about the information and a binary index file that gives merged data on all the traits and pointers in the binary file (Devdutt Pradhan, Lakshmi Lakshminarayanan 2014). The weakness of this system is the TDMS are specific to a binary file.



|    | A                          | B     | C                              | D              |
|----|----------------------------|-------|--------------------------------|----------------|
|    | Interruption Time          | Time* | Duration of Interruption (sec) | RMS Voltage(V) |
| 1  | 05/07/2013 03:29:07.191 PM | 0     | 0                              | 17.49449999    |
| 2  | 05/07/2013 03:29:08.119 PM | 1     | 0.927032975                    | 17.50323233    |
| 3  | 05/07/2013 03:29:09.119 PM | 2     | 1.928110123                    | 17.47163711    |
| 4  | 05/07/2013 03:29:10.119 PM | 3     | 2.927167416                    | 17.5147282     |
| 5  | 05/07/2013 03:29:32.111 PM | 25    | 24.92642593                    | 17.502382      |
| 6  | 05/07/2013 03:34:05.117 PM | 62    | 61.92554188                    | 17.48158574    |
| 7  | 05/07/2013 03:30:10.116 PM | 63    | 62.92555951                    | 17.46713819    |
| 8  | 05/07/2013 03:30:21.118 PM | 66    | 65.92691469                    | 17.49927347    |
| 9  | 05/07/2013 03:30:44.120 PM | 87    | 86.92787282                    | 17.45175183    |
| 10 | 05/07/2013 03:30:55.117 PM | 88    | 87.92802621                    | 17.51410586    |
| 11 | 05/07/2013 03:30:56.121 PM | 89    | 88.93008601                    | 17.47263267    |
| 12 | 05/07/2013 03:30:57.118 PM | 90    | 89.92714357                    | 17.50091147    |
| 13 | 05/07/2013 03:30:58.116 PM | 91    | 90.92520094                    | 17.4471084     |
| 14 | 05/07/2013 03:30:59.117 PM | 92    | 91.92525816                    | 17.49828386    |
| 15 | 05/07/2013 03:30:51.118 PM | 104   | 103.9269443                    | 17.46873725    |
| 16 | 05/07/2013 03:30:52.118 PM | 105   | 104.9266015                    | 17.48947402    |
| 17 | 05/07/2013 03:30:53.118 PM | 106   | 105.9270587                    | 17.21454237    |
| 18 | 05/07/2013 03:31:00.117 PM | 113   | 112.9254589                    | 16.62420194    |
| 19 | 05/07/2013 03:31:01.117 PM | 114   | 113.9255163                    | 16.84749032    |
| 20 | 05/07/2013 03:31:02.116 PM | 115   | 0                              | 73.69717032    |
| 21 | 05/07/2013 03:31:03.117 PM | 116   | 0                              | 103.7876924    |
| 22 | 05/07/2013 03:31:04.116 PM | 117   | 0                              | 103.9259669    |
| 23 | 05/07/2013 03:31:05.116 PM | 118   | 0                              | 103.8632504    |
| 24 | 05/07/2013 03:31:06.116 PM | 119   | 0                              | 103.6433291    |
| 25 | 05/07/2013 03:31:07.117 PM | 120   | 0                              | 103.8125875    |
| 26 | 05/07/2013 03:31:08.117 PM | 121   | 0                              | 103.4732694    |

Figure 7: Data Logging using MS-Excel Sheet Generated using TDMS File Format



### 2.2.3 Application Camera

Base on Yael Pritch, Alex Rav-Acha, Avital Gutman and Shmuel Peleg. Have done research on Webcam Synopsis, peeking around the world. The purpose of this research is to generate a short video (Pritch et al. 2007). There are two process of webcam, first is online phase it done in real time. Second is Response Phase. This phase may take a few minutes, depending on the activity in the time period of interest.



Figure 8: Top: Three Image Taken over Two Days from a Webcam at the (Quiet), Stuttgart Airport Bottom: A frame From a 1 Minute Synopsis of This Period

### 2.4 Comparison Image Processing

Table 1: Comparison Image Processing

| Product-Background Color Image                                                              | Segmentation of | Color Recognition with Webcam                                                |
|---------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------|
| - Need to set proper threshold in order to carry on the image segmentation more accurately. |                 | - Easily to recognize color by changing the binary value for specific color. |

|                                                                                                                                      |                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>- Complicated combination to realize color image target and background separation.</li> </ul> | <ul style="list-style-type: none"> <li>- Easy to capture color image by using color spectrum range.</li> </ul> |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|





## CHAPTER 3

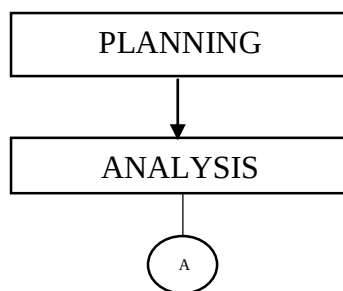
### METHODOLOGY

#### 3.0 Introduction

In this chapter, the arrangement of activities needed to solve a problem were discussed. Generally, there are several methodologies that can be utilized to develop a system. The research of methodology refers to the method most suitable to conduct research and determine the procedure to be the most effective answer to the problem of study. To carry out this study more effectively, the methodology is designed to involve the selection of design, data collection methods, flow chart or process systems and software development.

#### 3.1 Work Flow to Implement Project

It is implement in the early design stage so that the project becomes more organized. There are five step to implement project. Which is plan, analysis, design, and test. Figure 1 is show the flow chart of this project.



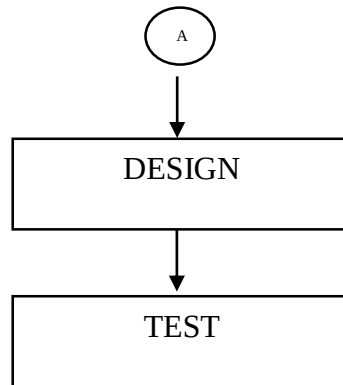


Figure 9: Flow Chart of Implement Project

### 3.1.1 Planning

For the first stage, planning is the most important part before start the project. Which problem is identified and researched is made to solve or reduced the problem or weakness. That have covered in chapter 1. The identification of the productive of the system to get a clear picture of the system being developed are include in Chapter 1.

### 3.1.2 Analysis

For the second stage, data analysis is part that user requirements and the system to be developed. By using quantitative method is made as a part of request acquire theory and evaluation the outcome result. Which an analysis of the method that are being used are also important to ensure the smoothness of the system will be developed. The analysis is covered in chapter 2.

### 3.1.3 Design

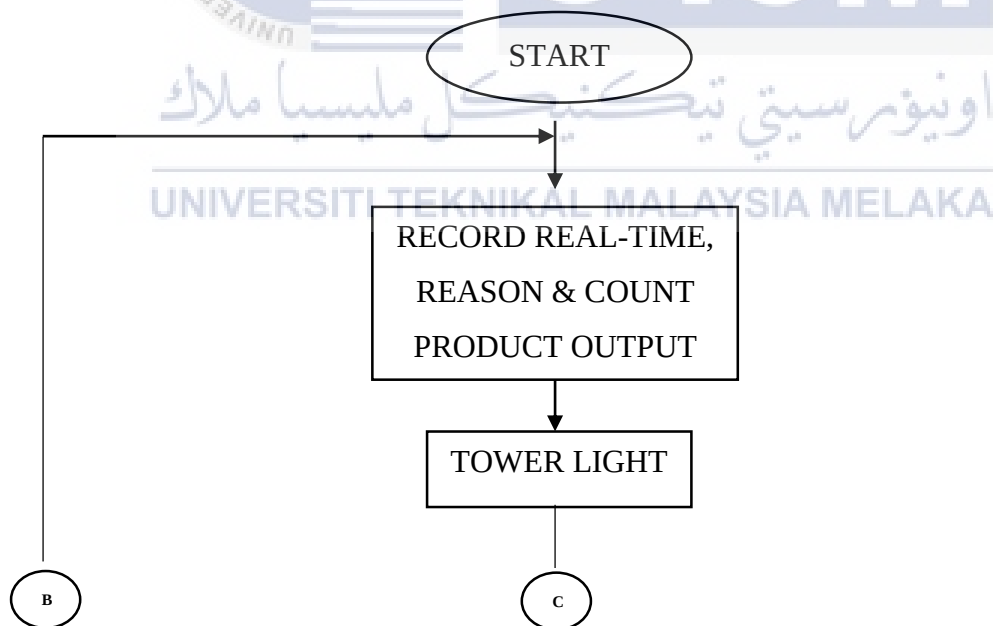
For the third stage, design a user interface that will be the intermediate between the user and the system developed. System part is designed and implemented based on early hypothesis whether it will achieve the productive or not. This stage will discuss hardware and software system in more detail and will be discussed in chapter 3.

### 3.1.4 Test

Last stage, the completed result of the project is testing for certain period to decide the defective or any imperfections of the product and also to estimate product durability.

## 3.2 Flow Chart of Conveyor Tower Light Alarm Signal

### 3.2.1 Flow Chart



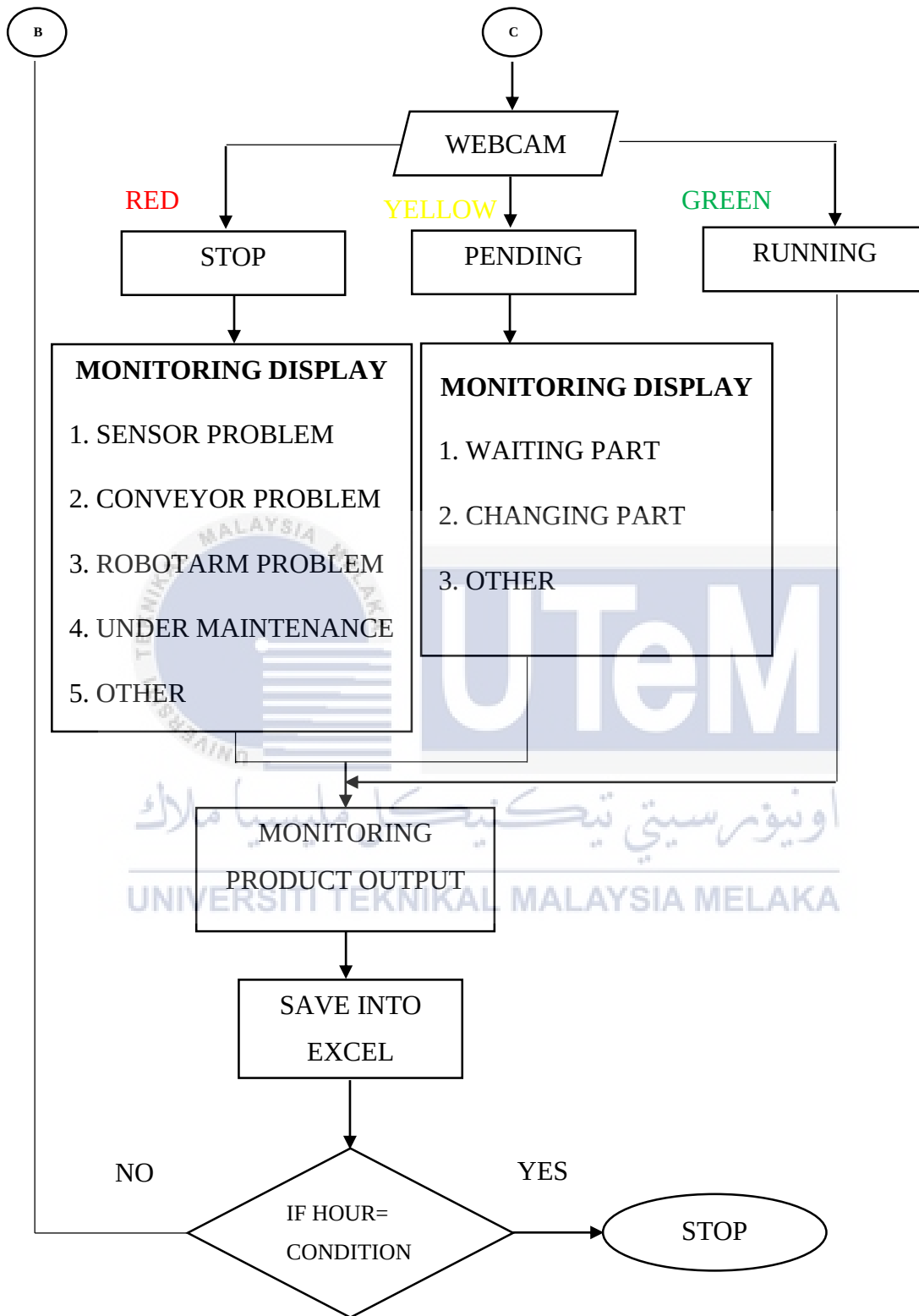


Figure 10: Flow Chart

### 3.2.2 Explanation of Flow Chart

Figure 3.2.1 are about flow of the system. There are 8 section of process, which is record real-time, reason and product checked. This process is to record all the signal into MS-Excel in every second. For tower light is an output of the system that purpose to send signal into webcam for process determine the condition. There are three condition that state in the system (red, yellow, green). First condition is green, running system, second condition is yellow, pending system and red condition is stop system. There are two condition to record, which is (red and yellow). This system is semi-manual, once the signal is red or yellow the worker need to observed and record the problem of conveyor system into program software. There are program of monitoring display that will display the reason of the problem. Next process is monitoring product output is to record the product is score or not. Lastly the save data into Microsoft Excel for every second and operation time (12 Hour).

### 3.3 Block Diagram Monitoring Tower Light Conveyor Alarm System

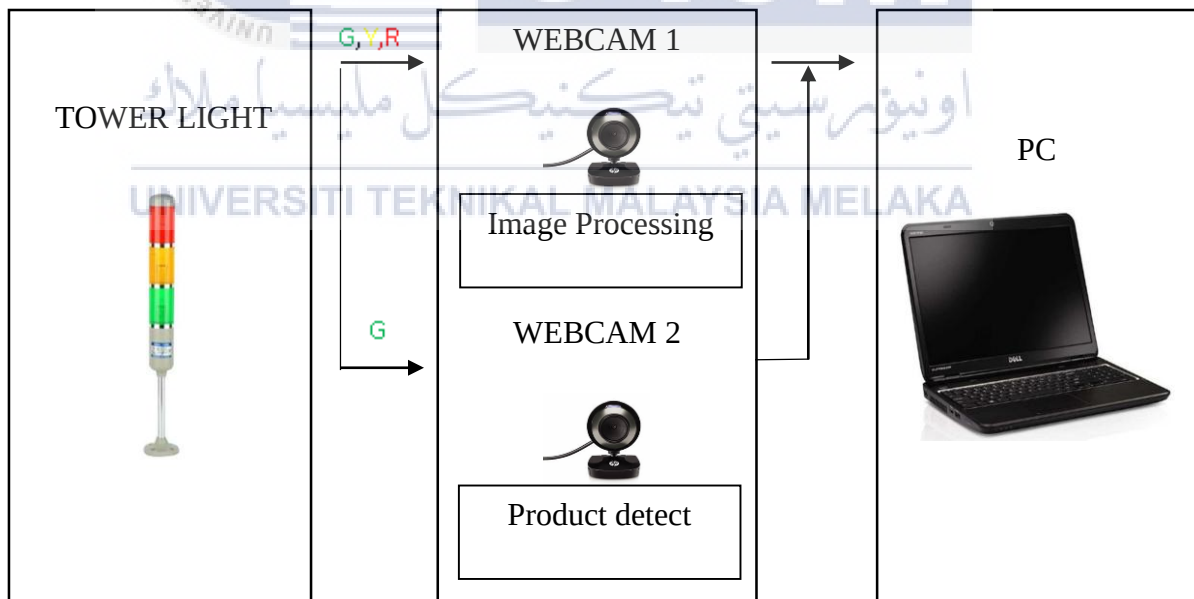


Figure 11: Hardware Block Diagram

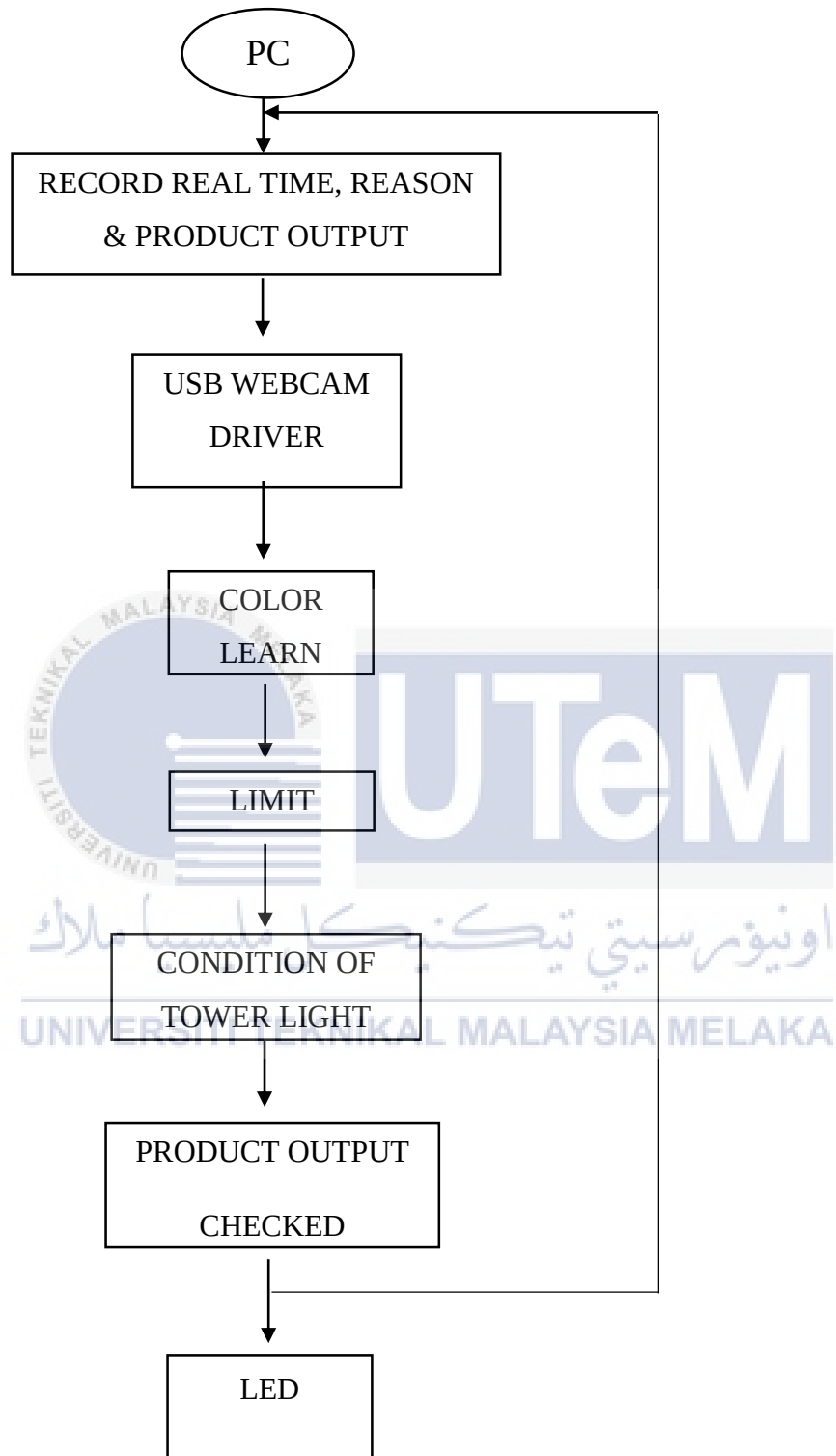


Figure 12: Software Block Diagram

### **3.4 Explanation of Block Diagram**

In figure 11, there are three part of hardware that used in Monitoring Conveyor Tower Light Alarm Signal, which are tower light, webcam and PC.

