



University of Moratuwa

Faculty of Engineering

BSc Eng Hons



THALAGALA B.P.

180631J

NO.326/2, KANDAHENA,
DEDIGAMUWA,
HOMAGAMA.



Valid until - Dec. 2022

Piyawatura
Holder's Signature
NIC No: 980822826V



Annex. D

CONTINUOUS ASSESSMENT REPORT

(See page 9 of Training Guideline Book for details)

#	Report Details							
1	Report Number	1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	
2	For the Duration	From	03	01	2022	To	30	01

#	Undergraduate's Details											
1	Name as per Register	Mr. / Ms. THALAGALA B. P.										
2	Index Number	180631J										
3	Discipline	BM <input type="checkbox"/>	CH <input type="checkbox"/>	CE <input type="checkbox"/>	CS <input type="checkbox"/>	EE <input type="checkbox"/>	EN <input checked="" type="checkbox"/>	ER <input type="checkbox"/>	ME <input type="checkbox"/>	MT <input type="checkbox"/>	TL <input type="checkbox"/>	TT <input type="checkbox"/>
4	Contact Phone Number	0750296594										
5	Email	180631j@uom.lk										
6	Personal Address During	326/2, Kandahena, DediGamuwa.										

#	Training Provider Details											
1	Training Provider's Name	L.E. Robotics (Pvt) Ltd.										
2	Address of Corporate Office	100/4, Divulapitiya Rd, Minuwangoda.										
3	Address of Worksite	100/4, Divulapitiya Rd, Minuwangoda.										
4	Nearest City to Worksite	Minuwangoda.										
5	Name of Supervisor	J. A. L. Jayasinghe										
6	Supervisor Position	Engineer In-charge										
7	Supervisor Phone No.	077-2716181										
8	Email	laknpej@lerobotics.lk										

Important Note!

A summary of undergraduate's work experience during the considered four (04) weeks period to be attached along with this duly filled Annex. Highlight any shortcomings, problems that the undergraduate experienced, if there were any, for the purpose of improving. Finally, make sure to attach completed assessment by the Supervisor (see overleaf).

Endorsement by the Undergraduate			
Signature of Undergraduate		Date	01/02/2022

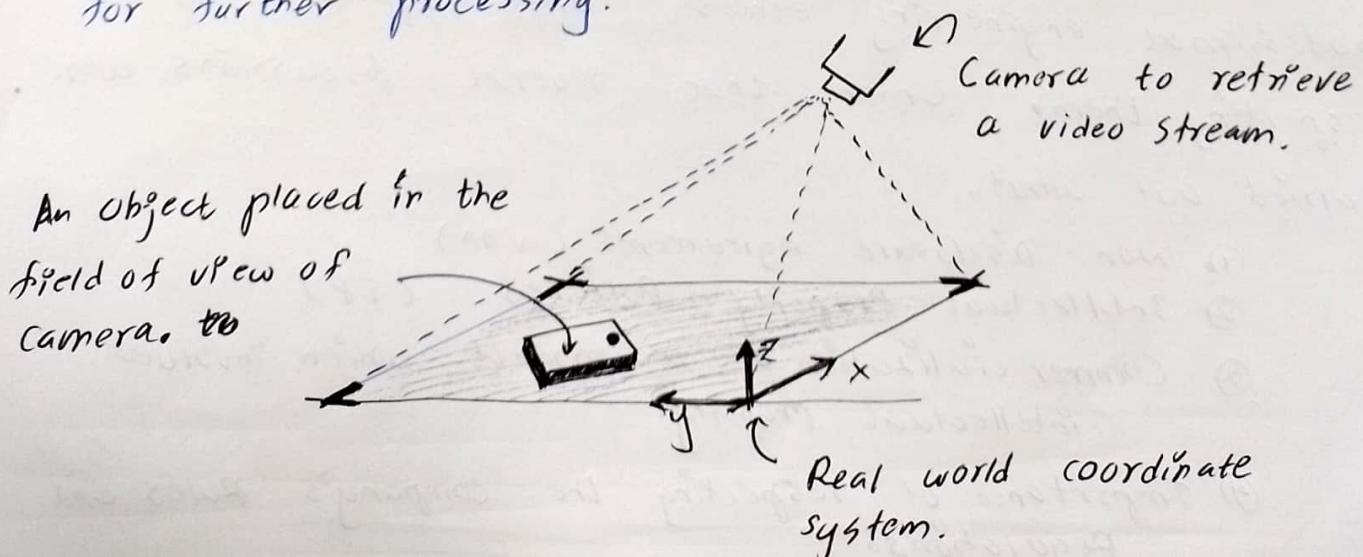
Supervisor's Assessment on Undergraduate						
[rate on a scale from 1 (Disagree) to 5 (Agree)]						
A	Behavioral:	1	2	3	4	5
1	Thinks independently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Takes initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Organized and manages time well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Results oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Ability to learn from all levels of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Technical:	1	2	3	4	5
1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C Any Other Remark: Satisfactory, can improve upon further exposure to industrial environment						
D	No. of Days of leave during 4-week period:	Authorized	3	Unauthorized	—	
E	Endorsement by the Supervisor:					
1	Name of the Supervisor	J.A.L. Jayasinghe		Official Stamp	L.E. ROBOTICS (PVT.) LTD.	
2	Position					
3	Signature			 John Jayasinghe Engineer - In - Charge	
4	Date	03 / 05 / 2022				

