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NATIONAL APPRENTICE AND INDUSTRIAL TRAINING AUTHORITY



DAILY DIARY
UNDERGRADUATE / DIPLOMA / CERTIFICATE
INDUSTRIAL TRAINING

APPRENTICE'S DAILY DIARY

Name :..... BIMALKA PIYARUWAN THALAGALA

Apprentice's Private Address : 326/2, Kandahena, Dedigamuwa.

Contact Phone Number : 0750296594 / 0112 141148

Category : Degree (B.Sc. Engg.) Specialist Industrial Training

Field / Trade of Training : Electronic and Telecommunication Engineering

Registration Number given by the University/Institute/College : 180631J

Registration Number given by the NAITA : -

Name of Training Establishment : (1) L.E. Robotics (Pvt.) Ltd.

Period of Training: From : 04/01/2022 To : 20/06/2022

(2).....

From : To :

NOVATION

Name and Address of Establishment	Workshops/ Worksites	Period		Signature of Officer In Charge (With Rubber Stamp)	Designation
		From	To		
LE Robotics (Pvt) Ltd. 100/4, Divulapitiya Rd, Minuwangoda	-Do-	04/01/ 2022	20/06/ 2022	L.E. ROBOTICS (PVT.) LTD. Lakoni Engineer - In - Charge	

WEEK NO: 01

FOR THE WEEK ENDING

Sunday..09/01/2022.....

TRAINING LOCATION

LE Robotics (Pvt) Ltd.

DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday		
Tuesday	01/03	<ul style="list-style-type: none"> * A brief introduction about the company, including history, progress and current status was given. * Observed the machines used in industrial robot arm manufacturing (Lathe/milling /computer numerical control [CNC])
Wednesday	01/04	<ul style="list-style-type: none"> * Responsibilities and tasks were assigned to each trainee. * Initiated the feasibility study of the task "Machine vision based Real time trajectory generation". * Learnt the basics of robot arm motion planning.
Thursday	01/05	<ul style="list-style-type: none"> * Investigated the tradeoffs between traditional and Deep Learning based Machine Vision algorithms in resource constrained environment. * Referred several research and conference papers.
Friday	01/06	<ul style="list-style-type: none"> * A discussion was carried out about Non-Disclosure Agreements (NDA) and Intellectual Property (IP) of a company * Review a source code written in "C" programming language to identify best practices in codebase maintenance.
Saturday	01/07	
Sunday	01/08	
	01/09	

} - Weekend -

DETAILS AND NOTES OF WORK CARRIED OUT, PROBLEMS ENCOUNTERED AND HOW SOLVED ETC., DIMENSIONS AND SKETCHES TO BE GIVEN WHEREVER POSSIBLE

The task that was assigned : Machine vision based Real time Trajectory generation for an industrial articulated / SCARA robot arm.

Primary task carried out : Feasibility study of the different algorithms to achieve the object detection portion of the above task.

* During the feasibility study two main approaches for object detection was identified.

1. Traditional machine vision algorithms.

2. Deep Learning based Machine vision algorithms

* The inevitable tradeoff between accuracy and the speed was identified as the primary concern when choosing an algorithm for the object detection, when it comes to resource constrained embedded systems.

* Therefore, it was decided to incorporate a traditional machine vision approach to address the object detection problem, as those algorithms are optimized for performance and minimum computing resource when it is compared with deep learning based algorithms.

* A documentation was initiated to document the feasibility study and the progress.

Niyerum

SIGNATURE OF TRAINEE

REMARKS AND CERTIFICATION BY THE ENGINEER /T.O

satisfactory.

L.E. ROBOTICS (PVT.) LTD.

Lakshmi

Engineer - In - Charge

DATE : 12/01/2022

DESIGNATION AND SIGNATURE

FOR THE WEEK ENDING

Sunday..... 16 / 01 / 2022

TRAINING LOCATION

LF Robotics (Pvt) Ltd.

DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	01 / 10	* A discussion was carried out about commercialisation a product which involves Intellectual Property (IP) of a company * * Feasibility study was continued and finalized one algorithm.
Tuesday	01 / 11	* A presentation about "Non-Disclosure agreements" was prepared to present in front of the trainees of LF Robotics. * Further documentation of the selected object detection algorithm was added.
Wednesday	01 / 12	* Learnt about, how to choose a suitable hardware platform for a given embedded system. * A discussion was carried out about optimising designing optimal hardware architecture for a given algorithm.
Thursday	01 / 13	* Initiated implementing an algorithm for a research paper named as "Topological Structural Analysis of Digitized binary Images by border following" from
Friday	01 / 14	— Tamil Thai Pongal Day. —
Saturday	01 / 15	—
Sunday	01 / 16	—

DETAILS AND NOTES OF WORK CARRIED OUT, PROBLEMS ENCOUNTERED AND HOW SOLVED ETC., DIMENSIONS AND SKETCHES TO BE GIVEN WHEREVER POSSIBLE

Primary Task Carried out } = Learnt about how to select a proper hardware platform (processor) which is suitable and optimal for a given algorithm. optimal in the sense- with minimum execution time and minimum cost.

Detailed description of the steps to follow

- ③ Select an algorithm which is suitable for the given task.
 - ④ Investigate the modules and the most fundamental functions that the algorithm composed of.
 - ⑤ Find out the types of most basic operations that are used inside those modules/functions. (addition / multiplication / floating point operation)
 - ⑥ Compute the time complexity according to those basic operations.
 - ⑦ Select a processor which has a sufficient "clock rate" to run the algorithm within the desired time durations (real time.)
- # Problems encountered: Finding related research papers of functions inside "OpenCV" python library
* Solved the problem by finding the paperwork
tracing the function descriptions in OpenCV documentations!