In figure 12, flow software part. 90% of the Monitoring Conveyor Tower Light Alarm Signal project are done by software. All recognition and storage data file is work by software. There are 7 parts of software, which are USB Webcam drive (IMAQ), Record real time, Reason and Quality product, Color Learn, Limit, Quality product, LED.

#### **3.4.1 Tower Light**

This part is about indicator light that are commonly used on equipment in industrial manufacturing and process control environments to provide visual and audible indicators of a machine state or process event. There are three indicator lights which RED is condition machine faulty, YELLOW is warning signal, and GREEN is normal machine.

#### **3.4.2 Webcam**

This part will discuss about webcam, webcam is a video camera that streams the image in real time through a computer. Webcam is generally connected by a USB cable. Webcam 1 is function to monitor and record the condition of Tower Light which is RED, YELLOW and GREEN into excel.CSV. Furthermore, the function of Webcam 2 is to count the product when Tower Light Green operate. Therefore, when the Green Light is active the webcam 2 will count the product running at that time. Green Light mean the condition is GOOD (product good).

#### **3.4.3 Laptop**

The laptop is a device that can be programmed to carry out a set of arithmetic or logical operations automatically. Therefore, this project using a laptop to build a simulation.

### 3.5 Software Project

#### 3.5.1 Color Image Processing Design

This part will discuss about IMAQ .VI, IMAQ. VI is one of the LabVIEW platform software. Color image can be capture by using the combination of 7 IMAQ.Vi, which are IMAQdx Open Camera VI, IMAQdx Configure Grab VI, IMAQdx Grab2 VI, IMAQdx Close Camera VI, IMAQ Create VI, IMAQ Dispose VI and IMAQ ColorLearn VI.

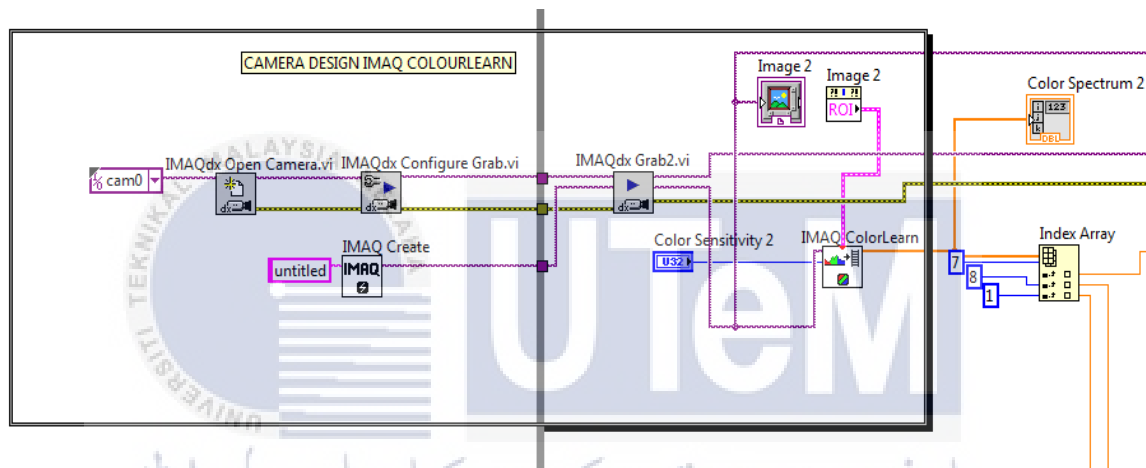


Figure 13: Camera Design Imaq ColourLearn

##### 3.5.1.1 IMAQdx Open Camera VI

Table 2: IMAQdx Open Camera VI

| ICON                                                                                | DISCRETION                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Opens a camera, queries the camera for its capabilities, loads a camera configuration file, and creates a unique reference to the camera. Use the IMAQdx Close Camera VI when you are finished with the reference. |



### 3.5.1.2 IMAQdx Configure Grab VI

Table 3 IMAQdx Configure Grab VI

| ICON                                                                              | DISCRETION                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Configures and starts a grab acquisition. A grab performs an acquisition that loops continually on a ring of buffers. Use the grab VI for high-speed image acquisition. Use the IMAQdx Grab VI to copy an image out of the buffer. If you call this VI before calling the IMAQdx Open Camera VI, the IMAQdx Configure Grab VI uses cam0 by default. Use the IMAQdx Configure Acquisition VI to configure the acquisition. |

### 3.5.1.3 IMAQdx Grab2 VI

Table 4: IMAQdx Grab2 VI

| ICON                                                                                | DISCRETION                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Acquires the most current frame into Image Out. Call this VI only after calling IMAQdx Configure Grab.vi. If the image type does not match the video format of the camera, this VI changes the image type to a suitable format. |

### 3.5.1.4 IMAQdx Close Camera VI

Table 5: IMAQdx Close Camera VI

| ICON                                                                              | DISCRETION                                                                                                                    |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|  | Stops an acquisition in progress, releases resources associated with an acquisition, and closes the specified Camera Session. |

### 3.5.1.5 IMAQ Create VI

Table 6: IMAQ Create VI

| ICON                                                                                | DISCRETION                                                                                                                                        |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Creates a temporary memory location for an image. Use IMAQ Create in conjunction with the VI to create or dispose of NI Vision images in LabVIEW. |

### 3.5.1.6 IMAQ Dispose VI

Table 7: IMAQ Dispose VI

| ICON                                                                                | DISCRETION                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Destroys an image and frees the space it occupied in memory. This VI is required for each image created in an application to free the memory allocated to the IMAQ Create VI. |

|  |                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Execute IMAQ Dispose only when the image is no longer needed in your application. You can use IMAQ Dispose for each call to IMAQ Create or just once for all images created with IMAQ Create. |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 3.5.1.7 IMAQ ColorLearn VI

Table 8: IMAQ ColorLearn VI

| ICON                                                                              | DISCRETION                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Extracts the color features of an image, which can be used for color matching or other applications related with color information, such as color identification and color image segmentation. |

### 3.5.2 Data Storage Design

This part will discuss about spreadsheet file, file purpose is folder of data, which need to save in form Microsoft excel or Microsoft word. This project have to save data into excel.CSV file. CSV is a comma separated values file which allow structure format.

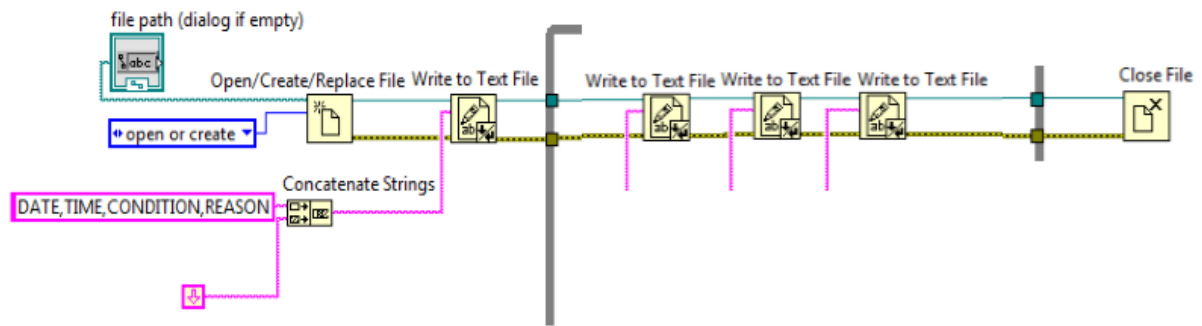


Figure 14: Data Storage Design

### 3.5.2.1 Open/Create/Replace File Purpose

Table 9: Open/Create/Replace File Purpose

| ICON                                                                                | DISCRETION                                                                                                                                                                               |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Opens an existing file, creates a new file, or replaces an existing file, programmatically or interactively using a file dialog box. This purpose does not work for files inside an LLB. |

### 3.5.2.2 Write to Text File Purpose

Table 10: Write to Text File Purpose

| ICON                                                                                | DISCRETION                                                                                                                |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|  | Write a string otherwise a grouping of strings as lines to a file. This purpose ensures work for documents inside an LLB. |

### 3.5.2.3 Close File Purpose

Table 11: Close File Purpose

| ICON                                                                              | DISCRETION                                                                                     |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|  | Closes an open file stated by refnum and returns the lane to the file related with the refnum. |

### 3.5.2.4 Concatenate Strings Purpose

Table 12: Concatenate String Purpose

| ICON                                                                                | DISCRETION                                                                                                                                                |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Concatenates input strings and 1D grouping of strings into a single output string. For array inputs, this purpose concatenates each element of the array. |

### 3.5.3 Condition Design

This part will discuss about condition of project, there are 3 combination of case structure is use, to state the reason of signal which Running, Pending or Stop.

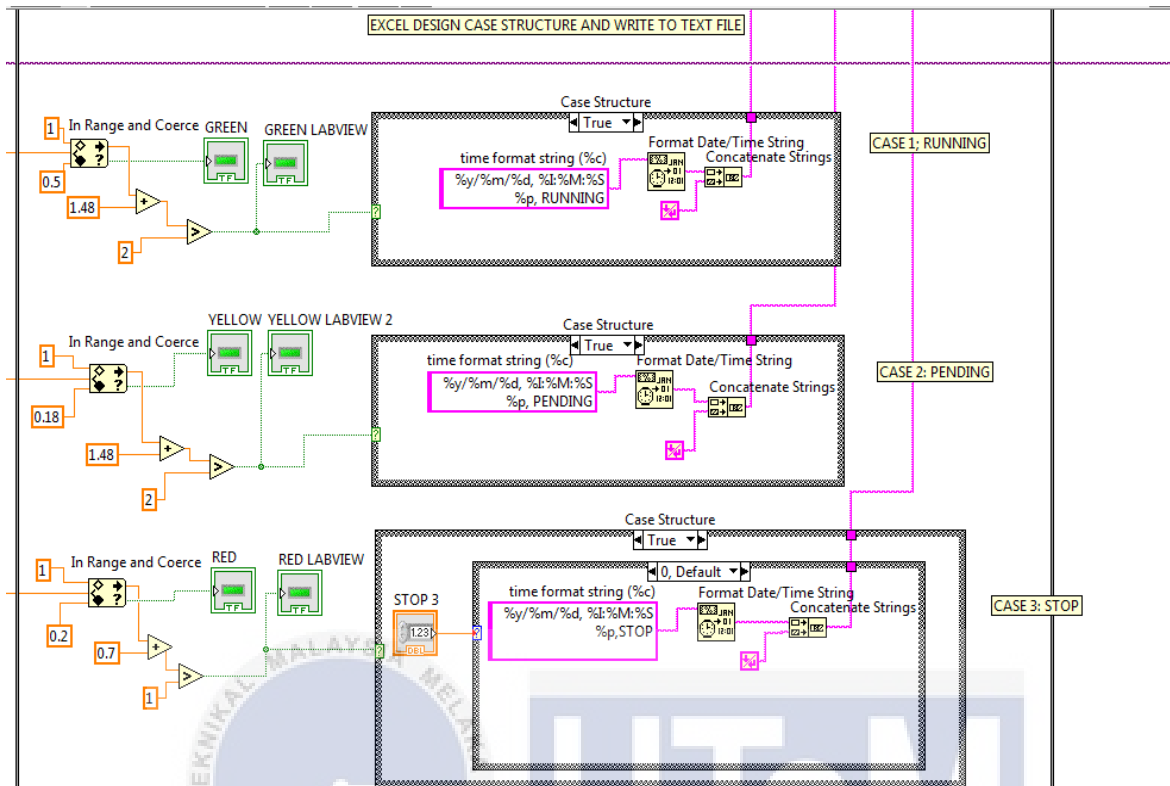
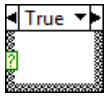


Figure 15: Excel Design Case Structure

### 3.5.3.1 Case Structure

Table 13: Case Structure

| ICON                                                                                | DISCRETION                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Contains one or more sub figures, or cases, exactly one of which performs when the structure performs. The value wired to the situation selector determines which case to execute.</p> |

### 3.5.3.2 Format Date/Time String Purpose

Table 14: Format Data/Time String Purpose

| ICON                                                                              | DISCRETION                                                                                            |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|  | Shows a timestamp value or a numeric value as time in the format you specify using time format codes. |

### 3.5.3.3 In Range and Coerce Purpose

Table 15: In range and Coerce Purpose

| ICON                                                                                | DISCRETION                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Defines whether <b>x</b> falls within a range specified by the <b>upper boundary</b> and <b>lower boundary</b> inputs and optionally coerces the value to fall within the range. The purpose performs the coercion only in Compare Elements mode. This purpose accepts time stamp values if all inputs are time stamp values. You can change the comparison style of this purpose. |

## 3.5.4 Real Time and Time Elapsed Design

This part will discuss about elapsed time. This design is to set the system run or stop.

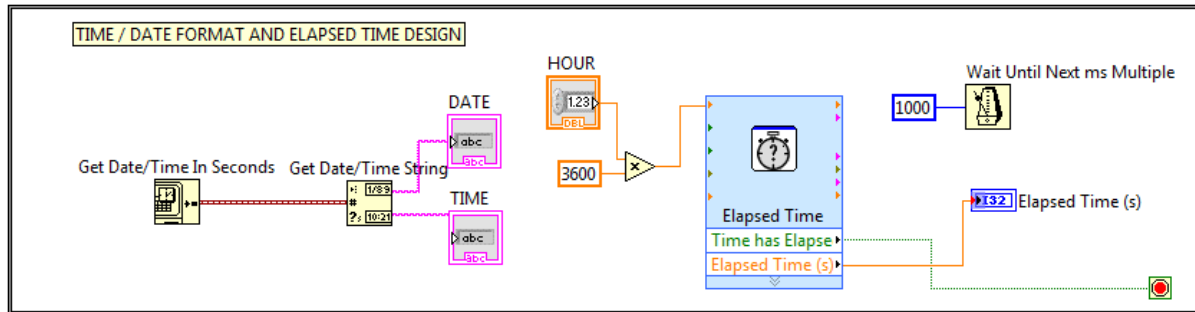


Figure 16: Time/Date Format and Elapsed Time Design

### 3.5.4.1 Get Data/Time in Second

Table 16: Get Date/Time in Second

| ICON | DISCRETION                                                                                                                                                                  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Returns a timestamp of the recent time. LabVIEW analyzes this timestamp using the number of seconds elapsed ever since 12:00 a.m., Friday, January 1, 1904, Universal Time. |

### 3.5.4.2 Get Date/Time String Purpose

Table 17: Get Date/Time String Purpose

| ICON | DISCRETION                                                                                                                                                               |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Changes a timestamp value or a numeric value to a date and time string in the time zone formed for the computer. The purpose understands timestamp and numeric values as |



|  |                                                                                                                               |
|--|-------------------------------------------------------------------------------------------------------------------------------|
|  | the time-zone-independent number of seconds that have elapsed ever since 12:00 a.m., Friday, January 1, 1904, Universal Time. |
|--|-------------------------------------------------------------------------------------------------------------------------------|

### 3.5.4.3 Wait until millisecond Multiple Purpose

Table 18: Wait Until millisecond Multiple Purpose

| ICON                                                                              | DISCRETION                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Waits up until the value of the millisecond timer becomes a multiple of the stated millisecond multiple. Use this purpose to synchronize events. You can call this purpose in a loop to control the loop execution rate. However, it is probable that the first loop period might be short. Wiring a value of 0 to the milliseconds multiple input forces the current thread to yield control of the CPU. |

### 3.5.5 Expected Result without Count Product

The figure 17 is expected result of this project that saved in excel by use LabVIEW.

| DATE     | TIME        | CONDITION | REASON           |
|----------|-------------|-----------|------------------|
| 16-05-18 | 01:42:43 AM | PENDING   |                  |
| 16-05-18 | 01:42:45 AM | PENDING   |                  |
| 16-05-18 | 01:42:45 AM | PENDING   |                  |
| 16-05-18 | 01:42:46 AM | PENDING   |                  |
| 16-05-18 | 01:42:47 AM | PENDING   |                  |
| 16-05-18 | 01:42:49 AM | PENDING   |                  |
| 16-05-18 | 01:42:50 AM | PENDING   |                  |
| 16-05-18 | 01:42:51 AM | PENDING   |                  |
| 16-05-18 | 01:42:52 AM | PENDING   |                  |
| 16-05-18 | 01:42:53 AM | PENDING   |                  |
| 16-05-18 | 01:42:56 AM | PENDING   |                  |
| 16-05-18 | 01:42:59 AM | RUNNING   |                  |
| 16-05-18 | 01:43:00 AM | RUNNING   |                  |
| 16-05-18 | 01:43:01 AM | RUNNING   |                  |
| 16-05-18 | 01:43:02 AM | RUNNING   |                  |
| 16-05-18 | 01:43:03 AM | RUNNING   |                  |
| 16-05-18 | 01:43:03 AM | RUNNING   |                  |
| 16-05-18 | 01:43:04 AM | RUNNING   |                  |
| 16-05-18 | 01:43:05 AM | RUNNING   |                  |
| 16-05-18 | 01:43:07 AM | RUNNING   |                  |
| 16-05-18 | 01:43:08 AM | RUNNING   |                  |
| 16-05-18 | 01:43:09 AM | RUNNING   |                  |
| 16-05-18 | 01:43:10 AM | RUNNING   |                  |
| 16-05-18 | 01:43:11 AM | PENDING   |                  |
| 16-05-18 | 01:43:12 AM | PENDING   |                  |
| 16-05-18 | 01:43:12 AM | PENDING   |                  |
| 16-05-18 | 01:43:13 AM | PENDING   |                  |
| 16-05-18 | 01:43:14 AM | PENDING   |                  |
| 16-05-18 | 01:43:15 AM | PENDING   |                  |
| 16-05-18 | 01:43:17 AM | PENDING   |                  |
| 16-05-18 | 01:43:18 AM | PENDING   |                  |
| 16-05-18 | 01:43:19 AM | PENDING   |                  |
| 16-05-18 | 01:43:21 AM | STOP      |                  |
| 16-05-18 | 01:43:21 AM | STOP      |                  |
| 16-05-18 | 01:43:22 AM | STOP      |                  |
| 16-05-18 | 01:43:23 AM | STOP      |                  |
| 16-05-18 | 01:43:25 AM | STOP      |                  |
| 16-05-18 | 01:43:26 AM | STOP      |                  |
| 16-05-18 | 01:43:27 AM | STOP      |                  |
| 16-05-18 | 01:43:28 AM | STOP      | SENSOR PROBLEM   |
| 16-05-18 | 01:43:29 AM | STOP      | SENSOR PROBLEM   |
| 16-05-18 | 01:43:30 AM | STOP      | CONVEYOR PROBLEM |
| 16-05-18 | 01:43:30 AM | STOP      | CONVEYOR PROBLEM |

Figure 17: Expected Result MS-Excel

### 3.5.6 Improvement Progress Product Detect Design

This figure 18 design function to count the output product and the function to check which is good or not good.