Summary of work experience - (report no:1)
From 03/01/2022 To 30/01/2022.

Week 01

In week 01 of the training period we were given some opportunity to be familiarize with the company and the environment. It mainly included getting to know about the history and the current status of the company, and ~~get to know~~ about the various machines that are required to manufacture ~~Robot~~ Industrial Robots. (mainly robot arms).

In addition to that we were assigned the projects that we will be working on, in the next couple of months. I was assigned a project known as, "Machine vision Based Real Time Trajectory Generation" which includes analyzing a video stream, identifying the objects in pre defined set of objects, estimating their locations with respect to the a known real world coordinate system and providing the mentioned details to the main Robot controller for further processing.



As I was assigned a complete project rather than a part of another big project, I could gain the experience of a complete system design. It included,

- ① Selection of a suitable Hardware platform for the application.
- ② Carrying out a feasibility study, prior to make any design decisions.
- ③ Maintaining a better source code which complies with the company's standards (in order to improve the readability and ability to be understood by someone else from your working group).
- ④ Finding reliable resources of data for implementation (research papers / web pages / software documentations, etc.)
- ⑤ Identifying design constraints, such as cost / execution time of programs / environment where the final product is deployed and etc.
- ⑥ Computing time complexity of algorithms to be used inside the device / system.

In addition to the above mentioned technical skills, we were given a thorough understanding about the professional engineering ethics and importance of respecting them. Under that several discussions were carried out about,

- ① Non-Disclosure Agreements (NDA)
- ② Intellectual Property Policies (IP)
- ③ Commercialization of a product which involves intellectual property.
- ④ Importance of respecting the company's Rules and Regulations.

Annex. D

FOUR - WEEKLY CONTINUOUS ASSESSMENT REPORT

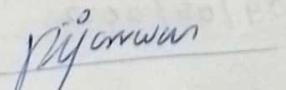
(Please Refer Section 9, page 5 of Training Guideline Book for details)

#	Report Details							
1	Report Number	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	
2	For the Duration	From	31	01	2022	To	27	02

#	Undergraduate's Details											
1	Name as per Register	Mr. / Ms. TITALAGALA Bo Po										
2	Index Number	180631J										
3	Discipline	BM <input type="checkbox"/>	CH <input type="checkbox"/>	CE <input type="checkbox"/>	CS <input type="checkbox"/>	EE <input type="checkbox"/>	EN <input checked="" type="checkbox"/>	ER <input type="checkbox"/>	ME <input type="checkbox"/>	MT <input type="checkbox"/>	TL <input type="checkbox"/>	TT <input type="checkbox"/>
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5	Name of Supervisor	J.A.L. Jayasinghe										
6	Supervisor Position	Engineer In-Charge										
7	Supervisor Phone No.	077-271 6181										
8	Email	laknijej@lrobotics.lk										

Important Note!											
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Endorsement by the Undergraduate			
Signature of Undergraduate		Date	01/03/2022

Annex. D (contd.)

Supervisor's Assessment on Undergraduate [rate on a scale from 1 (Disagree) to 5 (Agree)]							
A	Behavioral:		1	2	3	4	5
	1	Thinks independently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Takes initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4	Organized and manages time well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5	Results oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6	Ability to learn from all levels of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
B	Technical:		1	2	3	4	5
	1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
C	Any Other Remark:						
	Satisfactory. Can improve for with further experience in the industrial environment.						
D	No. of Days of leave during 4-week period:	Authorized	○	Unauthorized	○		
E	Endorsement by the Supervisor:						
1	Name of the Supervisor	J. A. L. Jayasinghe	Official Stamp	L.E. ROBOTICS (PVT.) LTD.			
2	Position					
3	Signature			J. A. L. Engineer - In - Charge			
4	Date	09/05/2022					

Summary of work experience : Report No: (2)

From: 31/01/2022 To 27/02/2022.

