WEEK NO: 09

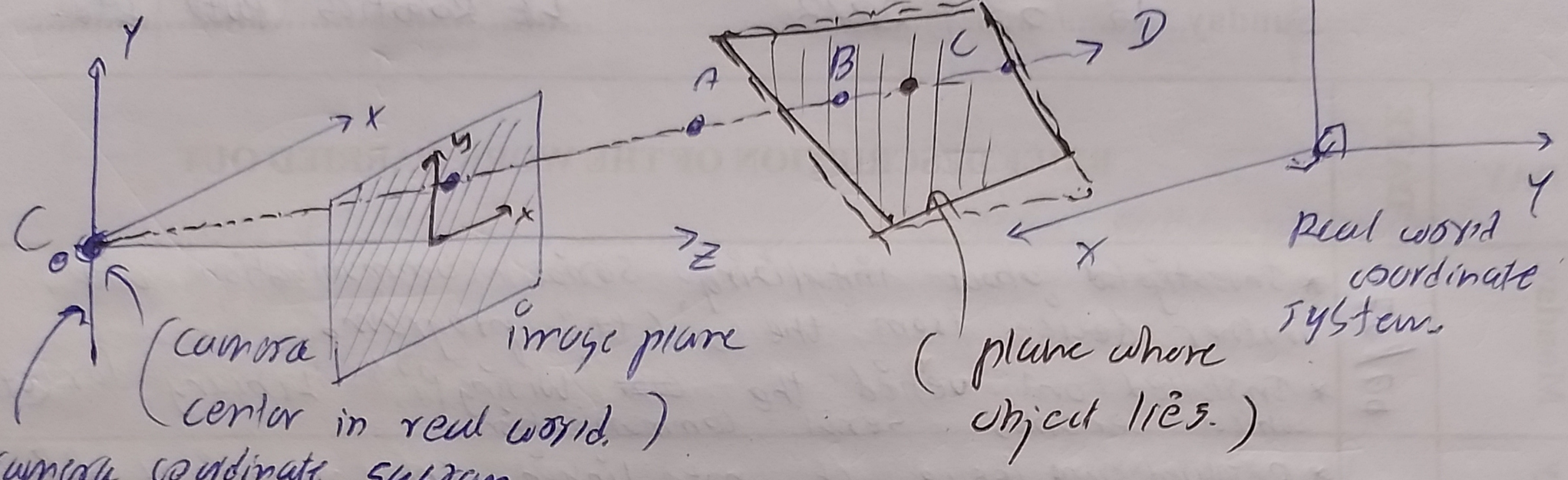
FOR THE WEEK ENDING	TRAINING LOCATION
Sunday 06 / 03 / 2022	LE Robotics (Pvt) Ltd.

DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	28/02	* started implementing algorithm of the paper "Real world coordinate from Image coordinate using single calibrated camera, Based on Prelytical Geometry"
Tuesday	01/03	* Algorithm's performance was analyzed and observed that it gives successful outcomes! * Documented the methods followed, and cleansed the code.
Wednesday	02/03	* Extended the object detection algorithm to map image coordinates back to the real world. * Analyzed the time taken for the full task.
Thursday	03/03	* Changed object detection algorithm from "connected component analysis based" to "contour analysis and contour moment analysis based." (Hu moment: scale and rotation invariant ~~moment.~~) - quantity used for ~~image~~ object classifications.) * Cleansed the main code for better understanding. by defining functions for tasks and dividing code into sectioning.
Friday	04/03	
Saturday		* —
Sunday		—

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 in the week } : Implemented ~~code~~ ~~using~~ the paper using both Python and C++ languages and integrated image coordinate to real world mapping functions to main ~~code~~ object detection code, along with object orientation detection algorithms

* Image plane to real world mapping of coordinates is inherently ambiguous operation.



* The reason is that point A, B, C and every other point lies on the 6o D lines map to the same point on the image plane.

* Real world point can be approximated if we know the equation of the line joining camera center and real world point) and equation of the plane that the object lies, with respect to the real world.

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* Point of intersection of that plane and the line gives the real world coordinate.

REMARKS AND CERTIFICATION BY THE ENGINEER /T.O

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Engineer - In - Charge

DATE : 11/03/2022

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WEEK NO: ....10.....

FOR THE WEEK ENDING

Sunday....13..../03..../....2022.....

TRAINING LOCATION

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DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	03/07	* Investigated about initializing serial communication with another device from the "C++" program. * Installed and verified the ~~wor~~ "WiringPi" Library for (C++/C) which enables serial communication.
Tuesday	03/08	* Resolved ~~and~~ issue of not linking the mentioned WiringPi library, when the program is built using "CMake". ~~build~~ * Extended the main object detection code to setup serial communication link with external device.
Wednesday	03/09	* Investigated about how the serial communication happens ~~and~~ between two devices that are compatible with ~~Serial~~ UART (Universal Asynchronous Receiver-Transmitter) protocol. * Implemented data to "byte" conversion algorithm to use with the protocol
Thursday	03/10	* Refactored the code to handle different requests ~~make~~ made by the main robot controller. using ("switch-case") procedure in C++. * Fixed several bugs in the code and Cleanse ed the code.
Friday	03/11	* worked on finding a way to simulate the communication between robot arm and the program. * found out that it can be done through ~~ot~~ ~~term~~ the help of terminal emulator and USB to serial converter cable connected to the Raspberry Pi.
Saturday		— } Weekend.
Sunday		—]

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 in the week. } : Extended the object detection algorithm to serial communicate with the main robot controller to perform operations, when requested.