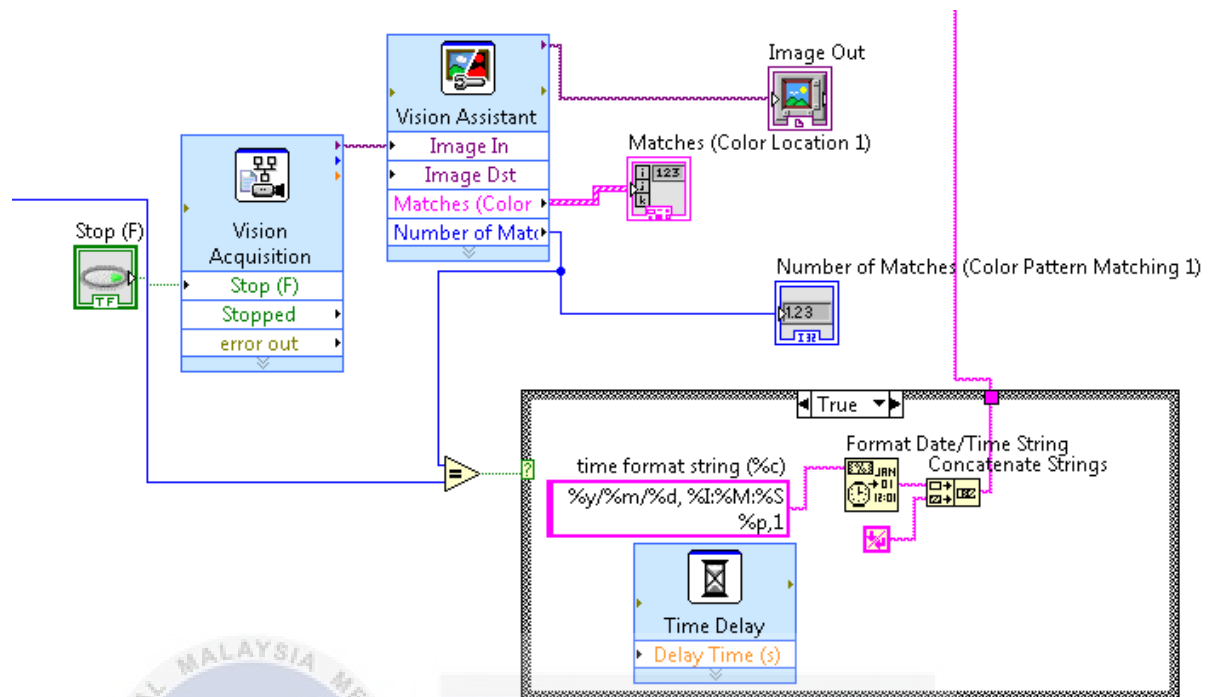


Figure 18: Product Detect Design

### 3.5.6.2 Vision Acquisition Purpose

Table 19: Vision Acquisition Purpose

| ICON | DISCRETION                                                                                                                        |
|------|-----------------------------------------------------------------------------------------------------------------------------------|
|      | NI Vision Acquisition is driver software for acquiring, showing, logging, and monitoring images from a multitude of camera types. |

### 3.5.6.3 Vision Assistant Purpose

Table 20: Vision Assistant Purpose

| ICON                                                                              | DISCRETION                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Tool for prototyping and testing image dispensation applications. To prototype an image dispensation application, build custom algorithms with the Vision Assistant scripting feature. The scripting feature records every step of the dispensation algorithm. After implementation the algorithm, you can test it on other images to make sure it works. |



## RESULT AND DISCUSSION

## 4.0 INTRODUCTION

This section is shown in the figure of Time and condition of in this chapter the result about the effectiveness of the system depending on the experiment done at the previous chapter. The effectiveness of the system will focus on accuracy. Discussion of the experimental result will be included in this chapter.

## 4.1 GUI SOFTWARE

This is the result of figure 19 the combination design, there are include design of Color Image Processing, Data Storage, Condition, Time Stamp and Product detected.

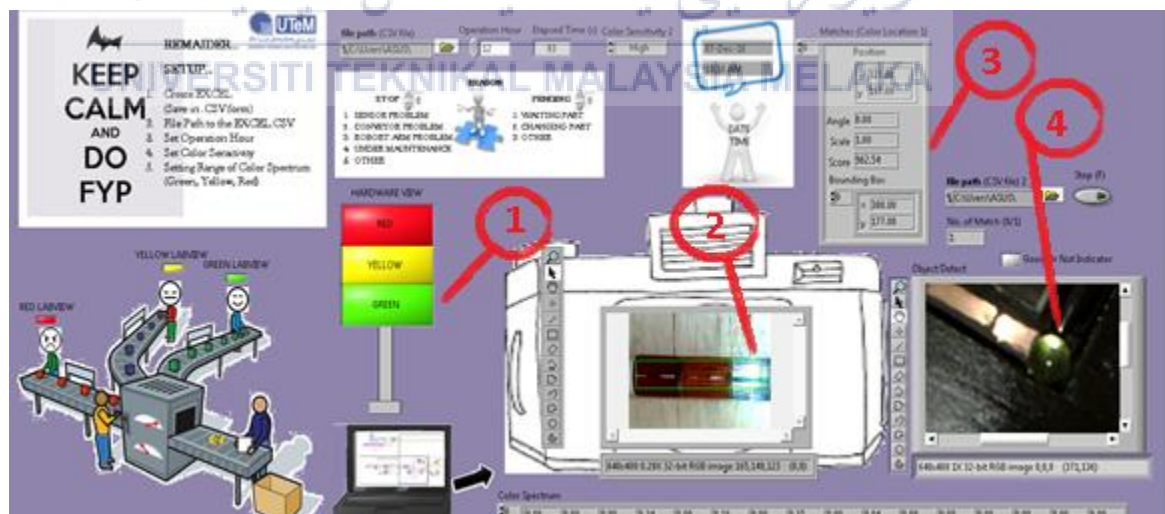


Figure 19: Green Light GUI Design with Good Product (Save into Excel PD)

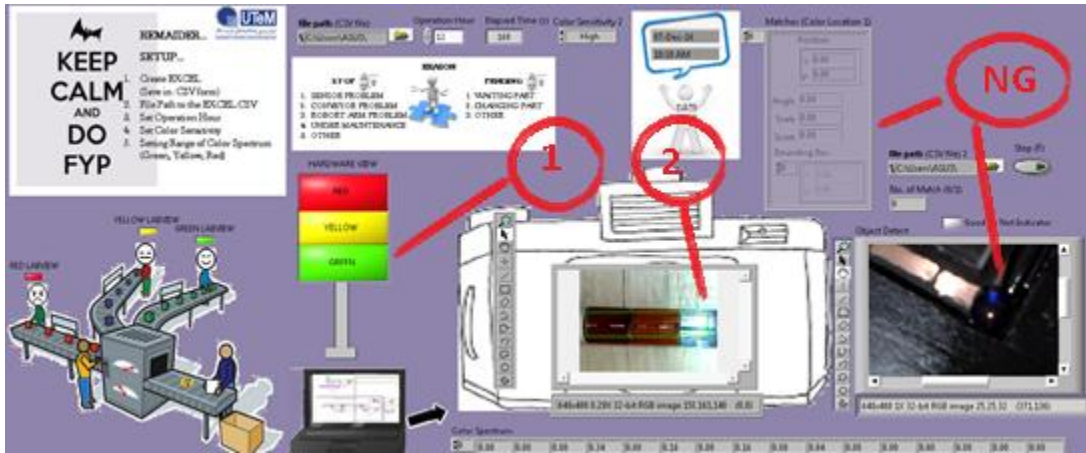


Figure 20: Green Light GUI Design with Not Good Product (Not save into Excel PD)



Figure 21: Yellow Light GUI Design with Good Product (Not save into Excel PD)



Figure 22: Red Light GUI Design with Good Product (Not save into Excel PD)



The figure 19 is about the GUI design include product detects and image processing. The design condition to store into excel.CSV are conditioned to store the data into excel.CSV is score highest 800 and Green Light must be 1. Therefore, Figure 19 Green Light GUI Design with Good Product is result saved into excel.CSV to count the output product. Once the Green Light is functioning, the second Webcam 2 will capture the product pass by and count as 1 to the output folder excel.CSV, Figure 20 Green Light GUI Design with Not Good Product is result not saved into excel.CSV because of the product is not match with the score Product Detect Design, Figure 21 and Figure 22 result not save into excel.CSV because of the condition the program.

#### 4.1.1 Product Scale



Figure 24: Good Product



Figure 23: Not Good Product

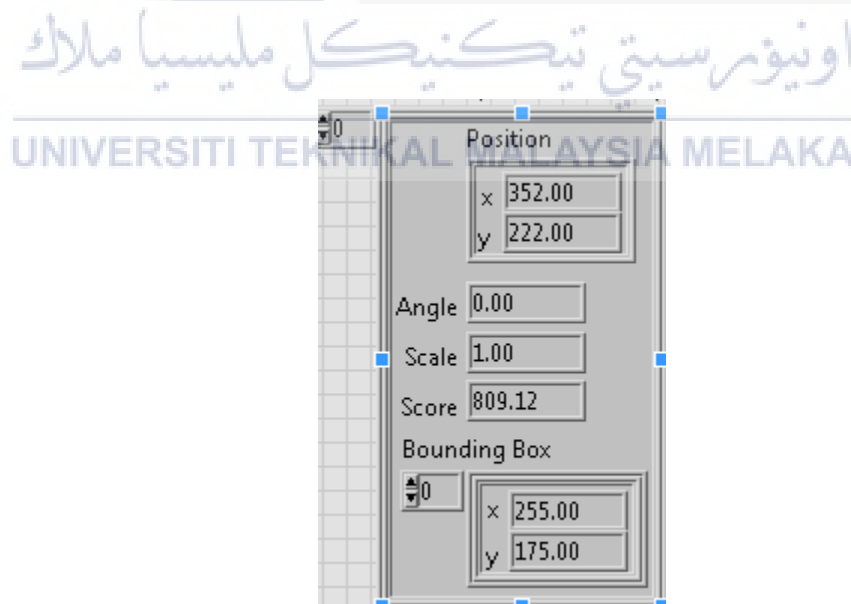


Figure 25: Match ColourLearn (Score 800 above)

#### 4.1.2 Result Count Output Product

|    | A        | B           | C      |
|----|----------|-------------|--------|
| 1  | DATE     | TIME        | OUTPUT |
| 2  | 16-12-07 | 10:15:34 AM | 1      |
| 3  | 16-12-07 | 10:15:37 AM | 1      |
| 4  | 16-12-07 | 10:15:39 AM | 1      |
| 5  | 16-12-07 | 10:15:41 AM | 1      |
| 6  | 16-12-07 | 10:16:54 AM | 1      |
| 7  | 16-12-07 | 10:16:56 AM | 1      |
| 8  | 16-12-07 | 10:16:58 AM | 1      |
| 9  | 16-12-07 | 10:17:00 AM | 1      |
| 10 | 16-12-07 | 10:17:02 AM | 1      |
| 11 | 16-12-07 | 10:17:04 AM | 1      |
| 12 | 16-12-07 | 10:17:06 AM | 1      |
| 13 | 16-12-07 | 10:17:08 AM | 1      |
| 14 | 16-12-07 | 10:17:10 AM | 1      |
| 15 | 16-12-07 | 10:17:12 AM | 1      |
| 16 | 16-12-07 | 10:17:15 AM | 1      |
| 17 |          |             |        |
| 18 |          |             |        |

Figure 26: Excel store the Good Product

#### 4.2 Cause of Equipment Failure

Equipment Failure represents any critical timeframe in which gear is organized to produce however is not running because of a disappointment or some likeness thereof. A more summed up approach to consider hardware disappointment is as any impromptu stop or down time. Gear disappointment is an Availability Loss.

Cases of normal purposes behind gear disappointment incorporate tooling disappointment, breakdowns, and impromptu upkeep. From the more extensive viewpoint of impromptu stops, other basic reasons incorporate no administrators or materials, being famished by upstream gear or being obstructed by downstream hardware.



| Overall Equipment Effectiveness | Recommended Six Big Losses | Traditional Six Big Losses |
|---------------------------------|----------------------------|----------------------------|
| Availability Loss               | Unplanned Stops            | Equipment Failure          |
|                                 | Planned Stops              | Setup and Adjustments      |
| Performance Loss                | Small Stops                | Idling and Minor Stops     |
|                                 | Slow Cycles                | Reduced Speed              |
| Quality Loss                    | Production Rejects         | Process Defects            |
|                                 | Startup Rejects            | Reduced Yield              |

Figure 27: Table cause of Six Big Losses

This is 6 factor losses in industries, one of them is an Equipment Failure (unplanned stops) because of this factor, come out with the idea to develop a monitoring system to record cause and reason to stop the machine.

#### 4.3 Result of Monitoring Graph

This section is shown in the figure of Time and condition of Tower Light. There are figure Time in Second and Hour. Moreover, reason for Stop is Sensor Problem, Conveyor Problem, Robot Arm Problem, Under Maintenance Problem, Other and reason of Pending is Waiting Part, Changing Part and Other. There are blank, the blank is value count of Pending, Stop and Running which are not having reason run the Tower Light. The data form MS-excel is convert into table (Pivot Table).

### 4.3.1 Date 21.8.2016

| DATE: 21.8.2016 -22.8.2016 |                  |                |         |             |
|----------------------------|------------------|----------------|---------|-------------|
|                            | CONVEYOR PROBLEM | SENSOR PROBLEM | (blank) | Grand Total |
| 16-08-21                   | 6814             | 3006           | 23      | 9843        |
| PENDING                    |                  |                | 1       | 1           |
| RUNNING                    |                  |                | 11      | 11          |
| STOP                       | 6814             | 3006           | 11      | 9831        |
| 16-08-22                   | 184              | 1              | 23125   | 23310       |
| PENDING                    |                  |                | 14521   | 14521       |
| RUNNING                    |                  |                | 8599    | 8599        |
| STOP                       | 184              | 1              | 5       | 190         |
| Grand Total                | 6998             | 3007           | 23148   | 33153       |

Figure 28: Time in Second

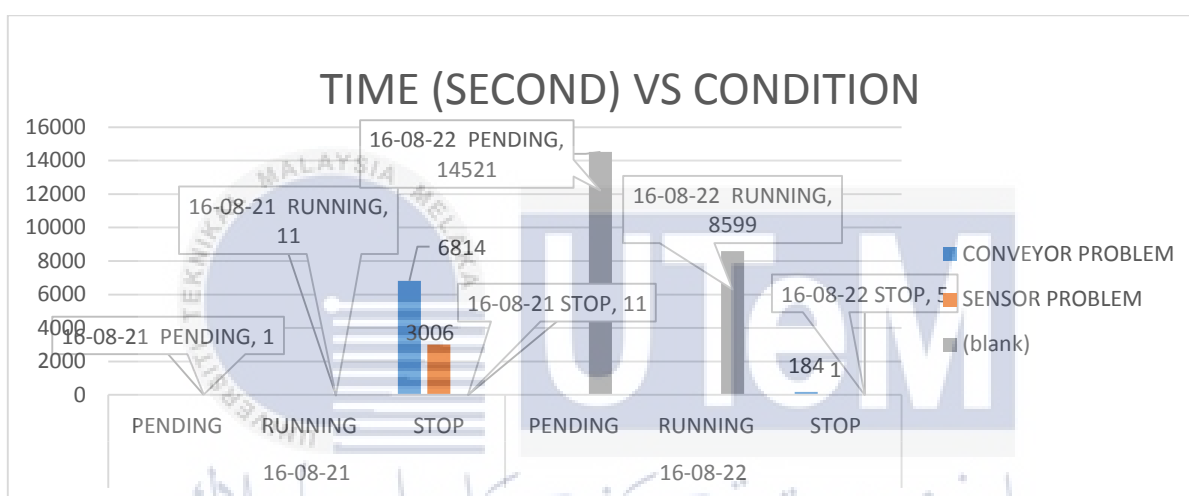


Figure 29: Graph Time (second) VS Condition (reason)

Table 21: Time (Hour)

| DATE:<br>21.8.2016<br>(HOUR) | WAITI<br>NG<br>PART | CHANGIN<br>G PART | OTHER | SENSOR<br>PROBLE<br>M | CONVEY<br>OR<br>PROBLE<br>M | ROBOT<br>ARM<br>PROBLE<br>M | UNDER<br>MAINTEN<br>ANCE | OTHER2 | BLANK | TOTAL<br>TIME |
|------------------------------|---------------------|-------------------|-------|-----------------------|-----------------------------|-----------------------------|--------------------------|--------|-------|---------------|
| PENDING                      | 0.00                | 0.00              | 0.00  |                       |                             | 0.00                        | 0.00                     | 0.00   |       | 0.00          |
| RUNNING                      | 0.00                | 0.00              | 0.00  |                       |                             | 0.00                        | 0.00                     | 0.00   |       | 0.00          |
| STOP                         | 0.00                | 0.00              | 0.00  | 0.84                  | 1.89                        | 0.00                        | 0.00                     | 0.00   | 0.01  | 2.74          |
| TOTAL TIME                   | 0.00                | 0.00              | 0.00  | 0.84                  | 1.89                        | 0.00                        | 0.00                     | 0.00   | 0.01  | 2.74          |

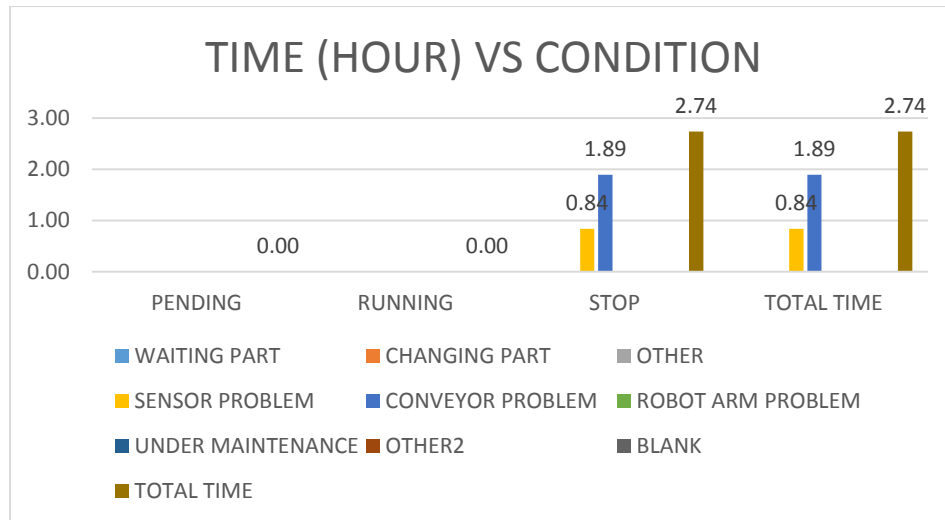


Figure 30: Graph Time (hour) VS Condition (reason)

This result of table 21, show 3 Hour and 46 Minutes of the process is stopped because of Sensor Problem 50 Minute, 2 Hour and 43 Minutes because of Conveyor Problem and 3 Minutes for blank which stop without Reason. The result show cause of the problem and time running the system.