As a continuation of the work carried out in the first four weeks, I was instructed to make the necessary changes to a program written in general purpose "C" language, to suit a microcontroller. (Microcontroller is a tiny computer fabricated on a single metal oxide integrated circuit chip). In contrast to a usual personal computer, these microcontrollers have very low system specifications, in terms of memory / processing power and etc.

Due to that, a different set of technical skills are required to work with those tiny computers. The first week of the second four weeks was dedicated to a acquire and improve some of those skills. Because getting the most out of these tiny computers is crucial when it comes to an embedded system development.

It was observed that the performance of these microcontrollers are no way near the expectations of the real time system that I was assigned to design. Therefore, the focus was then given towards a "Raspberry Pi" single board computers. (Complete computers built on a single circuit board, with microprocessors, memory, ~~etc~~ Input / output peripherals and etc.)

In contrast to aforementioned micro controllers, these (SBC) Raspberry Pi type single Board computers have quite greater system specifications, which make them ideal for prototype development. Therefore it was later decided to stick with "Raspberry Pi" SBC for further development of the system. (computer vision based real time trajectory generation: the task allocated at initial phase of industrial training.) However, when it comes to industrial product development, these Raspberry Pi's have various drawbacks. These drawbacks were discussed with the supervisor ~~and~~ ~~supervisor~~ and it was realized, how hard it is to choose a proper hardware development platform for an industrial level project.

When it comes to "computer vision" ~~literature~~ based applications, (as it is obvious) there must be an associated video / image capturing device to get a video stream / set of images of the environment. However, due to the internal works of a camera, these captured images / videos can not be directly ~~directly~~ used for useful industrial application. Therefore, what is known as "camera calibration" process is done prior to any computer vision task. Last week of second four-weeks was spent ~~doing~~ investigating that studying the concept of

FOUR - WEEKLY CONTINUOUS ASSESSMENT REPORT
 (Please Refer Section 9, page 5 of Training Guideline Book for details)

#	Report Details								
1	Report Number	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>		
2	For the Duration	From	28	02	2022	To	27	03	2022

#	Undergraduate's Details											
1	Name as per Register	Mr. / Ms. THALAGALA B.P.										
2	Index Number	180631J										
3	Discipline	BM <input type="checkbox"/>	CH <input type="checkbox"/>	CE <input type="checkbox"/>	CS <input type="checkbox"/>	EE <input type="checkbox"/>	EN <input checked="" type="checkbox"/>	ER <input type="checkbox"/>	ME <input type="checkbox"/>	MT <input type="checkbox"/>	TL <input type="checkbox"/>	TT <input type="checkbox"/>
4	Contact Phone Number	0750296594										
5	Email	180631J@uomo.lk										
6	Personal Address During	326/2, Kandahera, Dedigamawa										

#	Training Provider Details											
1	Training Provider's Name	L.E. Robotics (Pvt) Ltd.										
2	Address of Corporate Office	100/4, Divulapitiya Rd, Minuwangoda										
3	Address of Worksite	100/4, Divulapitiya Rd, Minuwangoda.										
4	Nearest City to Worksite	Minuwangoda.										
5	Name of Supervisor	J.A.L. Jayasinghe										
6	Supervisor Position	Engineer In-charge										
7	Supervisor Phone No.	077 - 2716181										
8	Email	jachnieg@lerobotics.lk										

Important Note!			
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Endorsement by the Undergraduate			
Signature of Undergraduate	Piyawan	Date	29/03/2022