REMARKS AND CERTIFICATION BY THE ENGINEER /T.O

satisfactory, focus on proper grammatical usage

L.E. ROBOTICS (PVT.) LTD.

J. Lakshmi

Engineer - In - Charge

DATE : 18/01/2022

DESIGNATION AND SIGNATURE

WEEK NO:Q3.....

FOR THE WEEK ENDING

Sunday 23 / 01 / 2022

TRAINING LOCATION

LF Robotics (Pvt) Ltd.

DAY		BRIEF DESCRIPTION OF THE WORK CARRIED OUT				
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
					- Duruthu Full moon Poya Day -	
					* continued the implementation of contour finding algorithm described in the paper "Topological structural analysis of digitized binary images by border following."	
					- Study leave for semester 5 end of Semester - exams	
					- study leave for semester 5 end of Semester - exams.	
					* Implemented and debugged linked List data structure using C language which is required for further implementation of the algorithm(mentioned above).	
					—	
					—	

DETAILS AND NOTES OF WORK CARRIED OUT, PROBLEMS ENCOUNTERED AND HOW SOLVED ETC., DIMENSIONS AND SKETCHES TO BE GIVEN WHEREVER POSSIBLE

Primary task carried out in 7th the week

TE. ROBOTICS (PVT) LTD

Engineer - II - Class

Continued the implementation of algorithm from the paper mentioned above.



University of Moratuwa

Department of Electronic and Telecommunication Engineering

February 17, 2022

Dear Sir or Madam,

Compensation for Leaves Taken to Sit for Exams During Industrial Training

Thank you for offering industrial training for the students at the Department of Electronic and Telecommunication Engineering, University of Moratuwa.

With reference to the letter dated January 12, 2022, thank you for granting leave (leave on the exam dates and one day prior to each exam as study leave) for the students to complete the Semester 5 exams as per the schedule mentioned below.

Module	Date
Applied statistics	20 January 2022
Numerical methods	22 January 2022
Industrial management	24 January 2022
Multidisciplinary design, innovation and venture creation	26 January 2022
Business economics and financial accounting	28 January 2022

This is to confirm that the leave the interns took for exams can be compensated after the official 24-week internship period is complete.

Thank you.

Yours sincerely,

Dr. Ranga Rodrigo
Head of the Department
head-entc@uom.lk
+94 11 264 0416

Problems encountered: Struggled to solve debug a C program which involved pointers.

Problems encountered: struggled to solve a bug which involved manipulation of pointers in C language

Later it was realized that ~~the~~ time the bug was due to the lack of knowledge of a life time of a variable ~~within~~ within different scopes.

The bug was solved using pointers of pointers!

The concepts of pass by value, pass by reference were deeply studied in regard to function calls in C language.

Jignesh
SIGNATURE OF TRAINEE

REMARKS AND CERTIFICATION BY THE ENGINEER /T.O

Satisfactory

L.E. ROBOTICS (PVT.) LTD.

Jakande

Engineer - In - Charge

DATE : 01/02/2022

DESIGNATION AND SIGNATURE

FOR THE WEEK ENDING

Sunday 30.01.2022

TRAINING LOCATION

LF Robotics (Pvt) Ltd.

DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	01/24	- Study leave for Semester 5 end of semester - exams
Tuesday	01/25	* Implemented part of the algorithm mentioned in previous week, in order to find the first nonzero pixel of a moore neighbourhood of a given pixel. * Implemented & optimized the same using enumerators in C language.
Wednesday	01/26	* Implemented border following algorithm part of the main algorithm and debugged it for the border traversing concepts of moore neighborhood was used because was used back to back
Thursday	01/27	* The algorithm from the paper "Topological Structural Analysis of digitized binary images" was completed to a satisfactory level. + Debugged the algorithm using test images.
Friday	01/28	* Carried out timing comparisons of the algorithm using different algorithms (C & python) * Observed how efficient the "opencv" python library functions with respect to the algorithm developed by me.
Saturday	01/29	—
Sunday	01/30	—

DETAILS AND NOTES OF WORK CARRIED OUT, PROBLEMS ENCOUNTERED AND HOW SOLVED ETC., DIMENSIONS AND SKETCHES TO BE GIVEN WHEREVER POSSIBLE

Primary Work carried out : Completion of the main algorithm of the paper "Topological Structural Analysis of a digitized binary images by border following", by adding the border following algorithm to the main algorithm.

* The concept of Moore neighbourhood of a pixel was used when implementing the "border following" part of the main algorithm. The pixels indexed

1, 2, 3, 4, 5, 6, 7, and 8

1	2	3
8	/ / /	4
7	6, 5	

center pixel

Moore neighbourhood of pixels indexed from 1 - 8 are known as the Moore neighbourhood of a pixel. This concept has variety of applications in the computer vision literature.

* Calculating time it takes to execute a function call in Python: This time can not be accurately calculated if we use only a single function call to measure it. As the reason for that frequent shifts between processes of an operating system can be shown.

Soln: Run the function call for PyCharm around (100-1000) times and get an average time of execution. That was found to be consistent over time.

REMARKS AND CERTIFICATION BY THE ENGINEER / T.O

Satisfactory, Good approach towards summarizing the work done & problems encountered.

DATE: 01/02/2022

L.E. ROBOTICS (PVT.) LTD

Lakshmi

Engineer - In - Charge

DESIGNATION AND SIGNATURE