#### 4.3.2 Date 7.12.2016 – 8.12.2016

Table 22: Time (second)

| DATE: 7.12.2016 - 8.12.2016 |       |               |       |           |               |            |              |             |
|-----------------------------|-------|---------------|-------|-----------|---------------|------------|--------------|-------------|
|                             | blank | CHANGING PART | OTHER | ROBOT ARM | SENSOR PROBLE | UNDER MAIN | WAITING PART | Grand Total |
| 16-12-07                    | 149   | 1685          | 3944  | 3450      | 33            | 1703       | 1779         | 12743       |
| RUNNING                     | 149   |               |       |           |               |            |              | 149         |
| PENDING                     |       | 1685          |       |           |               |            | 1779         | 3464        |
| STOP                        |       |               | 3944  | 3450      | 33            | 1703       |              | 9130        |
| 16-12-08                    | 453   | 1142          | 1222  |           | 1211          |            |              | 4028        |
| RUNNING                     | 453   |               |       |           |               |            |              | 453         |
| PENDING                     |       | 1142          | 1222  |           |               |            |              | 2364        |
| STOP                        |       |               |       |           | 1211          |            |              | 1211        |
| Grand Total                 | 602   | 2827          | 5166  | 3450      | 1244          | 1703       | 1779         | 16771       |

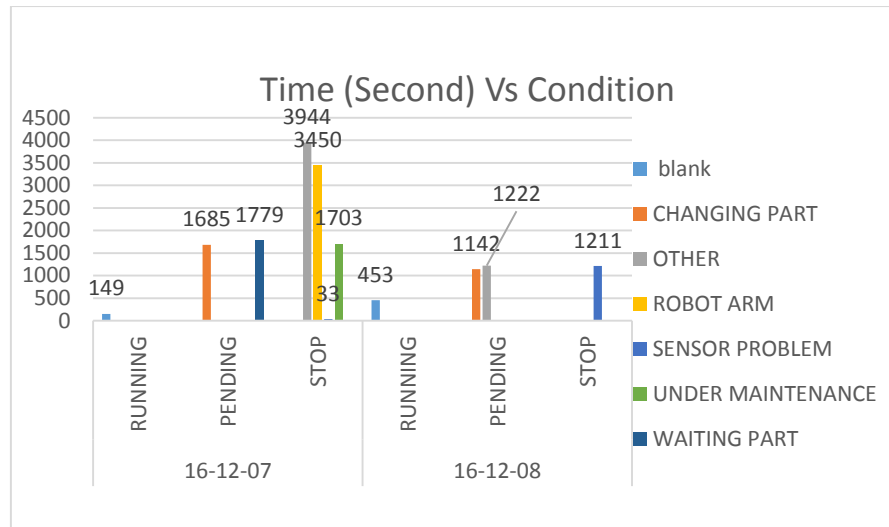


Figure 31: Graph Time (second) VS Condition (reason)

Table 23: Time (Hour)

| DATE:<br>7.12.2016<br>(HOUR) | WAITING<br>PART | CHANGIN<br>G PART | OTHER | SENSOR<br>PROBLEM | CONVEYO<br>R PROBLEM | ROBOT<br>ARM<br>PROBLEM | UNDER<br>MAINTEN<br>ANCE | OTHER2 | BLANK | TOTAL<br>TIME |
|------------------------------|-----------------|-------------------|-------|-------------------|----------------------|-------------------------|--------------------------|--------|-------|---------------|
| PENDING                      | 0.49            | 0.47              | 0.00  | 0.00              | 0.00                 | 0.00                    | 0.00                     | 0.00   | 0.00  | 0.96          |
| RUNNING                      | 0.00            | 0.00              | 0.00  | 0.00              | 0.00                 | 0.00                    | 0.00                     | 0.00   | 0.04  | 0.04          |
| STOP                         | 0.00            | 0.00              | 1.10  | 0.01              | 0.00                 | 0.96                    | 0.47                     | 0.00   | 0.00  | 2.54          |
| TOTAL<br>TIME                | 0.49            | 0.47              | 1.10  | 0.01              | 0.00                 | 0.96                    | 0.47                     | 0.00   | 0.04  | 3.54          |

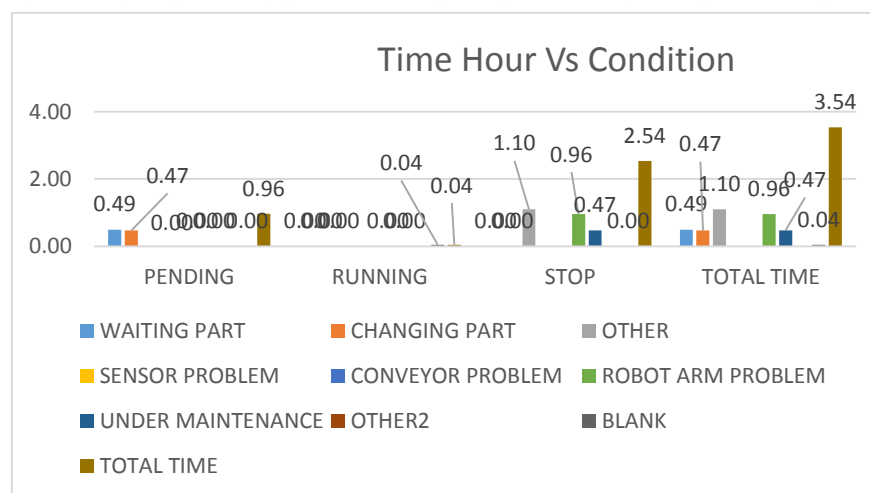


Figure 32: Graph Time (hour) VS Condition (reason)

Table 24: Time (Hour)

| DATE:<br>8.12.2016<br>(HOUR) | WAITING<br>PART | CHANGIN<br>G PART | OTHER | SENSOR<br>PROBLEM | CONVEYO<br>R<br>PROBLEM | ROBOT<br>ARM<br>PROBLEM | UNDER<br>MAINTEN<br>ANCE | OTHER2 | BLANK | TOTAL<br>TIME |
|------------------------------|-----------------|-------------------|-------|-------------------|-------------------------|-------------------------|--------------------------|--------|-------|---------------|
| PENDING                      | 0.00            | 0.32              | 0.00  | 0.00              | 0.00                    | 0.00                    | 0.00                     | 0.00   | 0.00  | 0.32          |
| RUNNING                      | 0.00            | 0.00              | 0.34  | 0.00              | 0.00                    | 0.00                    | 0.00                     | 0.00   | 0.13  | 0.47          |
| STOP                         | 0.00            | 0.00              | 0.00  | 0.34              | 0.00                    | 0.00                    | 0.00                     | 0.00   | 0.00  | 0.34          |
| TOTAL<br>TIME                | 0.00            | 0.32              | 0.34  | 0.34              | 0.00                    | 0.00                    | 0.00                     | 0.00   | 0.13  | 1.12          |

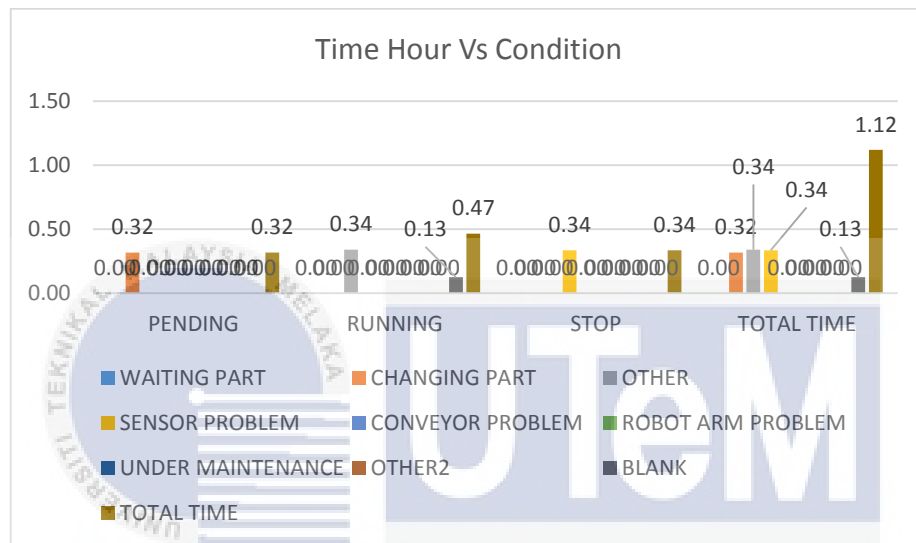


Figure 33: Graph Time (hour) VS Condition (reason)

This result shows the purpose of the Conveyor Monitoring System, to monitor the run-time process by using a webcam and tower light.

#### 4.4 Result of Output Monitoring Graph

This section is about the result of Monitoring Output Product. There are tables of Output Product Detected and Minute of Running Processes.

Table 25: Output Product Detect

| Date 7.12.2016 - 8.12.2016 |           |             |
|----------------------------|-----------|-------------|
|                            | 1         | Grand Total |
| 16-12-07                   | 9         | 9           |
| 16-12-08                   | 38        | 38          |
| <b>Grand Total</b>         | <b>47</b> | <b>47</b>   |

Table 26: Minute of Running Process (Green Light)

| Column1                              | 2 Minute .4 Second | 7 Minute.8 Second |
|--------------------------------------|--------------------|-------------------|
| Date 7.12.2016 - 8.12.2016 (RUNNING) | 9                  | 38                |

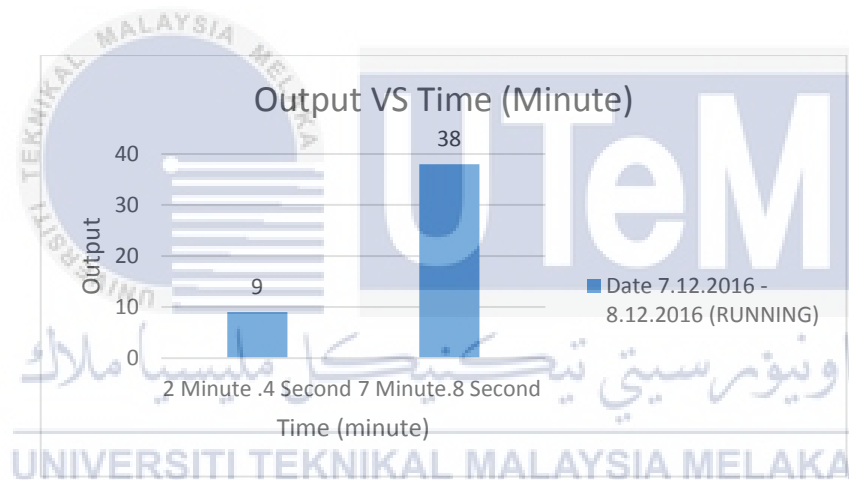


Figure 34: Graph Output (product) VS Time (minute)

The table 26, show 2 minutes and 4 second because of the processing time is 11.57PM and the date 7.8.2016. Therefore, the process is continued 7 minutes and 8 second. Record to 12. 07 AM and the result continues into date 8.12.2016. Refer to table 23 and table 24 shows the total time is 5 hours and 6 minutes and the running time (blank) is 9 minutes and 12 second get the output of product is 47. Except, 9 minute and 12 second, total time to stop and pending condition is 4 hours and 57 minutes.

#### 4.5 Accuracy of Capture Output Product

This section is to measure accuracy of design. Therefore, two analyses, product defect is taken which is 30 products and 50 products. The result is taken at running condition.

| 30 Object          |            | 30 Object          |           |
|--------------------|------------|--------------------|-----------|
| Blank              |            | Output             |           |
| 16-12-08           | 108        | 16-12-08           | 33        |
| <b>Grand Total</b> | <b>108</b> | <b>Grand Total</b> | <b>33</b> |

| 50 Object          |            | 50 Object          |           |
|--------------------|------------|--------------------|-----------|
| Blank              |            | Output             |           |
| 16-12-08           | 165        | 16-12-08           | 49        |
| <b>Grand Total</b> | <b>165</b> | <b>Grand Total</b> | <b>49</b> |

(a)

(b)

Figure 35: (a) Time (second), (b) Output (product)

Table 27: Time (minute) and Output

| Time (minute)   | 2 Minute. 20 Second (30) | 3 Minute . 33 Second (50) |
|-----------------|--------------------------|---------------------------|
| Date:08-12-2016 | 33                       | 49                        |

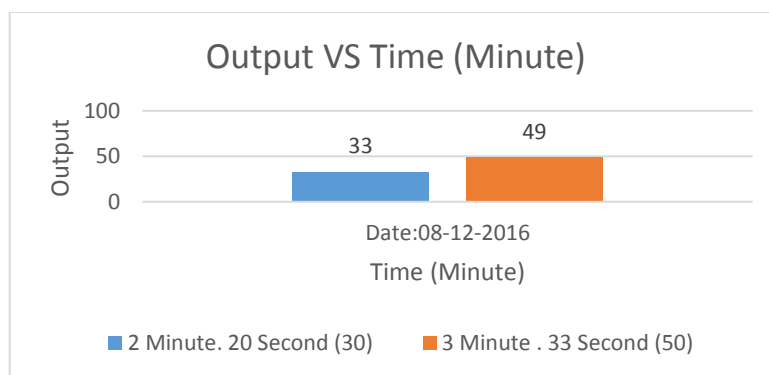


Figure 36: Graph Output (product) VS Time (minute)

Figure 35 is data storage in second. Therefore, table 27 is convert second into minute. This section is to measure accuracy of Product Detect Design which is analysis 30 and 50 product. The result shown 3 errors in the first 30 product run test, it is because of delay time in the design is 2second. Therefore, the design change to 3second delay to count 50 of the product and less 1 of the product because of product run faster than 3second.





## **CHAPTER 5**

### **CONCLUSION AND FUTURE RECOMMENDATION**

#### **5.1 Conclusion**

Overall, the objective of this project has been achieved. A lot of time was spent during this research exploring the LabVIEW design of Color, Image Processing, Data Storage, Condition, Time Stamp, Product detected and Excel.CSV. After that, the execution of the software was able to help the researcher to understand the command and the tools used in the program. There are a lot of knowledge and new skill gained throughout this project. It explains the operation of a system which software execution. Furthermore, this project is able to record the time, date, and condition of signal into Microsoft Excel and the prototype is designed to ensure the brightness of tower light is not effective to the Color Image Processing design and time have been manually converting into a table and graph. Moreover, image of good product must be saved as reference for Product Detect Design to determine the product is good or not. The time shown in every second of condition. Lastly, this project is plug in play.

## 5.2 Future Recommendation

In this section, the idea to improve the project is replacing record every second of condition into excel to every changing condition by using step sequence design and case structure or record the data not in second but in the hour. Furthermore, change the laptop as medium to MyRIO. MyRIO is LabVIEW instrument capabilities to work alone (MyRIO can save the excel.CSV same as laptop function).



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## Gant Chart PSM I

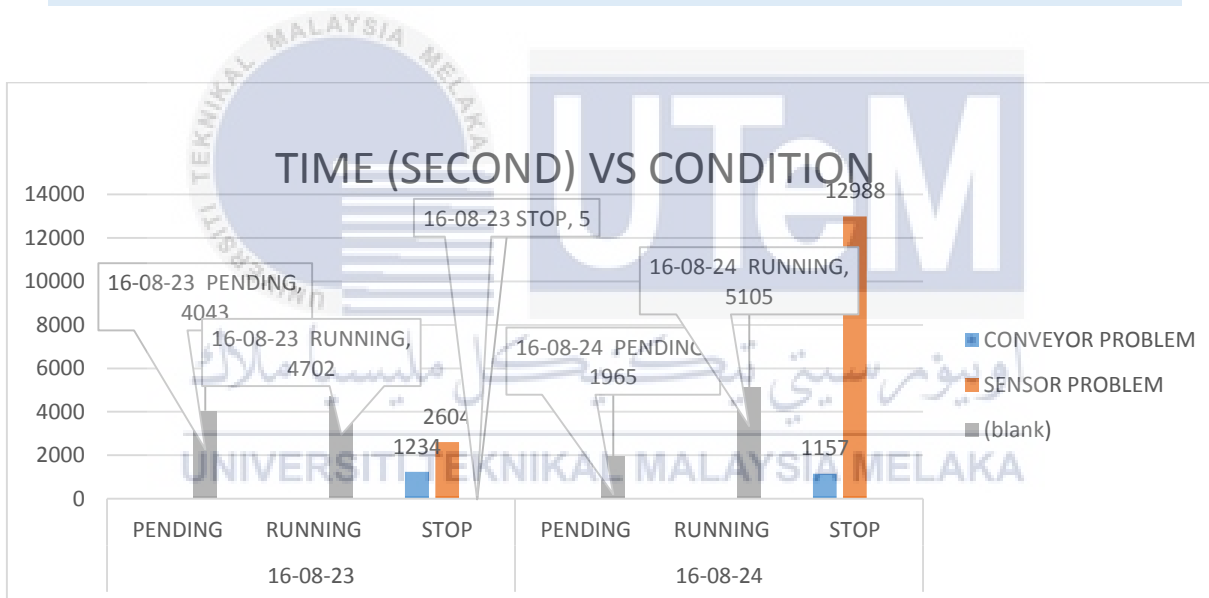
[illegible]

## Gant Chart PSM II

[illegible]