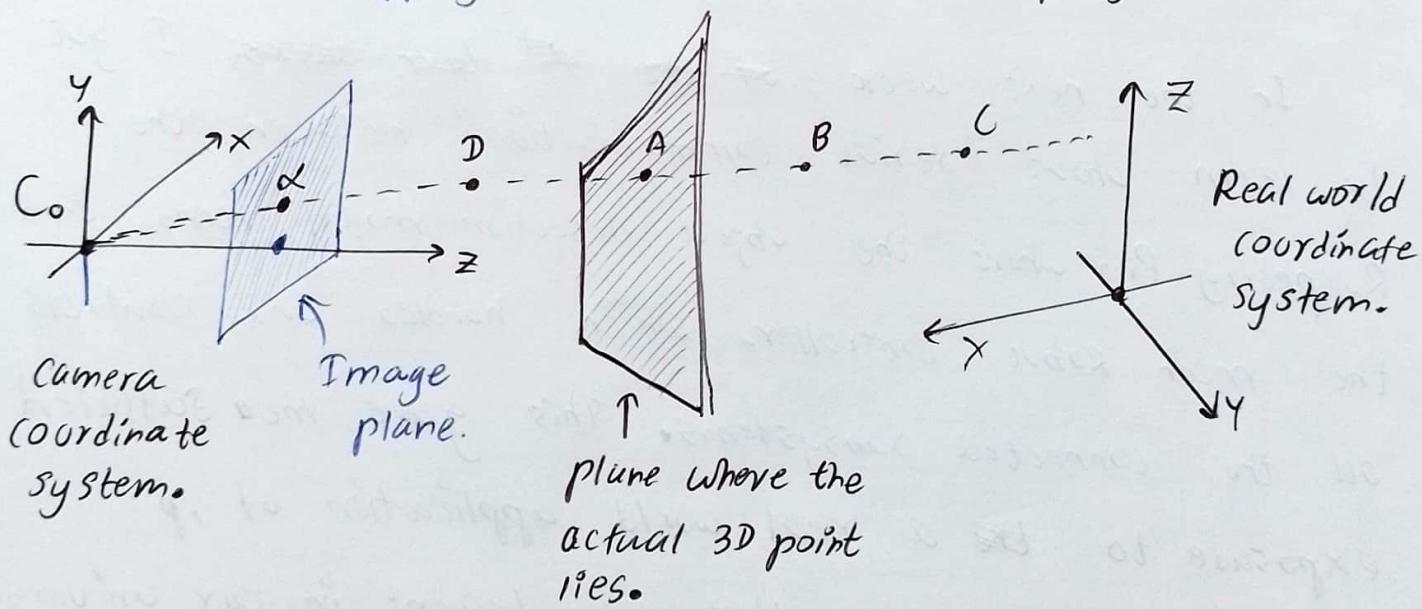
Annex. D (contd.)

Supervisor's Assessment on Undergraduate						
[rate on a scale from 1 (Disagree) to 5 (Agree)]						
A	Behavioral:	1	2	3	4	5
1	Thinks independently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Takes initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Organized and manages time well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Results oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Ability to learn from all levels of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B	Technical:	1	2	3	4	5
1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C Any Other Remark: satisfactory. Can further improve with more industrial exposure.						
D	No. of Days of leave during 4-week period:	Authorized	<input type="radio"/>	Unauthorized	<input type="radio"/>	
E	Endorsement by the Supervisor:					
1	Name of the Supervisor	J. A. L. Jayasinghe		Official Stamp	L.E. ROBOTICS (PVT.) LTD.	
2	Position					
3	Signature					
4	Date	10/05/2022				

Summary of work Experience : Report Number 03

From 28/02/2022 To 27/03/2022

The duty of a camera is to map a 3D scene ~~to~~ in the real world to 2D image plane. In computer vision literature this transformation is known as the "forward-projection" and it is an obvious / simple task. However, reverse of this is not so obvious and researches are going on to find methods to do this task efficiently. This 2D image plane to 3D world mapping is known as "back-projection".



Back-projection is not so obvious as mentioned earlier because the point "d" on image plane can be any point that lies on the line joining C_0 and C .

First ~~one~~ week of the ~~third four weeks~~ above mentioned period were used to investigate about efficient methods to do the explained operation.

I went through several research papers and could find a paper that follows analytical geometry approach to solving the above mentioned problem. It was an ideal solution for the problem at my hand and "OpenCV open source computer vision library" was used for the implementation of the algorithms explained. This gave me the opportunity to learn how to find better research papers and implement the methodologies to suit our application.

In the next week ~~of the project~~, I got to learn about "serial communication" between the Raspberry Pi, where the object detection model runs, and the main Robot controller, which handles and controls all the connected Subsystems. This gave me sufficient exposure to ~~the~~ a real world application of communication protocols that we learnt in our university.

Rest of the weeks of the ~~3rd four weeks~~ of duration were spent on documenting the work carried out so far, and restructuring the code written by me. This gave me an idea of the importance of maintaining documentation when it comes to an industrial level project.

Annex. D

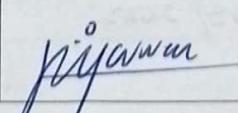
FOUR - WEEKLY CONTINUOUS ASSESSMENT REPORT
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Endorsement by the Undergraduate			
Signature of Undergraduate		Date	31/05/2022

Supervisor's Assessment on Undergraduate						
[rate on a scale from 1 (Disagree) to 5 (Agree)]						
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3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Technical:	1	2	3	4	5
1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C	Any Other Remark:	<i>Satisfactory</i>				
D	No. of Days of leave during 4-week period:	Authorized	0	Unauthorized	0	
E	Endorsement by the Supervisor:					
1	Name of the Supervisor	<i>J.A.L. Jayasinghe</i>		Official Stamp	<i>L.E. ROBOTICS (PVT.) LTD.</i>	
2	Position				<i>Jackson</i>	
3	Signature				<i>Engineer - In - Charge</i>	
4	Date	<i>31/05/ 2022</i>				

Summary of work experience - Report No: (4)

From: 28/03/2022 To: 24/04/2022

As a part of my main allocated task of designing an object detection framework, I had to implement two Graphical User Interfaces (GUIs). The purpose of those two GUIs, is to generate required data for running the object detection framework properly, on a Raspberry Pi Single Board Computer.