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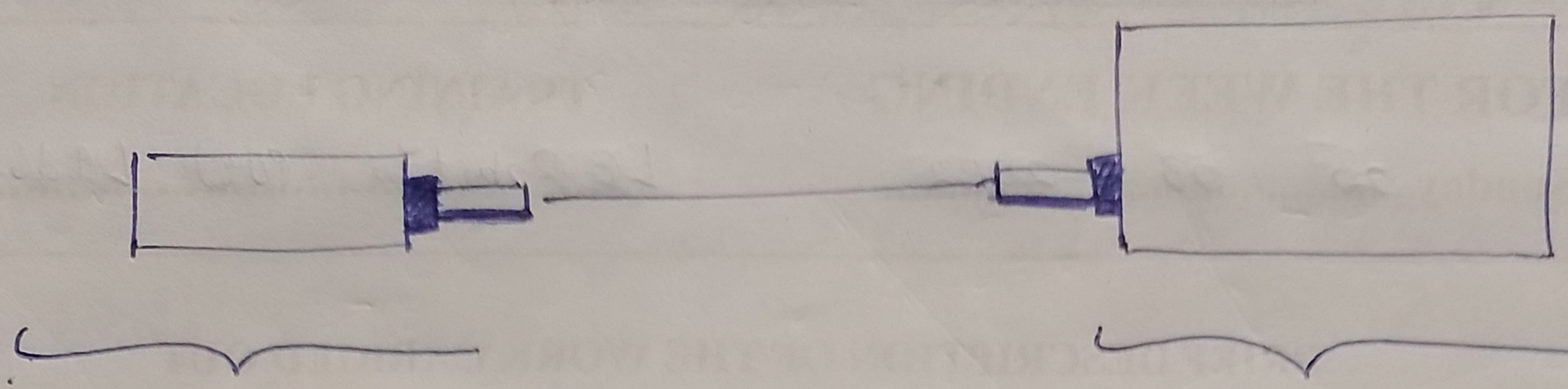

Raspberry Pi, running object detection and backprojection modal.

Main Robot controller,

* Object detection modal starts working according the commands and requests issued by the main controller. This objective is achived through a serial communication link established between two devices.

* However USB works in 5V whereas Raspberry Pi works in 3.3V logic level. This incompatibality is addressed using special hardware called as FTD232R USB-UART chip.

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DATE : 15/03/2022

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WEEK NO: 11

FOR THE WEEK ENDING

Sunday 20/03/2022

TRAINING LOCATION

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DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	14/03	* Started documenting the work done in first two months, that is related to object detection model implemented in the Raspberry Pi Single Board computer.
Tuesday	15/03	* Add the documentation and guide for the "camera calibration". * Add the related Python scripts to the document and linked them ~~to the~~ to the ~~main~~ explanation.
Wednesday	16/03	* Add guidelines to ~~install~~ ~~and~~ build and install the optimized version of the OpenCV for Raspberry Pi. * Add challenges faced during that build process and methods to solve.
Thursday	17/03	- Full moon Poya Day -
Friday	18/03	* Add ~~overall~~ system description / system overview / and the explanation of ~~from~~ the main object detection algorithm. * Appended the necessary scripts and linked them to the description.
Saturday		} Weekend.
Sunday		

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 in the week. } :- Documentation of the vision system, which ~~describes~~ includes,

(i) Required software installations,
(ii) Code explanations (written in Python)
(iii) Algorithm explanations.

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* Learnt about proper documentation techniques used in industry, and types of documentations.

* Learnt new techniques to use in LaTeX document processing platform.

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Can further explain new techniques learnt in the Details & notes section

DATE : 22/03/2022

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WEEK NO: 12

FOR THE WEEK ENDING
Sunday 27 / 03 / 2022

TRAINING LOCATION
L.E. Robotics (Pvt) Ltd.

DAY	DATE	BRIEF DESCRIPTION OF THE WORK CARRIED OUT
Monday	03/21	* Reformat the documentation according to the IEEE conference papers style. * Developed a c++ code to capture template images which will be used to classify objects.
Tuesday	03/22	* Extended the code to process template images, ~~and~~ extract their contours and save those contours. * Learnt about file handling using "fstream" in c++.
Wednesday	03/23	which can be used to both read and write from/to files. * Removed hard coded parts from the source codes and include functions to get necessary data ~~file by~~ by using files.
Thursday	03/24	* Restructured the source code into object oriented programming styles to improve the clarity and readable of the code. * Included more comments for code self explaining.
Friday	03/25	* Started implementing a user Interface to calibrate the camera, which will be used for object detection. * Created a simple basic layout for the application using visual studio's "windows forms App (.Net Framework)" template.
Saturday	03/26	- Weekend -
Sunday	03/27	

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 in the week. = Restructuring the soure code which was in a single file to seperate source and header files by following object oriented programming style in c++.

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* Learnt new concepts:

(i) C++ object oriented programming (OOP): OOP is a programming paradigm that relies on the concept of classes and objects. It is used to structure a software program into simple / reusable piece of code blueprints (usually called classes.)

(ii) C++ file handling using fstream: C++ programming lang. provides the class "fstream" to both read and write from/to files.

(iii) User Interface designing using "Windows Forms Application (.Net framework) of visual studio. This is based on "C#" programming language.

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