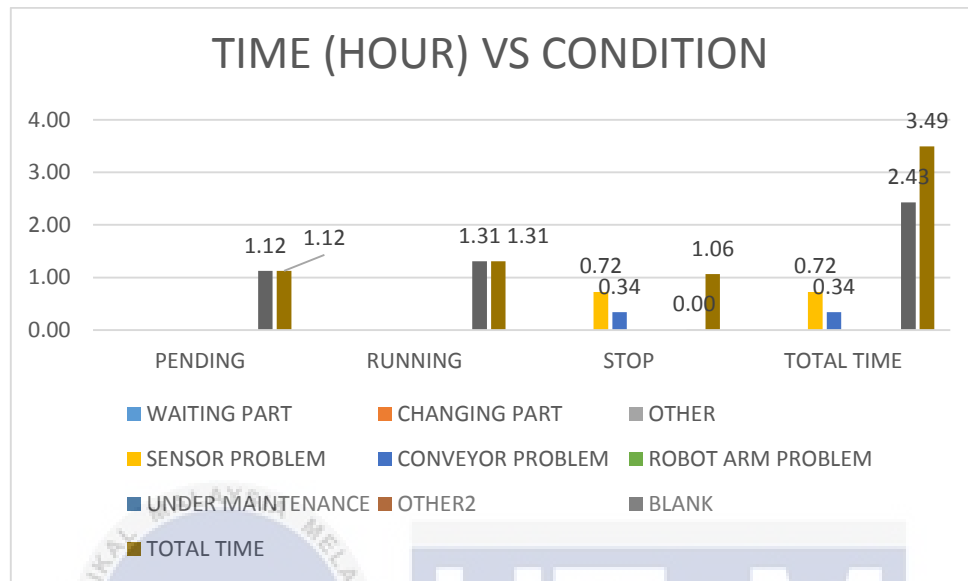
## AUGUST 2016

| DATE:<br>23.8.2016 -<br>24.8.2016 |                     |                   |         |             |
|-----------------------------------|---------------------|-------------------|---------|-------------|
|                                   | CONVEYOR<br>PROBLEM | SENSOR<br>PROBLEM | (blank) | Grand Total |
| 16-08-23                          | 1234                | 2604              | 8750    | 12588       |
| PENDING                           |                     |                   | 4043    | 4043        |
| RUNNING                           |                     |                   | 4702    | 4702        |
| STOP                              | 1234                | 2604              | 5       | 3843        |
| 16-08-24                          | 1157                | 12988             | 7070    | 21215       |
| PENDING                           |                     |                   | 1965    | 1965        |
| RUNNING                           |                     |                   | 5105    | 5105        |
| STOP                              | 1157                | 12988             |         | 14145       |
| Grand Total                       | 2391                | 15592             | 15820   | 33803       |

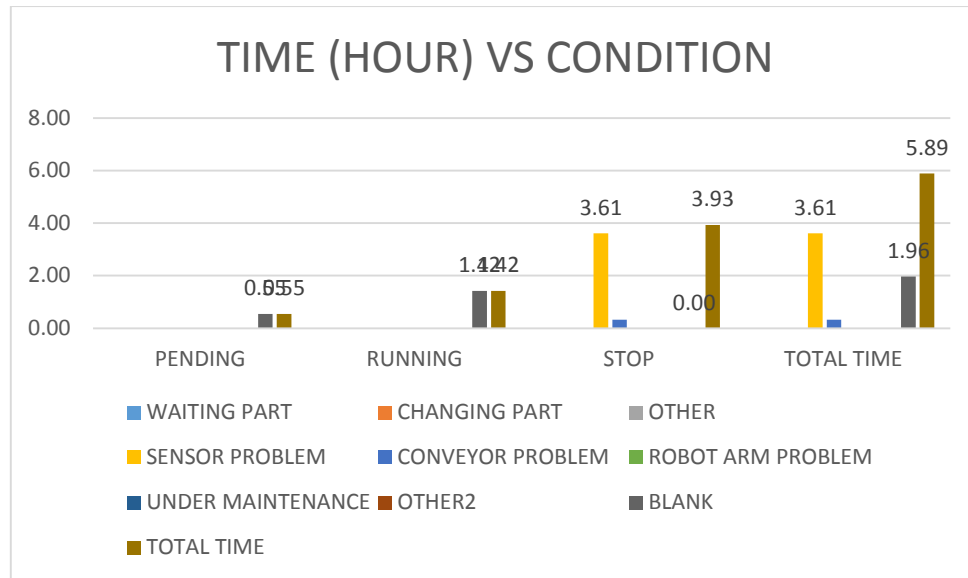


| DATE:<br>23.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 1.12  | 1.12          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 1.31  | 1.31          |
| STOP                                 | 0.00                | 0.00                 | 0.00  | 0.72                      | 0.34                        | 0.00                        | 0.00                         | 0.00       | 0.00  | 1.06          |

|            |      |      |      |      |      |      |      |      |      |      |
|------------|------|------|------|------|------|------|------|------|------|------|
| TOTAL TIME | 0.00 | 0.00 | 0.00 | 0.72 | 0.34 | 0.00 | 0.00 | 0.00 | 2.43 | 3.49 |
|------------|------|------|------|------|------|------|------|------|------|------|



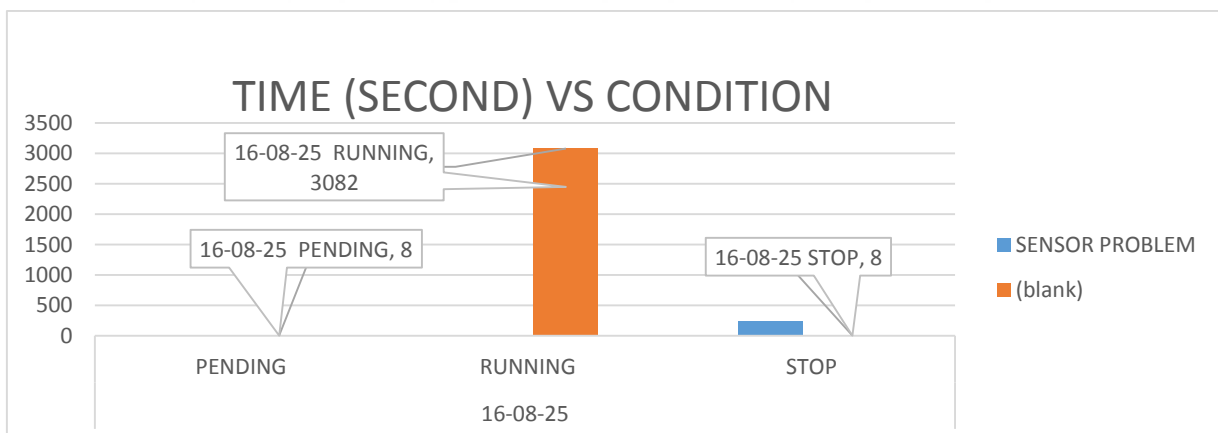
|                                   |                     |                      |       |                           |                             |                             |                              |            |       |               |
|-----------------------------------|---------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| DATE:<br>24.8.20<br>16<br>(HOUR ) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
| PENDI<br>NG                       | 0.00                | 0.00                 | 0.00  | 0.00                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 0.55  | 0.55          |
| RUNNI<br>NG                       | 0.00                | 0.00                 | 0.00  | 0.00                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 1.42  | 1.42          |
| STOP                              | 0.00                | 0.00                 | 0.00  | 3.61                      | 0.32                        | 0.00                        | 0.00                         | 0.00       | 0.00  | 3.93          |
| TOTAL<br>TIME                     | 0.00                | 0.00                 | 0.00  | 3.61                      | 0.32                        | 0.00                        | 0.00                         | 0.00       | 1.96  | 5.89          |



DATE: 25.8.2016

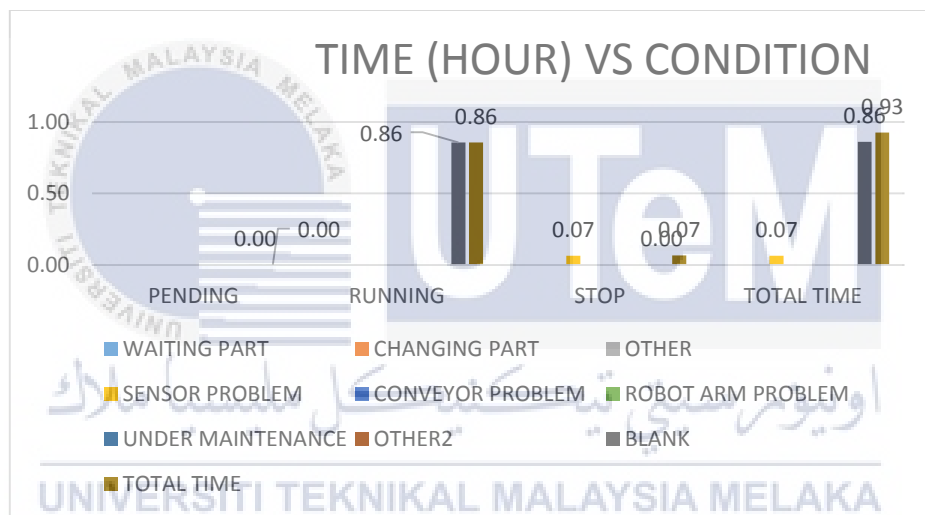
| Row Labels  | SENSOR PROBLEM | (blank) | Grand Total |
|-------------|----------------|---------|-------------|
| 16-08-25    | 235            | 3098    | 3333        |
| PENDING     |                | 8       | 8           |
| RUNNING     |                | 3082    | 3082        |
| STOP        | 235            | 8       | 243         |
| Grand Total | 235            | 3098    | 3333        |

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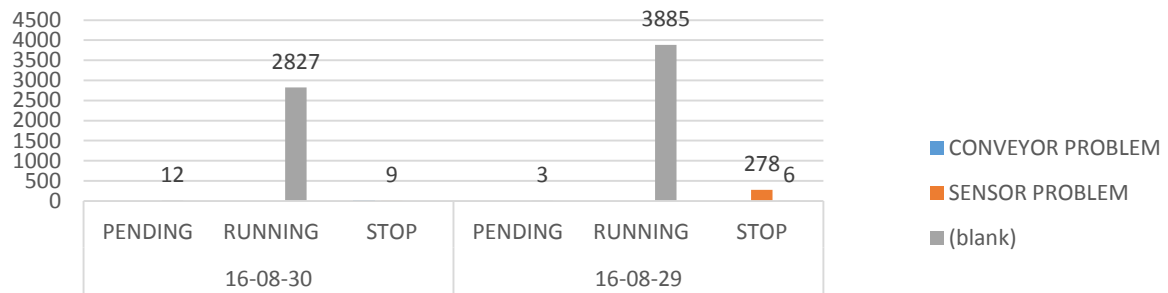


| DATE:<br>25.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER       | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK       | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.00          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.86        | 0.86          |
| STOP                                 | 0.00                | 0.00                 | 0.00        | 0.07                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.07          |
| TOTAL<br>TIME                        | 0.00                | 0.00                 | <b>0.00</b> | <b>0.07</b>               | <b>0.00</b>                 | 0.00                        | 0.00                         | 0.00       | <b>0.86</b> | <b>0.93</b>   |



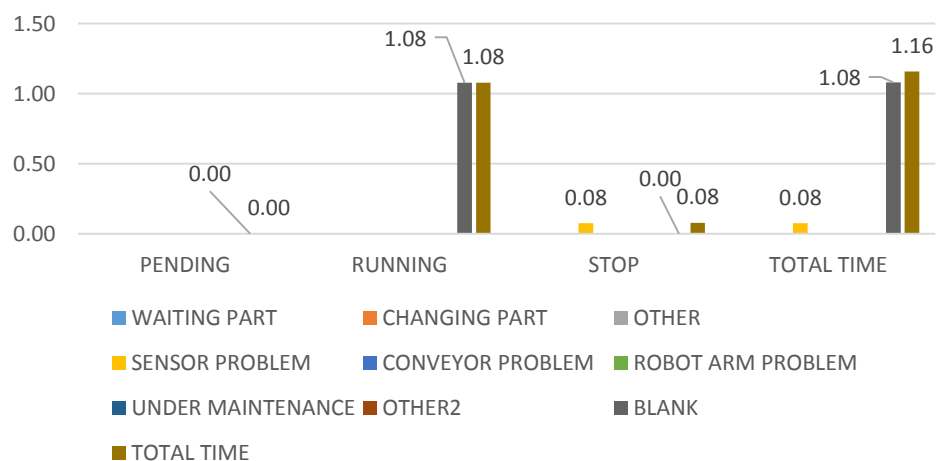
| Count of TIME | Column Labels       |                   |         |             |  |
|---------------|---------------------|-------------------|---------|-------------|--|
| Row Labels    | CONVEYOR<br>PROBLEM | SENSOR<br>PROBLEM | (blank) | Grand Total |  |
| 16-08-30      | 6                   | 9                 | 2839    | 2854        |  |
| PENDING       |                     |                   | 12      | 12          |  |
| RUNNING       |                     |                   | 2827    | 2827        |  |
| STOP          | 6                   | 9                 |         | 15          |  |
| 16-08-29      |                     | 278               | 3894    | 4172        |  |
| PENDING       |                     |                   | 3       | 3           |  |
| RUNNING       |                     |                   | 3885    | 3885        |  |
| STOP          |                     | 278               | 6       | 284         |  |
| Grand Total   | 6                   | 287               | 6733    | 7026        |  |

## TIME (SECOND) VS CONDITION

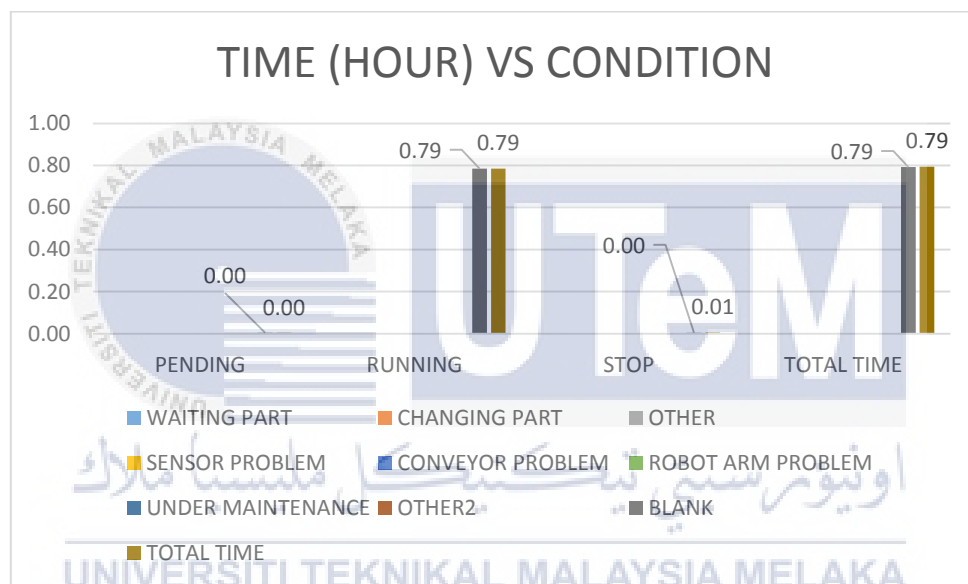


| DATE:<br>29.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER | SENSE<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.00  | 0.00          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 1.08  | 1.08          |
| STOP                                 | 0.00                | 0.00                 | 0.00  | 0.08                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 0.00  | 0.08          |
| TOTAL<br>TIME                        | 0.00                | 0.00                 | 0.00  | 0.08                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 1.08  | 1.16          |

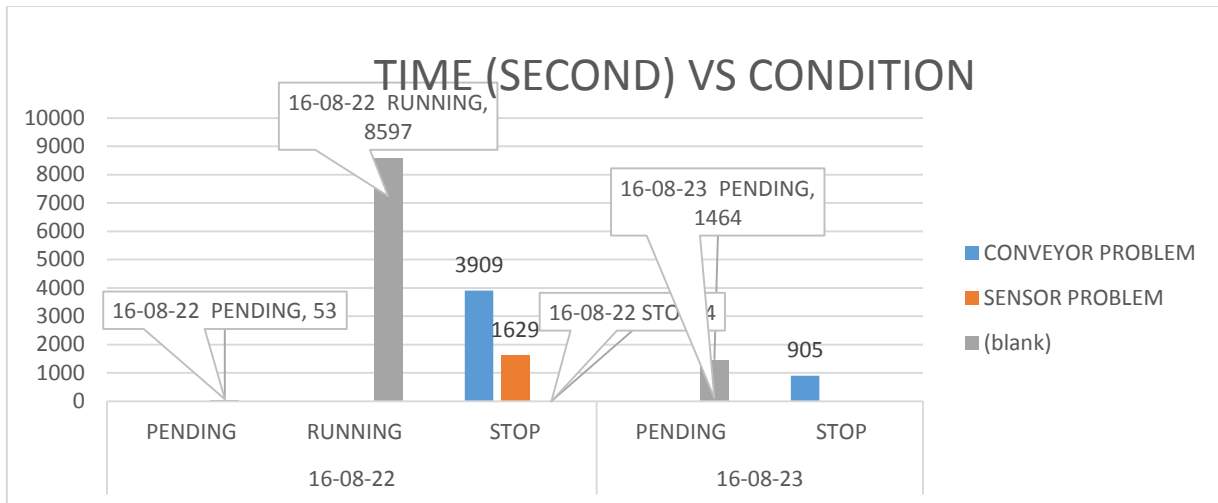
## TIME (HOUR) VS CONDITION



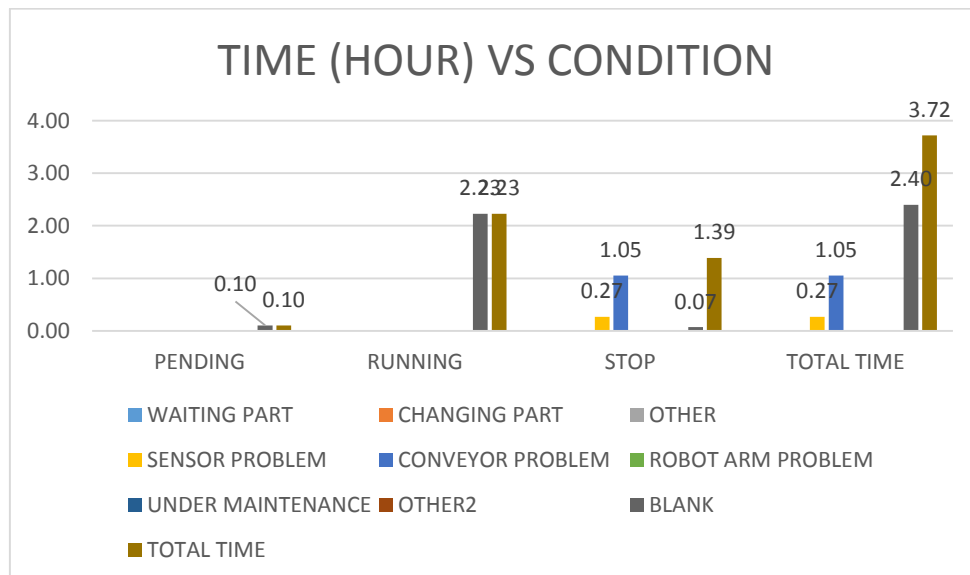
| DATE:<br>30.8.2016<br>(HOUR ) | WAITING PART | CHANGING PART | OTHER | SENSOR PROBLEM | CONVEYOR PROBLEM | ROBOT ARM PROBLEM | UNDER MAINTENANCE | OTHER 2 | BLANK | TOTAL TIME |
|-------------------------------|--------------|---------------|-------|----------------|------------------|-------------------|-------------------|---------|-------|------------|
| PENDING                       | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              | 0.00    | 0.00  | 0.00       |
| RUNNING                       | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              | 0.00    | 0.79  | 0.79       |
| STOP                          | 0.00         | 0.00          | 0.00  | 0.00           | 0.00             | 0.00              | 0.00              | 0.00    | 0.00  | 0.01       |
| TOTAL TIME                    | 0.00         | 0.00          | 0.00  | 0.00           | 0.00             | 0.00              | 0.00              | 0.00    | 0.79  | 0.79       |