One of the mentioned applications is capable of "calibrating cameras." As explained in one of the previous summaries, camera calibration is an essential process that is done when we have to use images/video capture from an associated camera in our computer vision system.

This user interface design activity gave me a valuable exposure on utilizing theoretical knowledge gathered from university, to implement a real world solution. In addition to that, I could gain a lot of knowledge on "hiding the technical complexity of a product," when we develop solutions for general non-technical savvy persons.

Some of the such techniques includes, providing interactive step by step guidelines to get the job done; enabling/disabling the options available operations depending on the current step of the process and ~~also~~ making as much as operations automate as much as possible underlying processes.

Moreover, this activity ~~gave~~ gave me a hands-on experience of using industrial level tools to build ~~with~~ Windows Graphical User Interfaces, such as "Visual Studio 2019" software ~~with~~ and "Git" version controlling utility. (a tool to keep track of the software development process.)

In addition to the design^{-ing} of the mentioned application, the documentation its user manual composition was also done by me. ~~This~~ activity exposed me to ~~the~~ various standards to follow when writing a user manual. Moreover ~~the~~ Moreover I realized the importance of iterative verifications ~~of~~ of the a software for better user experience.

Although the data generation happens in a ~~win~~ windows system, the actual object detection framework runs on a Raspberry Pi. This led me to learn and investigate various file transferring protocols to be used in future versions of the mentioned application, to transfer generated data

FOUR - WEEKLY CONTINUOUS ASSESSMENT REPORT

(Please Refer Section 9, page 5 of Training Guideline Book for details)

#	Report Details								
1	Report Number	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input checked="" type="checkbox"/>	6 <input type="checkbox"/>		
2	For the Duration	From	25	04	2022	To	22	05	2022

#	Undergraduate's Details											
1	Name as per Register	Mr. / Ms. THALAGALA B.P.										
2	Index Number	180631J										
3	Discipline	BM <input type="checkbox"/>	CH <input type="checkbox"/>	CE <input type="checkbox"/>	CS <input type="checkbox"/>	EE <input type="checkbox"/>	EN <input checked="" type="checkbox"/>	ER <input type="checkbox"/>	ME <input type="checkbox"/>	MT <input type="checkbox"/>	TL <input type="checkbox"/>	TT <input type="checkbox"/>
4	Contact Phone Number	0750296594										
5	Email	180631j@uom.lk										
6	Personal Address During	326/2, Kandahena, Dedigamuwa.										

#	Training Provider Details	
1	Training Provider's Name	
2	LE Robotics (Pvt) Ltd.	
3	Address of Corporate Office	
4	100/4, Divulapitiya Rd, Minuwangoda.	
5	Address of Worksite	
6	100/4, Divulapitiya Rd, Minuwangoda.	
7	Nearest City to Worksite	
8	Minuwangoda	
9	Name of Supervisor	
10	J.A.L. Jayasinghe	
11	Supervisor Position	
12	Engineer In-charge	
13	Supervisor Phone No.	
14	077-2716181	
15	Email	
16	laknij@lerobotics.lk	

Important Note!	
A summary of undergraduate's work experience during the considered four (04) weeks period to be attached along with this duly filled Annex. Highlight any shortcomings, problems that the undergraduate experienced, if there were any, for the purpose of improving. Finally, make sure to attach completed assessment by the Supervisor (see overleaf).	

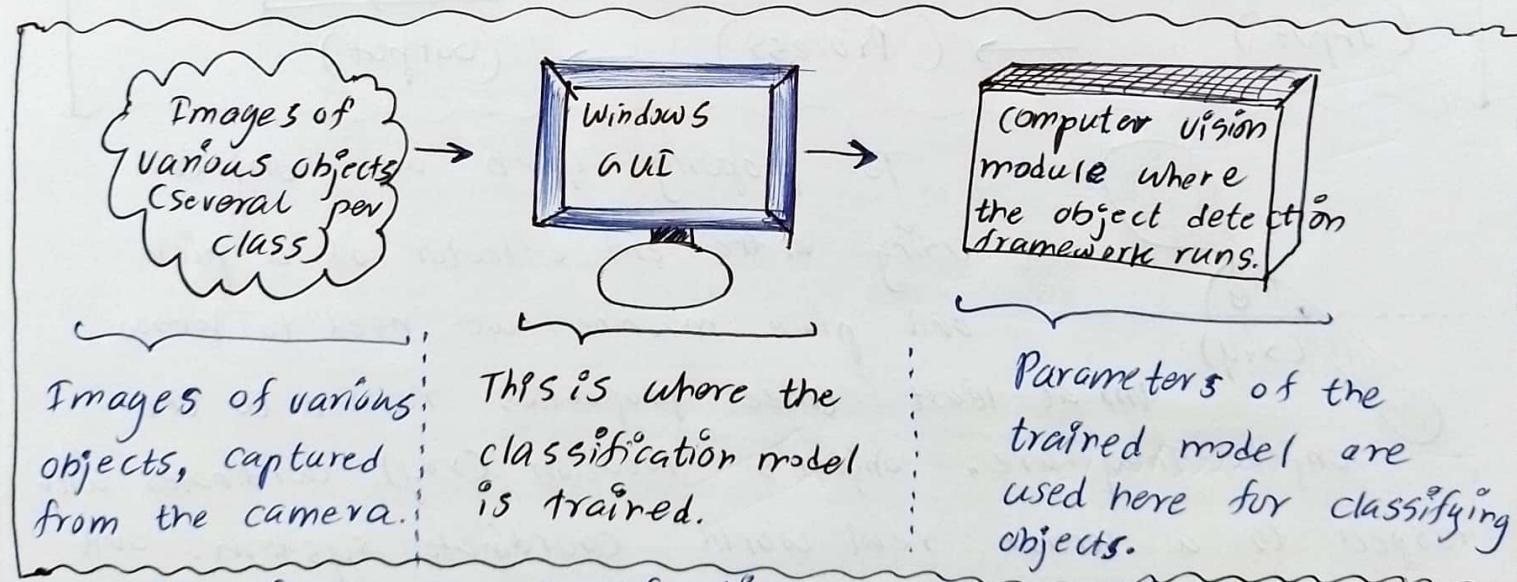
Endorsement by the Undergraduate			
Signature of Undergraduate	<i>Piyumi</i>	Date	12/06/2022

Supervisor's Assessment on Undergraduate						
[rate on a scale from 1 (Disagree) to 5 (Agree)]						
A	Behavioral:	1	2	3	4	5
1	Thinks independently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Takes initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Organized and manages time well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Results oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Ability to learn from all levels of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Technical:	1	2	3	4	5
1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C Any Other Remark: C satisfactory						
D	No. of Days of leave during 4-week period:	Authorized	1	Unauthorized	0	
E	Endorsement by the Supervisor:					
1	Name of the Supervisor	J.A. L. Jaysinghe		Official Stamp	L.E. ROBOTICS (PVT.) LTD. Engineer - In - Charge Jalenie	
2	Position					
3	Signature					
4	Date	15/06/2022				

Summary of work experience - Report No: ⑤ - W17-20

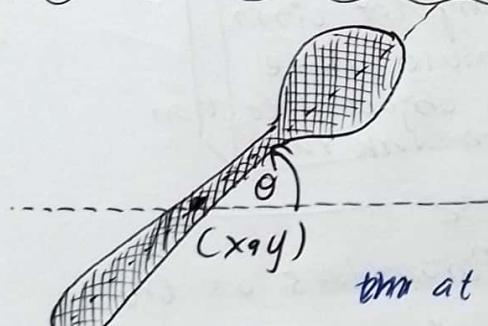
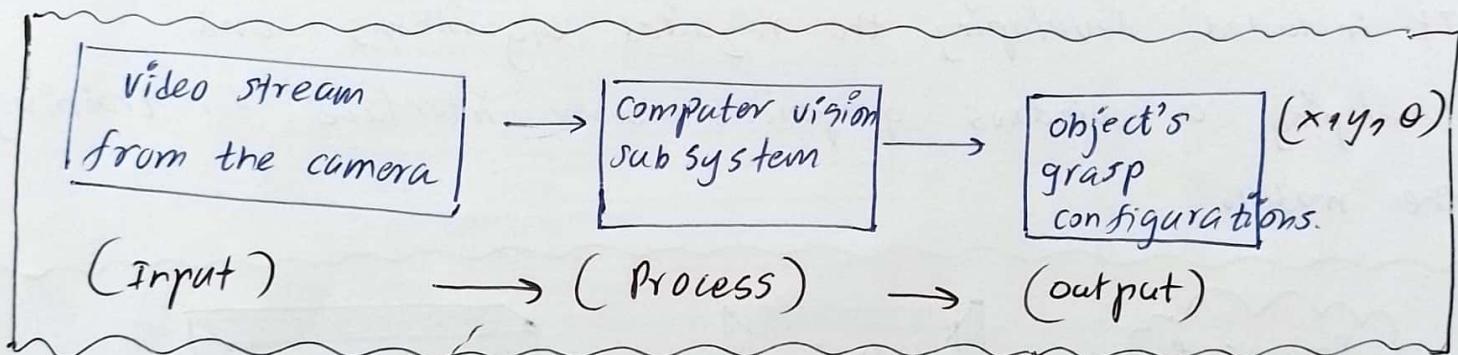
From 25/04/2022 To 29/05/2022

When it comes to object detection, object classification of the detected object is a very basic task that every object detection framework must be capable of. In computer vision literature there are various methods ^{to achieve} for that. As a part of my allocated project, "Machine Vision based Real Time Trajectory Planning", I also had to develop such an object classification model. It included developing the required algorithms and developing a windows graphical user interface for training the model.