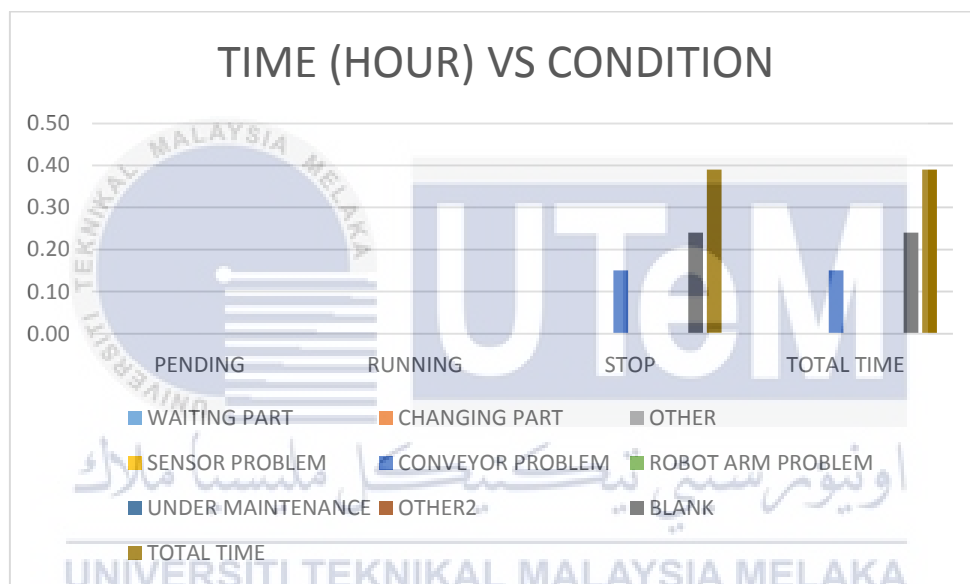
| DATE:22.8.2016 - 23.8.2016 |                  |                |         |             |
|----------------------------|------------------|----------------|---------|-------------|
|                            | CONVEYOR PROBLEM | SENSOR PROBLEM | (blank) | Grand Total |
| 16-08-22                   | 3909             | 1629           | 8654    | 14192       |
| PENDING                    |                  |                | 53      | 53          |
| RUNNING                    |                  |                | 8597    | 8597        |
| STOP                       | 3909             | 1629           | 4       | 5542        |
| 16-08-23                   | 905              |                | 1464    | 2369        |
| PENDING                    |                  |                | 1464    | 1464        |
| STOP                       | 905              |                |         | 905         |
| Grand Total                | 4814             | 1629           | 10118   | 16561       |



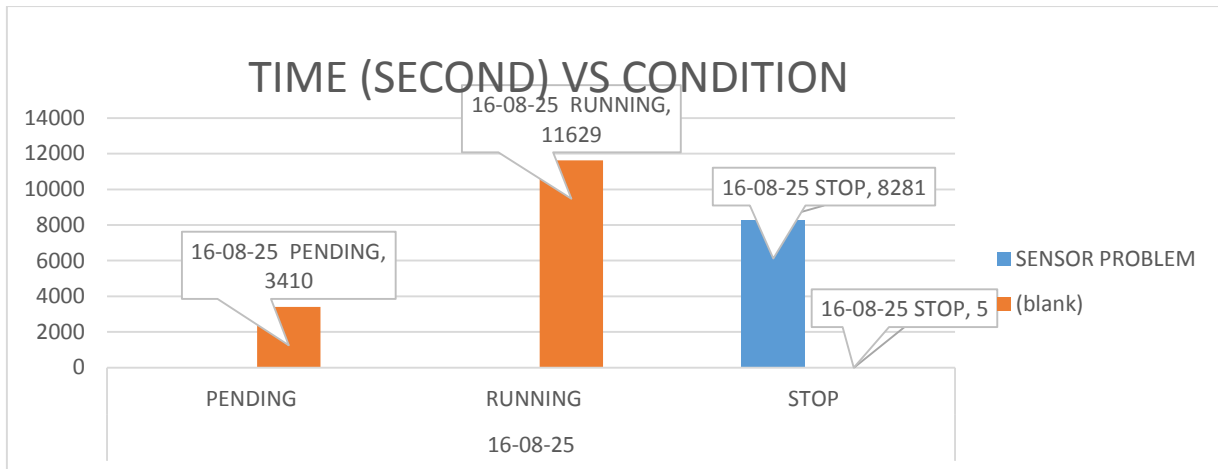
| DATE:<br>22.8.20 | WAITI<br>NG<br>(HOUR<br>) | CHANG<br>ING<br>PART | OTHER | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
|------------------|---------------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| PENDI<br>NG      | 0.00                      | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.10  | 0.10          |
| RUNNI<br>NG      | 0.00                      | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 2.23  | 2.23          |
| STOP             | 0.00                      | 0.00                 | 0.00  | 0.27                      | 1.05                        | 0.00                        | 0.00                         | 0.00       | 0.07  | 1.39          |
| TOTAL<br>TIME    | 0.00                      | 0.00                 | 0.00  | 0.27                      | 1.05                        | 0.00                        | 0.00                         | 0.00       | 2.40  | 3.72          |



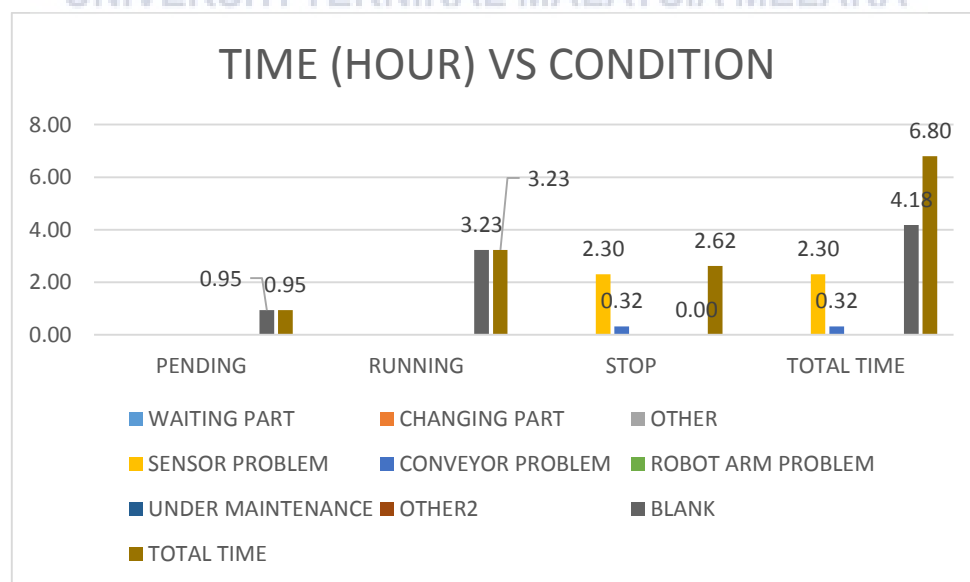
| DATE:<br>23.8.2016<br>(HOUR ) | WAITING PART | CHANGING PART | OTHER | SENSOR PROBLEM | CONVEYOR PROBLEM | ROBOT ARM PROBLEM | UNDER MAINTENANCE | OTHER 2 | BLANK | TOTAL TIME |
|-------------------------------|--------------|---------------|-------|----------------|------------------|-------------------|-------------------|---------|-------|------------|
| PENDING                       | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              |         |       | 0.00       |
| RUNNING                       | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              |         |       | 0.00       |
| STOP                          | 0.00         | 0.00          | 0.00  |                | 0.15             | 0.00              | 0.00              |         | 0.24  | 0.39       |
| TOTAL TIME                    | 0.00         | 0.00          | 0.00  | 0.00           | 0.15             | 0.00              | 0.00              | 0.00    | 0.24  | 0.39       |



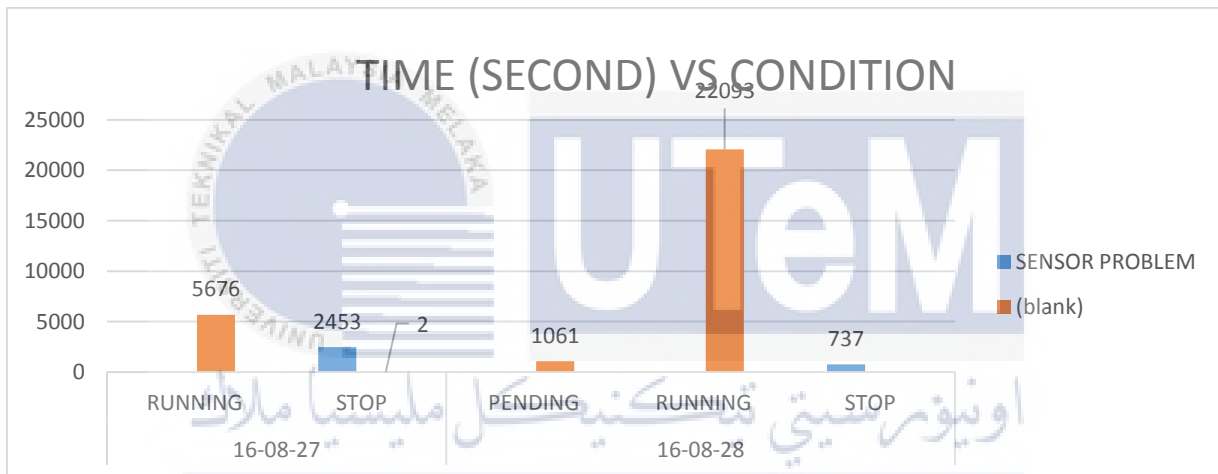
| DATE:<br>25.8.2016 | 25<br>SENSOR<br>PROBLEM | (blank) | Grand Total |
|--------------------|-------------------------|---------|-------------|
| 16-08-25           | 8281                    | 15044   | 23325       |
| PENDING            |                         | 3410    | 3410        |
| RUNNING            |                         | 11629   | 11629       |
| STOP               | 8281                    | 5       | 8286        |
| Grand Total        | 8281                    | 15044   | 23325       |



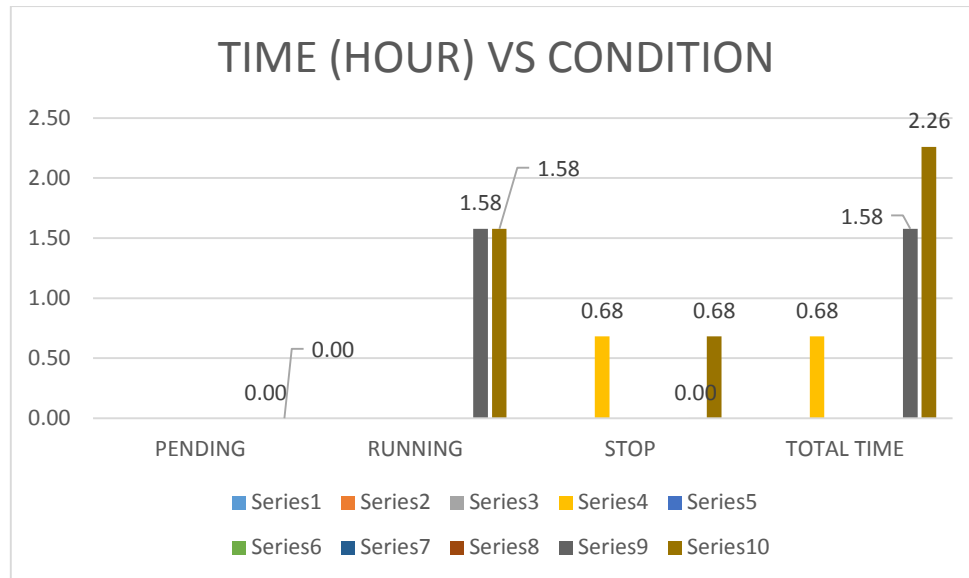
|                                   |                     |                      |       |                           |                             |                             |                              |            |       |               |
|-----------------------------------|---------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| DATE:<br>25.8.20<br>16<br>(HOUR ) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
| PENDI<br>NG                       | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.95  | 0.95          |
| RUNNI<br>NG                       | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 3.23  | 3.23          |
| STOP                              | 0.00                | 0.00                 | 0.00  | 2.30                      | 0.32                        | 0.00                        | 0.00                         | 0.00       | 0.00  | 2.62          |
| TOTAL<br>TIME                     | 0.00                | 0.00                 | 0.00  | 2.30                      | 0.32                        | 0.00                        | 0.00                         | 0.00       | 4.18  | 6.80          |



|                                   |                            |         |             |
|-----------------------------------|----------------------------|---------|-------------|
| DATE:<br>27.8.2016 -<br>28.8.2016 |                            |         |             |
|                                   | 27-28<br>SENSOR<br>PROBLEM | (blank) | Grand Total |
| 16-08-27                          | 2453                       | 5678    | 8131        |
| RUNNING                           |                            | 5676    | 5676        |
| STOP                              | 2453                       | 2       | 2455        |
| 16-08-28                          | 737                        | 23154   | 23891       |
| PENDING                           |                            | 1061    | 1061        |
| RUNNING                           |                            | 22093   | 22093       |
| STOP                              | 737                        |         | 737         |
| Grand Total                       | 3190                       | 28832   | 32022       |

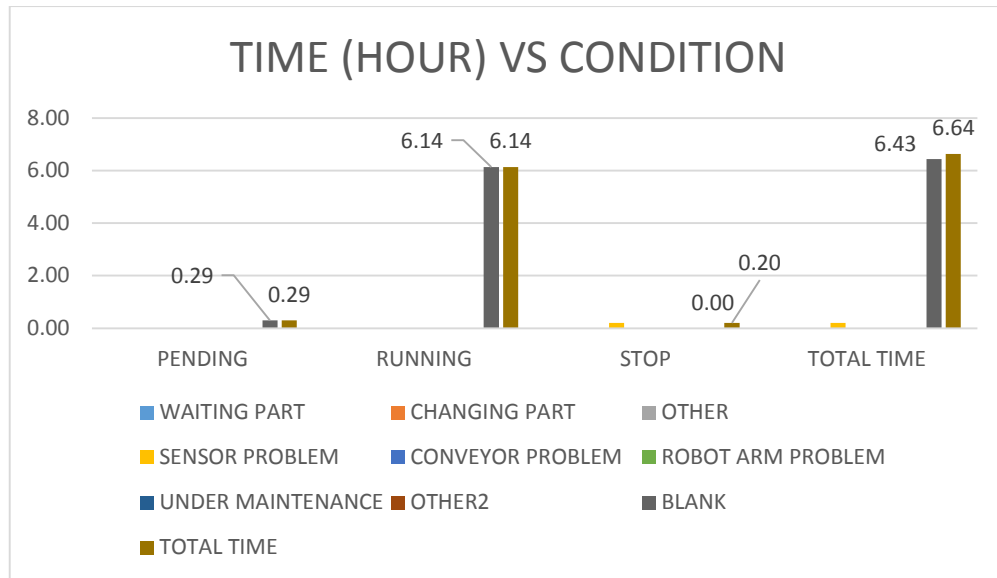


| DATE:<br>27.8.2016 |              |               |       |                |                  |                   |                   |         |       |            |
|--------------------|--------------|---------------|-------|----------------|------------------|-------------------|-------------------|---------|-------|------------|
| (HOUR )            | WAITING PART | CHANGING PART | OTHER | SENSOR PROBLEM | CONVEYOR PROBLEM | ROBOT ARM PROBLEM | UNDER MAINTENANCE | OTHER 2 | BLANK | TOTAL TIME |
| PENDING            | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              | 0.00    | 0.00  | 0.00       |
| RUNNING            | 0.00         | 0.00          | 0.00  |                |                  | 0.00              | 0.00              | 0.00    | 1.58  | 1.58       |
| STOP               | 0.00         | 0.00          | 0.00  | 0.68           |                  | 0.00              | 0.00              | 0.00    | 0.00  | 0.68       |
| TOTAL TIME         | 0.00         | 0.00          | 0.00  | 0.68           | 0.00             | 0.00              | 0.00              | 0.00    | 1.58  | 2.26       |



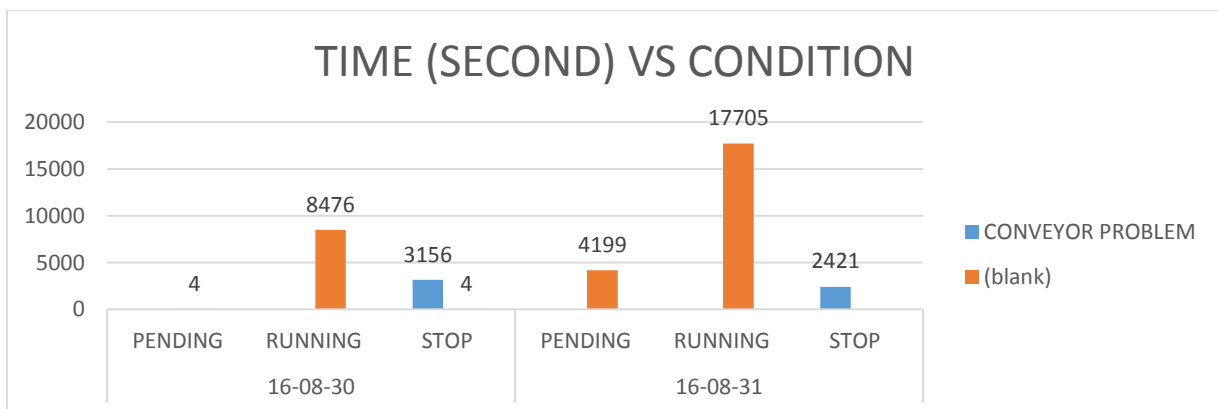
| DATE:<br>28.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.29  | 0.29          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00  |                           |                             | 0.00                        | 0.00                         | 0.00       | 6.14  | 6.14          |
| STOP                                 | 0.00                | 0.00                 | 0.00  | 0.20                      |                             | 0.00                        | 0.00                         | 0.00       | 0.00  | 0.20          |
| TOTAL<br>TIME                        | 0.00                | 0.00                 | 0.00  | 0.20                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 6.43  | 6.64          |



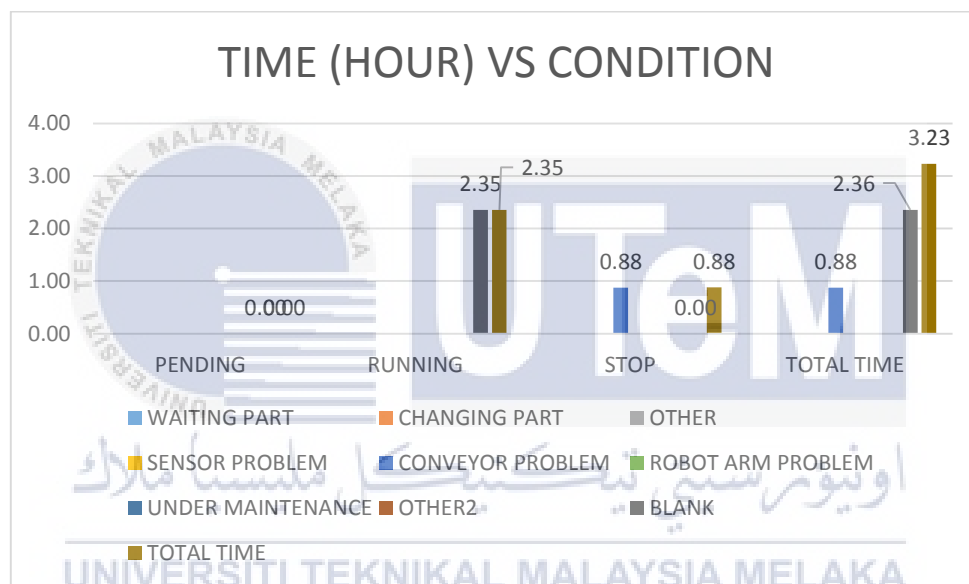


**DATE:**  
30.8.2016 - 31.8.2016

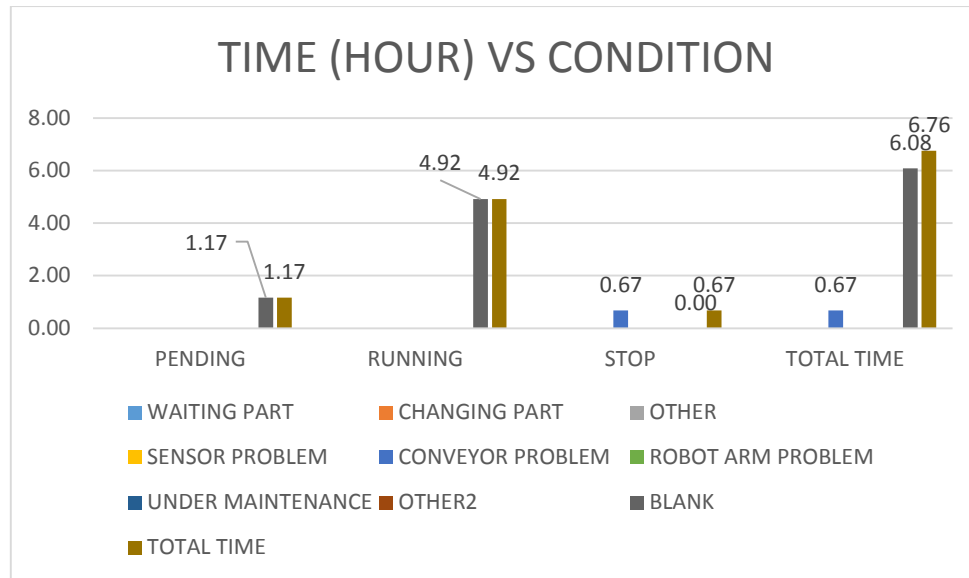
|                    | CONVEYOR PROBLEM | (blank)      | Grand Total  |
|--------------------|------------------|--------------|--------------|
| <b>16-08-30</b>    | <b>3156</b>      | <b>8484</b>  | <b>11640</b> |
| PENDING            |                  | 4            | 4            |
| RUNNING            |                  | 8476         | 8476         |
| STOP               | 3156             | 4            | 3160         |
| <b>16-08-31</b>    | <b>2421</b>      | <b>21904</b> | <b>24325</b> |
| PENDING            |                  | 4199         | 4199         |
| RUNNING            |                  | 17705        | 17705        |
| STOP               | 2421             |              | 2421         |
| <b>Grand Total</b> | <b>5577</b>      | <b>30388</b> | <b>35965</b> |



| DATE:<br>30.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER       | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK       | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.00          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 2.35        | 2.35          |
| STOP                                 | 0.00                | 0.00                 | 0.00        | 0.00                      | 0.88                        | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.88          |
| TOTAL<br>TIME                        | 0.00                | 0.00                 | <b>0.00</b> | <b>0.00</b>               | <b>0.88</b>                 | 0.00                        | 0.00                         | 0.00       | <b>2.36</b> | <b>3.23</b>   |



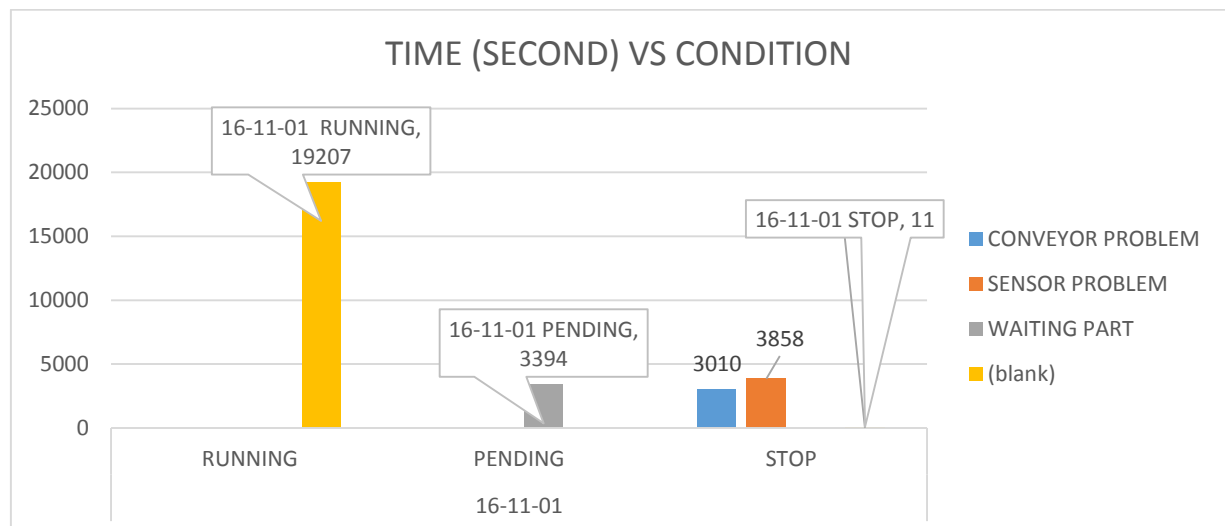
| DATE:<br>31.8.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER       | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK       | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------------|---------------|
| PENDI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 1.17        | 1.17          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00        |                           |                             | 0.00                        | 0.00                         | 0.00       | 4.92        | 4.92          |
| STOP                                 | 0.00                | 0.00                 | 0.00        | 0.00                      | 0.67                        | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.67          |
| TOTAL<br>TIME                        | 0.00                | 0.00                 | <b>0.00</b> | <b>0.00</b>               | <b>0.67</b>                 | 0.00                        | 0.00                         | 0.00       | <b>6.08</b> | <b>6.76</b>   |



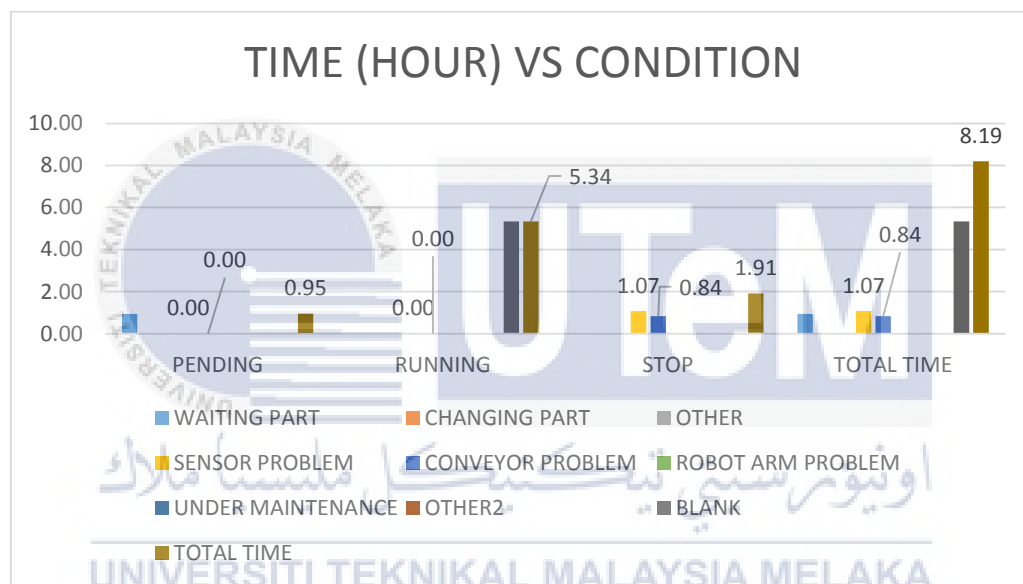
**NOVEMBER 2016**

**DATE:  
1.11.2016**

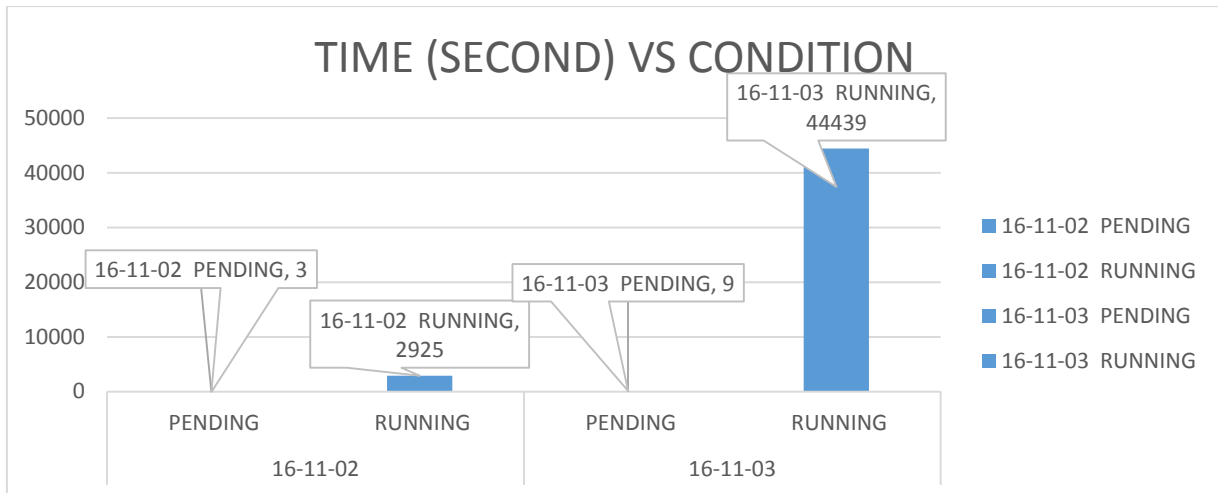
| Row Labels  | CONVEYOR PROBLEM | SENSOR PROBLEM | WAITING PART (blank) | Grand Total |
|-------------|------------------|----------------|----------------------|-------------|
| 16-11-01    | 3010             | 3858           | 3394                 | 19218       |
| RUNNING     |                  |                |                      | 19207       |
| PENDING     |                  |                | 3394                 | 3394        |
| STOP        | 3010             | 3858           |                      | 11          |
| Grand Total | 3010             | 3858           | 3394                 | 19218       |



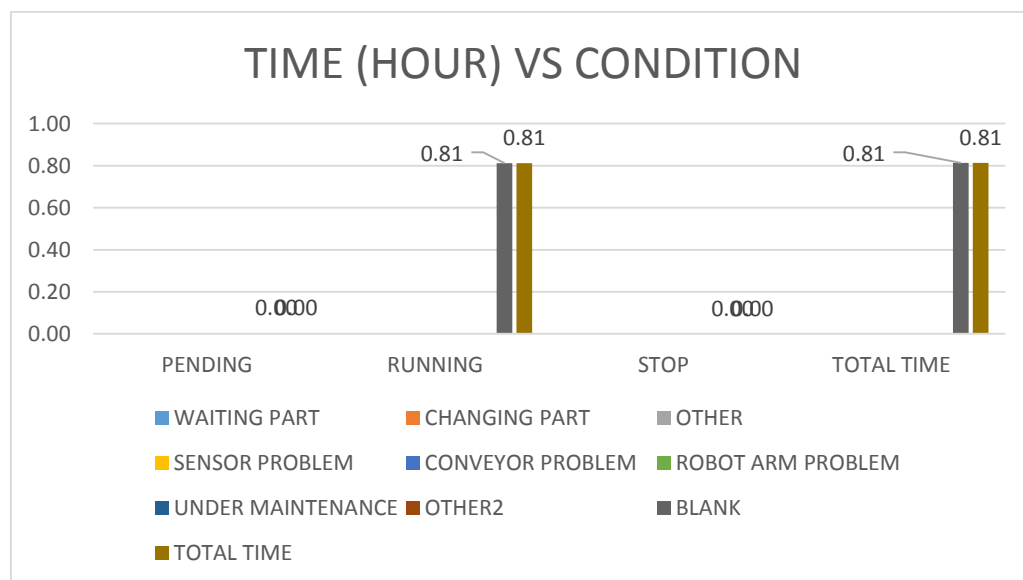
| DATE:<br>01.11.2016<br>(HOUR) | WAITING PART | CHANGING PART | OTHER | SENSOR PROBLEM | CONVEYOR PROBLEM | ROBOT ARM PROBLEM | UNDER MAINTENANCE | OTHER 2 | BLANK | TOTAL TIME |
|-------------------------------|--------------|---------------|-------|----------------|------------------|-------------------|-------------------|---------|-------|------------|
| PENDING                       | 0.94         | 0.00          | 0.00  | 0.00           | 0.00             | 0.00              | 0.00              | 0.00    | 0.01  | 0.95       |
| RUNNING                       | 0.00         | 0.00          | 0.00  | 0.00           | 0.00             | 0.00              | 0.00              | 0.00    | 5.34  | 5.34       |
| STOP                          | 0.00         | 0.00          | 0.00  | 1.07           | 0.84             | 0.00              | 0.00              | 0.00    | 0.00  | 1.91       |
| TOTAL TIME                    | 0.94         | 0.00          | 0.00  | 1.07           | 0.84             | 0.00              | 0.00              | 0.00    | 5.34  | 8.19       |



| DATE: 02.11.2016 - 03.11.2016 |         |              |              |
|-------------------------------|---------|--------------|--------------|
|                               | (blank) | Grand Total  |              |
| <b>16-11-02</b>               |         | <b>2928</b>  | <b>2928</b>  |
| PENDING                       |         | 3            | 3            |
| RUNNING                       |         | 2925         | 2925         |
| <b>16-11-03</b>               |         | <b>44448</b> | <b>44448</b> |
| PENDING                       |         | 9            | 9            |
| RUNNING                       |         | 44439        | 44439        |
| <b>Grand Total</b>            |         | <b>47376</b> | <b>47376</b> |

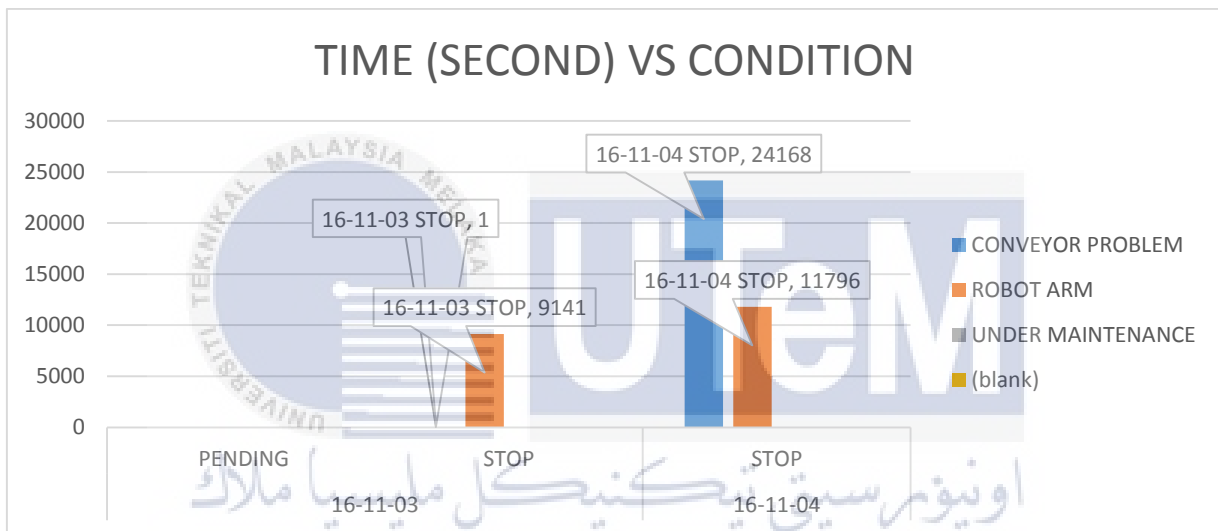


| <div> <div>DATE: 2.11.20</div> <div>16</div> <div>(HOUR )</div> </div> |                |       |                  |                    |                    |                     |         |       |            |      |
|------------------------------------------------------------------------|----------------|-------|------------------|--------------------|--------------------|---------------------|---------|-------|------------|------|
| WAITI NG PART                                                          | CHANG ING PART | OTHER | SENSE R PROBL EM | CONVE YOR PROBL EM | ROBOT ARM PROBL EM | UNDER MAINT ENANC E | OTHER 2 | BLANK | TOTAL TIME |      |
| PENDI NG                                                               | 0.00           | 0.00  | 0.00             | 0.00               | 0.00               | 0.00                | 0.00    | 0.00  | 0.00       | 0.00 |
| RUNNI NG                                                               | 0.00           | 0.00  | 0.00             | 0.00               | 0.00               | 0.00                | 0.00    | 0.81  | 0.81       | 0.81 |
| STOP                                                                   | 0.00           | 0.00  | 0.00             | 0.00               | 0.00               | 0.00                | 0.00    | 0.00  | 0.00       | 0.00 |
| TOTAL TIME                                                             | 0.00           | 0.00  | 0.00             | 0.00               | 0.00               | 0.00                | 0.00    | 0.81  | 0.81       | 0.81 |