At first a classification algorithm, which classifies objects depending on "object's shape" was developed. However, at the demonstration stage the model did not perform well and a lot of drawbacks were identified. Therefore, I had to investigate alternative methods for classifying objects.

As a result of that investigation, I could find an efficient and accurate classification model. It is based simply a Machine learning algorithm and based on SIFT (scale invariant feature transform) and SVM (Support vector Machines). This method yielded more accurate and more robust results. ~~This~~ It gave me some exposure to the world of Machine Learning. ~~and~~ I learnt a lot about building various steps in building Machine Learning models and deploying them in real world applications.



To properly grab an object using the end effector of a pick and place machine, we need to know at least three properties related to the object. They are, object's location (x, y) coordinates with respect to a known real world coordinate system, and its orientation w.r.t the same.

In the last week of the 5th four weeks period, I worked on various methods for identifying and implementing various "grasping configurations" detection methods.

FOUR - WEEKLY CONTINUOUS ASSESSMENT REPORT

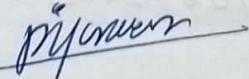
(Please Refer Section 9, page 5 of Training Guideline Book for details)

#	Report Details							
1	Report Number	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input checked="" type="checkbox"/>	
2	For the Duration	From	23	05	2022	To	19	06 2022

#	Undergraduate's Details											
1	Name as per Register	Mr. / Ms. THALAGALA B. P.										
2	Index Number	180631J										
3	Discipline	BM <input type="checkbox"/>	CH <input type="checkbox"/>	CE <input type="checkbox"/>	CS <input type="checkbox"/>	EE <input type="checkbox"/>	EN <input checked="" type="checkbox"/>	ER <input type="checkbox"/>	ME <input type="checkbox"/>	MT <input type="checkbox"/>	TL <input type="checkbox"/>	TT <input type="checkbox"/>
4	Contact Phone Number	0750296594										
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6	Personal Address During	326/2, Kandahena, Dedigamuwa.										

#	Training Provider Details											
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2	Address of Corporate Office	100/4, Divulapitiya Rd, Minuwangoda.										
3	Address of Worksite	100/4, Divulapitiya Rd, Minuwangoda.										
4	Nearest City to Worksite	Minuwangoda										
5	Name of Supervisor	J.A.L. Jayasinghe										
6	Supervisor Position	Engineer In-Charge										
7	Supervisor Phone No.	077-2716181										
8	Email	lakniesg@lerobotics.lk										