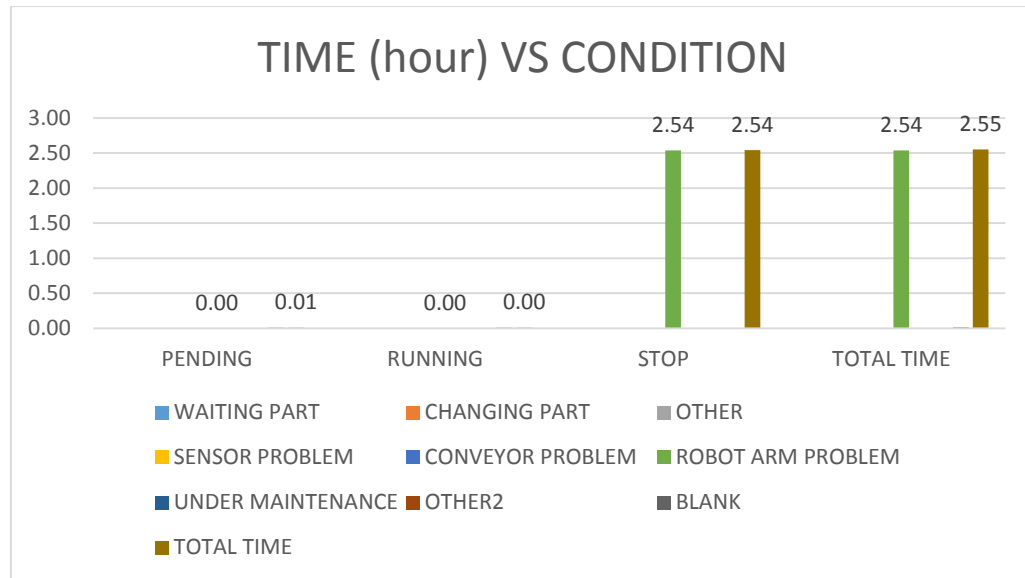
DATE:  
03.11.2016 -  
04.11.2016

|             | CONVEYOR<br>PROBLEM | ROBOT ARM | UNDER<br>MAINTENANCE | (blank) | Grand Total |
|-------------|---------------------|-----------|----------------------|---------|-------------|
| 16-11-03    | 1                   | 9141      |                      | 44      | 9186        |
| PENDING     |                     |           |                      | 27      | 27          |
| STOP        | 1                   | 9141      |                      | 17      | 9159        |
| 16-11-04    | 24168               | 11796     | 1                    |         | 35965       |
| STOP        | 24168               | 11796     | 1                    |         | 35965       |
| Grand Total | 24169               | 20937     | 1                    | 44      | 45151       |

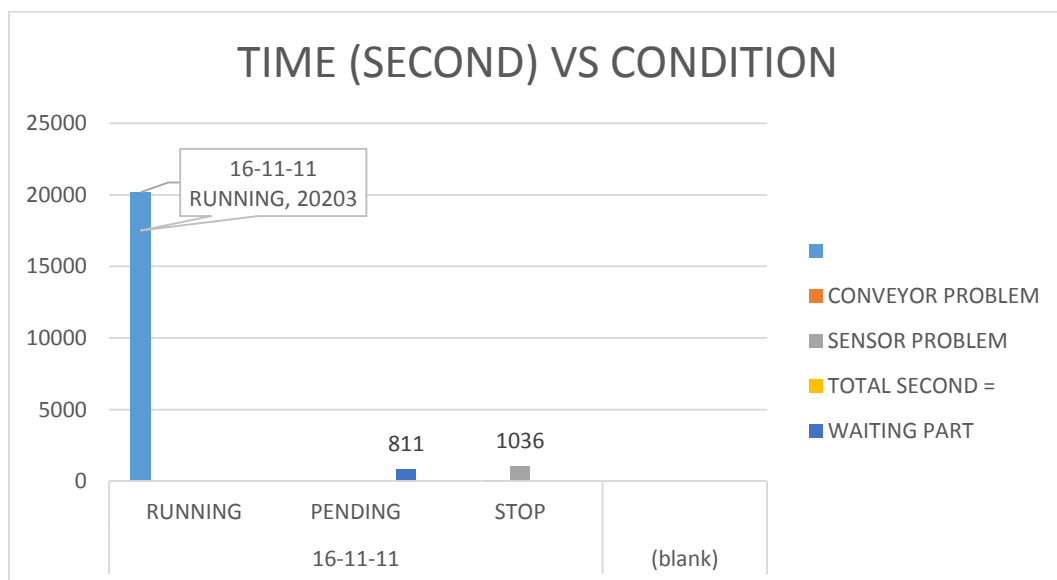


UNIVERSITI TEKNIKAL MALAYSIA MELAKA

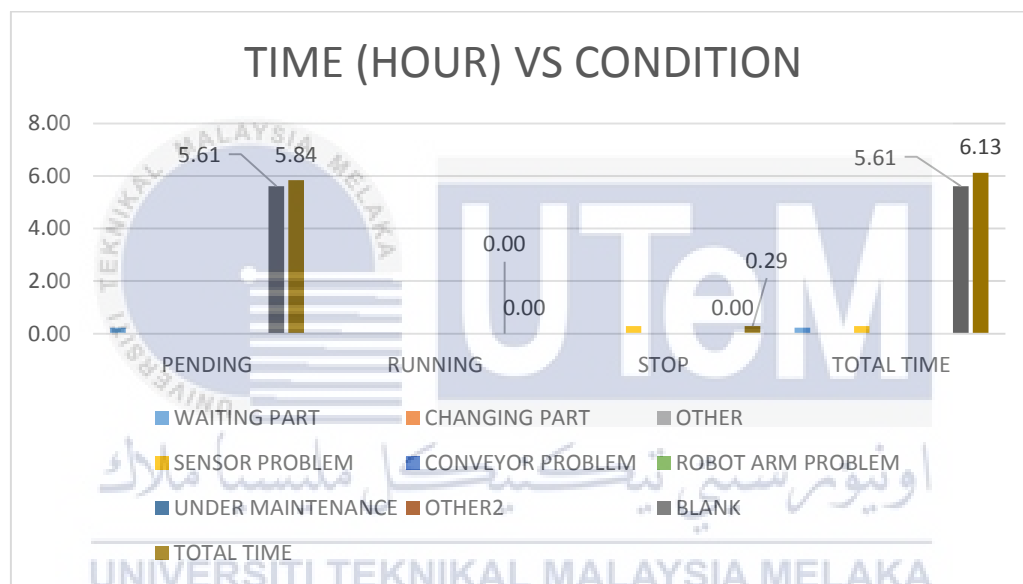
| DATE:<br>3.11.2016 | WAITING<br>PART | CHANGING<br>PART | OTHER | SENSOR<br>PROBLEM | CONVEYOR<br>PROBLEM | ROBOT<br>ARM<br>PROBLEM | UNDER<br>MAINTENANCE | OTHER<br>2 | BLANK | TOTAL<br>TIME |
|--------------------|-----------------|------------------|-------|-------------------|---------------------|-------------------------|----------------------|------------|-------|---------------|
| PENDING            | 0.00            | 0.00             | 0.00  | 0.00              | 0.00                | 0.00                    | 0.00                 | 0.00       | 0.01  | 0.01          |
| RUNNING            | 0.00            | 0.00             | 0.00  | 0.00              | 0.00                | 0.00                    | 0.00                 | 0.00       | 0.00  | 0.00          |
| STOP               | 0.00            | 0.00             | 0.00  | 0.00              | 0.00                | 2.54                    | 0.00                 | 0.00       | 0.00  | 2.54          |
| TOTAL<br>TIME      | 0.00            | 0.00             | 0.00  | 0.00              | 0.00                | 2.54                    | 0.00                 | 0.00       | 0.01  | 2.55          |



| 11.11.2016  |                     |                   |                   |                 |             |  |
|-------------|---------------------|-------------------|-------------------|-----------------|-------------|--|
|             | CONVEYOR<br>PROBLEM | SENSOR<br>PROBLEM | TOTAL<br>SECOND = | WAITING<br>PART | Grand Total |  |
| 16-11-11    | 20203               | 3                 | 1036              | 811             | 22053       |  |
| RUNNING     | 20203               |                   |                   |                 | 20203       |  |
| PENDING     |                     |                   |                   | 811             | 811         |  |
| STOP        |                     | 3                 | 1036              |                 | 1039        |  |
| (blank)     |                     |                   |                   |                 |             |  |
| Grand Total | 20203               | 3                 | 1036              | 811             | 22053       |  |

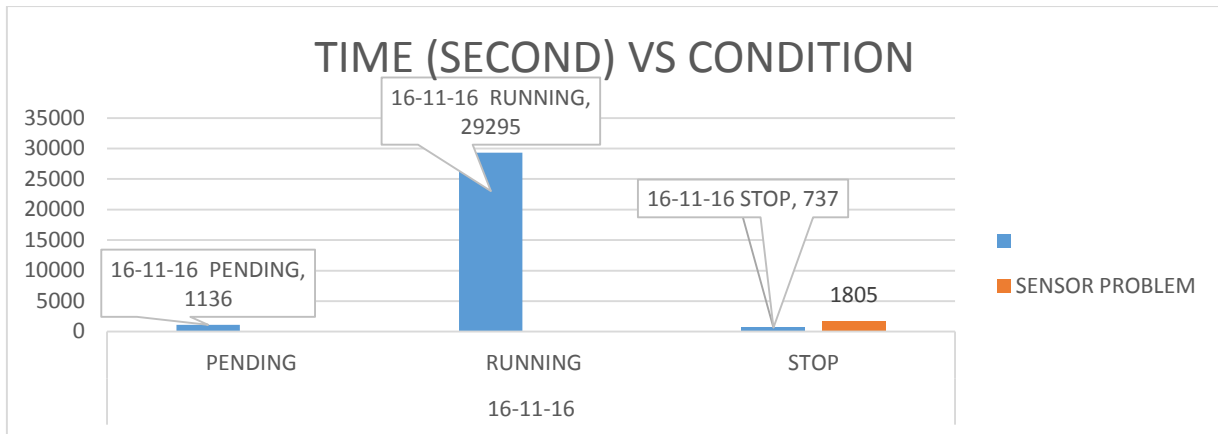


| DATE:<br>3.11.20<br>16<br>(HOUR<br>) | WAITI<br>NG<br>PART | CHANG<br>ING<br>PART | OTHER       | SENSO<br>R<br>PROBL<br>EM | CONVE<br>YOR<br>PROBL<br>EM | ROBOT<br>ARM<br>PROBL<br>EM | UNDER<br>MAINT<br>ENANC<br>E | OTHER<br>2 | BLANK       | TOTAL<br>TIME |
|--------------------------------------|---------------------|----------------------|-------------|---------------------------|-----------------------------|-----------------------------|------------------------------|------------|-------------|---------------|
| PENDI<br>NG                          | 0.23                | 0.00                 | 0.00        | 0.00                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 5.61        | 5.84          |
| RUNNI<br>NG                          | 0.00                | 0.00                 | 0.00        | 0.00                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.00          |
| STOP                                 | 0.00                | 0.00                 | 0.00        | 0.29                      | 0.00                        | 0.00                        | 0.00                         | 0.00       | 0.00        | 0.29          |
| TOTAL<br>TIME                        | 0.23                | 0.00                 | <b>0.00</b> | <b>0.29</b>               | <b>0.00</b>                 | 0.00                        | 0.00                         | 0.00       | <b>5.61</b> | <b>6.13</b>   |

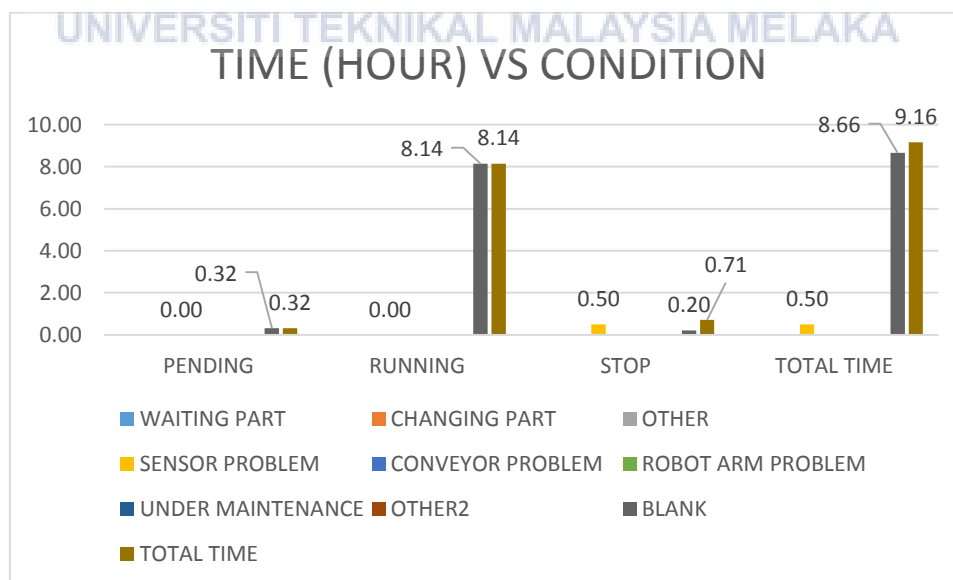


| 16.11.2016         |                |             |              |
|--------------------|----------------|-------------|--------------|
|                    | SENSOR PROBLEM |             | Grand Total  |
| <b>16-11-16</b>    | <b>31168</b>   | <b>1805</b> | <b>32973</b> |
| PENDING            | 1136           |             | 1136         |
| RUNNING            | 29295          |             | 29295        |
| STOP               | 737            | 1805        | 2542         |
| <b>Grand Total</b> | <b>31168</b>   | <b>1805</b> | <b>32973</b> |



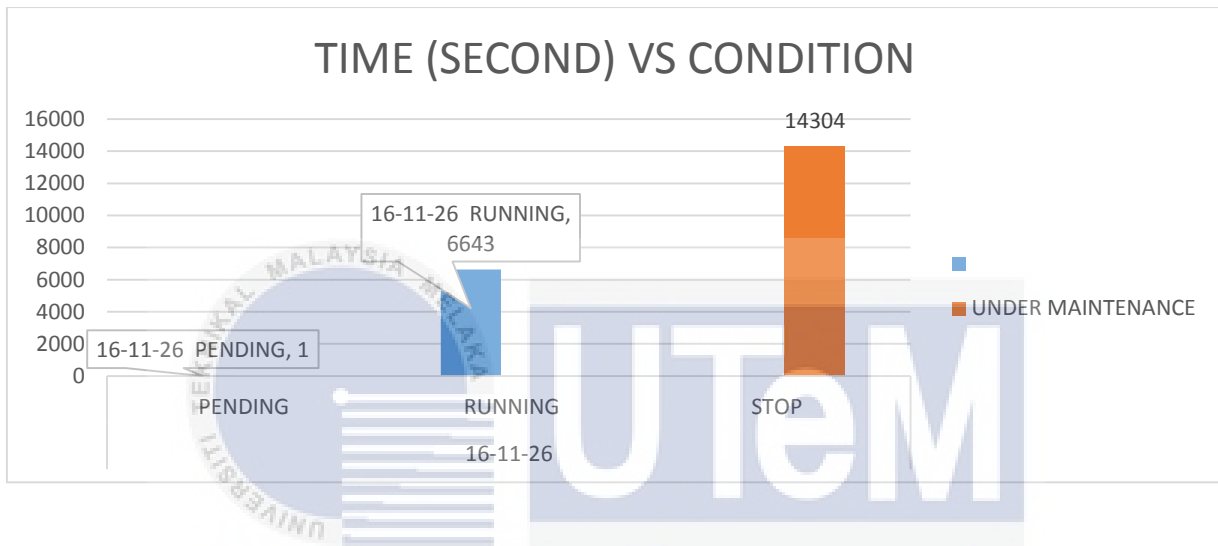


| DATE:   |       |       |       | SENSO | CONVE | ROBOT | UNDER |       |       | TOTAL |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 16.11.2 | WAITI | CHANG |       | R     | YOR   | ARM   | MAINT | OTHER | BLANK |       |
| (HOUR   | NG    | ING   |       | PROBL | PROBL | PROBL | ENANC |       |       |       |
| )       | PART  | PART  | OTHER | EM    | EM    | EM    | E     | 2     |       |       |
| PENDI   |       |       |       |       |       |       |       |       |       |       |
| NG      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.32  | 0.32  |
| RUNNI   |       |       |       |       |       |       |       |       |       |       |
| NG      | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 8.14  | 8.14  |
| STOP    | 0.00  | 0.00  | 0.00  | 0.50  | 0.00  | 0.00  | 0.00  | 0.00  | 0.20  | 0.71  |
| TOTAL   |       |       |       |       |       |       |       |       |       |       |
| TIME    | 0.00  | 0.00  | 0.00  | 0.50  | 0.00  | 0.00  | 0.00  | 0.00  | 8.66  | 9.16  |

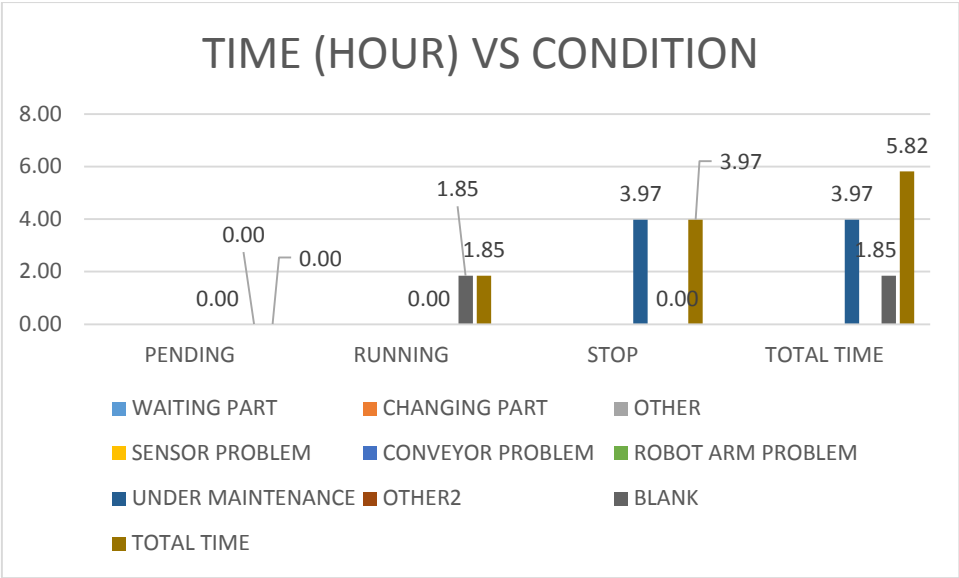


26.11.2016

|             |      | UNDER<br>MAINTENANCE | Grand Total |
|-------------|------|----------------------|-------------|
| 16-11-26    | 6644 | 14304                | 20948       |
| PENDING     | 1    |                      | 1           |
| RUNNING     | 6643 |                      | 6643        |
| STOP        |      | 14304                | 14304       |
| Grand Total | 6644 | 14304                | 20948       |



| DATE:<br>26.11.2016<br>(HOUR ) | WAITING PART | CHANGING PART | OTHER | SENSE PROBLEM | CONVEYOR PROBLEM | ROBOT ARM PROBLEM | UNDER MAINTENANCE | OTHER 2 | BLANK | TOTAL TIME |
|--------------------------------|--------------|---------------|-------|---------------|------------------|-------------------|-------------------|---------|-------|------------|
| PENDING                        | 0.00         | 0.00          | 0.00  | 0.00          | 0.00             | 0.00              | 0.00              | 0.00    | 0.00  | 0.00       |
| RUNNING                        | 0.00         | 0.00          | 0.00  | 0.00          | 0.00             | 0.00              | 0.00              | 0.00    | 1.85  | 1.85       |
| STOP                           | 0.00         | 0.00          | 0.00  | 0.00          | 0.00             | 0.00              | 3.97              | 0.00    | 0.00  | 3.97       |
| TOTAL TIME                     | 0.00         | 0.00          | 0.00  | 0.00          | 0.00             | 0.00              | 3.97              | 0.00    | 1.85  | 5.82       |





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