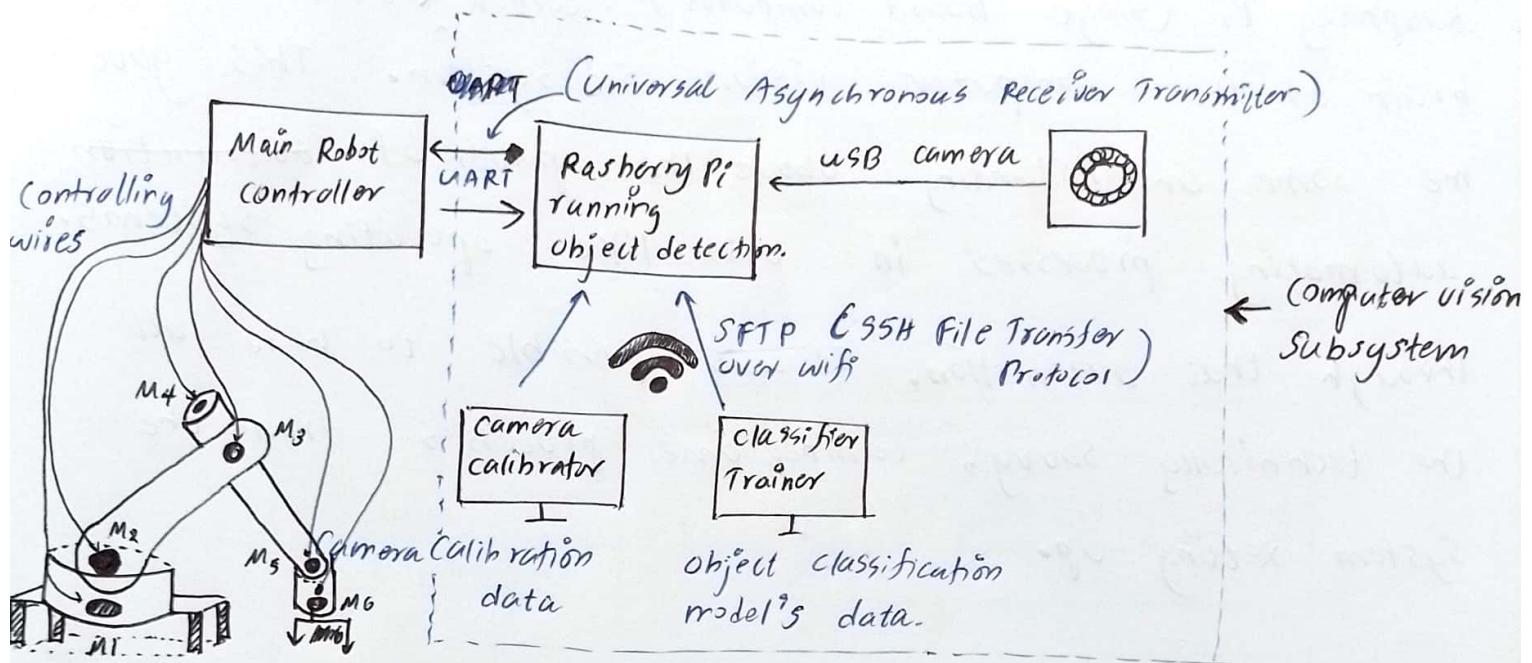
Important Note!												
A summary of undergraduate's work experience during the considered four (04) weeks period to be attached along with this duly filled Annex. Highlight any shortcomings, problems that the undergraduate experienced, if there were any, for the purpose of improving. Finally, make sure to attach completed assessment by the Supervisor (see overleaf).												

Endorsement by the Undergraduate			
Signature of Undergraduate		Date	19/06/2022

Supervisor's Assessment on Undergraduate						
[rate on a scale from 1 (Disagree) to 5 (Agree)]						
A	Behavioral:		1	2	3	4
1	Thinks independently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Takes initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Reliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Organized and manages time well	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Results oriented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Ability to learn from all levels of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Adaptability to different environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Open to different opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Ready to seek assistance when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Communicates well in all formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Technical:		1	2	3	4
1	Knows fundamentals related to work assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Able to apply fundamentals to practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Able to analyse and troubleshoot problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Engages modern tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Develops related hands on skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Concerned with quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Performs work in a safe manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Develops skills in planning & implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Understands costs & benefits relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Understands business operations in local & global context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C	Any Other Remark:	<i>Satisfactory</i>				
D	No. of Days of leave during 4-week period:	Authorized	<input checked="" type="checkbox"/>	Unauthorized	<input type="checkbox"/>	
E	Endorsement by the Supervisor:					
1	Name of the Supervisor	J. A. L. Jayasinghe	Official Stamp	L.E. ROBOTICS (PVT.) LTD.		
2	Position			<i>Jakru</i>		
3	Signature			<i>Engineer - In - Charge</i>		
4	Date	21/06/2022				

Summary of work experience W21 - 24 (Report NO ⑥)

From 23/05/2022 - To 19/06/2022



Pick & place Robot.

The last month of the internship was allocated to interface the computer vision subsystem that was developed by me, with the main controller of the pick and place robot. This gave me some exposure to a real world application ~~about~~ of the "communication protocols" that we have learnt at university.

In addition to that, this interfacing activity gave me a lot of experience about various debugging methods that can be used to solve problems with in embedded communication ^{between} of embedded systems. That included analyzing signals ~~from~~ transmitting and receiving signals and investigating using oscilloscope and investigating signalling paths on the printed circuit Board (PCB) to verify connections, of the main controller circuitry.

Moreover, two Linux shell scripts were developed to automate the software installation process, inside the Raspberry Pi (Single Board Computer) which was used as the brain of the computer vision subsystem. This gave me some understanding about the power of automation automating processes in Unix-like operating systems. Through that automation, it was possible to hide all the technically savvy, cumbersome processes from the system setting up.

As the final contribution to the company, the documentations of the developed computer vision subsystem, were composed. This gave me through a clear idea about the importance of properly documenting the work carried out, when the project is handed over to someone else.

In addition to that, it also gave me a lot of experience about proper technical writing. Moreover, I understood the importance of keeping the targeted audience in mind while composing the documentations. Because depending on that, because the amount / extent of explanation of project entirely depends on that.