



13th July, 2019

TO WHOM IT MAY CONCERN

This is to certify that Shri Aniruddha Chaki is a student of B. Tech. in Electrical Engineering from Siliguri Institute of Technology, Siliguri was training in our Design Department with us from **17th June, 2019 to 13th July, 2019.**

His conduct, performance and aptitude was found to be good during the training period.

For TITAGARH WAGONS LIMITED
HEAVY ENGINEERING DIVISION




(T. K. DEB)
SR.MANAGER(P & A)

TITAGARH WAGONS LIMITED

CIN: L27320WB1997PLC084819

Registered & Corporate Office: Titagarh Towers, 756, Anandapur, E. M. Bypass, Kolkata 700 107, India
Phone: +91 33 4019 0800 | Fax: +91 33 4019 0823 | Email: Info@titagarh.in | Web: www.titagarh.in



Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)



This certificate is awarded to

ANIRUDDHA CHAKI

for successfully completing the course

Programming in Java

with a consolidated score of **67** %

Online Assignments	14.19/25	Proctored Exam	52.5/75
--------------------	----------	----------------	---------

Total number of candidates certified in this course: **8377**

Jan-Apr 2019
(12 week course)

A. Goswami
Prof. Adrijit Goswami
Dean, Continuing Education & NPTEL Coordinator
IIT Kharagpur



Indian Institute of Technology Kharagpur





Siliguri Institute of Technology

Department of Electrical Engineering

Technical Report on Industrial Training

**Design and Simulation of SOGI-based Phase
locked loop**

By Aniruddha Chaki

Doc. ID: REE0015.3PHTP.03



Technical Report on Industrial Training on Titagarh Wagons Ltd.

Sec. Technical, III

Date: 2019-10-24

Page 2 / 9

1 Contents

1	Contents	2
2	List of Figures	2
3	Introduction of Phase Locked Loop (PLL)	3
4	Working of PLL	4
4.1	Orthogonal Signal Generator	4
4.2	Alpha-Beta to dq transformation	6
4.3	Low pass filter	7
4.4	Voltage Controlled Oscillator	8
5	Simulation of a Phase Locked Loop	8

2 List of Figures

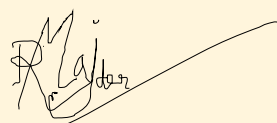
Figure 1: General Block Diagram of PLL	3
Figure 2: General structure of a single-phase PLL	4
Figure 3: Block diagram of Orthogonal System Generation based on SOGI	4
Figure 4: Basic Structure of SOGI-PLL	5
Figure 5: Bode plot of the sequence	5
Figure 6: Step response for different value of k	6
Figure 7: Characteristic of the input signal and the produced orthogonal signals	6
Figure 8: Simulink representation of the Park transformation	7
Figure 9: Simulink representation of the Park transformation	7
Figure 10: Simulink representation of the SOGI-PLL	8
Figure 11: Characteristics of the V_q and V_d generated	8
Figure 12: Output frequency Response of the system	9
Figure 13: Output and input characteristic of the PLL	9

CERTIFICATE OF PARTICIPATION

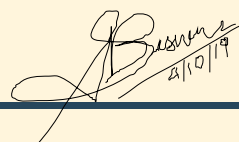
This is presented to

Aniruddha Chaki

for participating in the 23rd Annual .Camp for Hunger Eradication on 4th October,
2019



RATAN MAJUMDER
Event Coordinator



SANDIP BISWAS
Board Member



ICIMSAT-2019

1st International Conference on Innovation in Modern Science and Technology

Siliguri Institute of Technology

Siliguri, West Bengal-734009, India

20-21 September 2019

Certificate Of Presentation

This is to certify that Mr./Ms./Mrs./Dr. Amrindhna Chaki of _____

Siliguri Institute of Technology

The Study on Innovation, Development and Implementation of the Self-driving Car
in the 1st International Conference on Innovation in Modern Science and Technology

(ICIMSAT 2019) held at Siliguri Institute of Technology, Darjeeling, India during 20-21 September 2019.

We wish you a brilliant and successful career in life.

Prof. Jayanta Bhushan Basu

Organizing Chair
ICIMSAT 2019

Prof. Dr. Subhojit Dawn

Organizing Chair
ICIMSAT 2019

Prof. Dr. Sadhan Gope

Organizing Chair
ICIMSAT-2019

Prof. Dr. Valentina Emilia Balas

General Chair
ICIMSAT 2019

Springer

IET

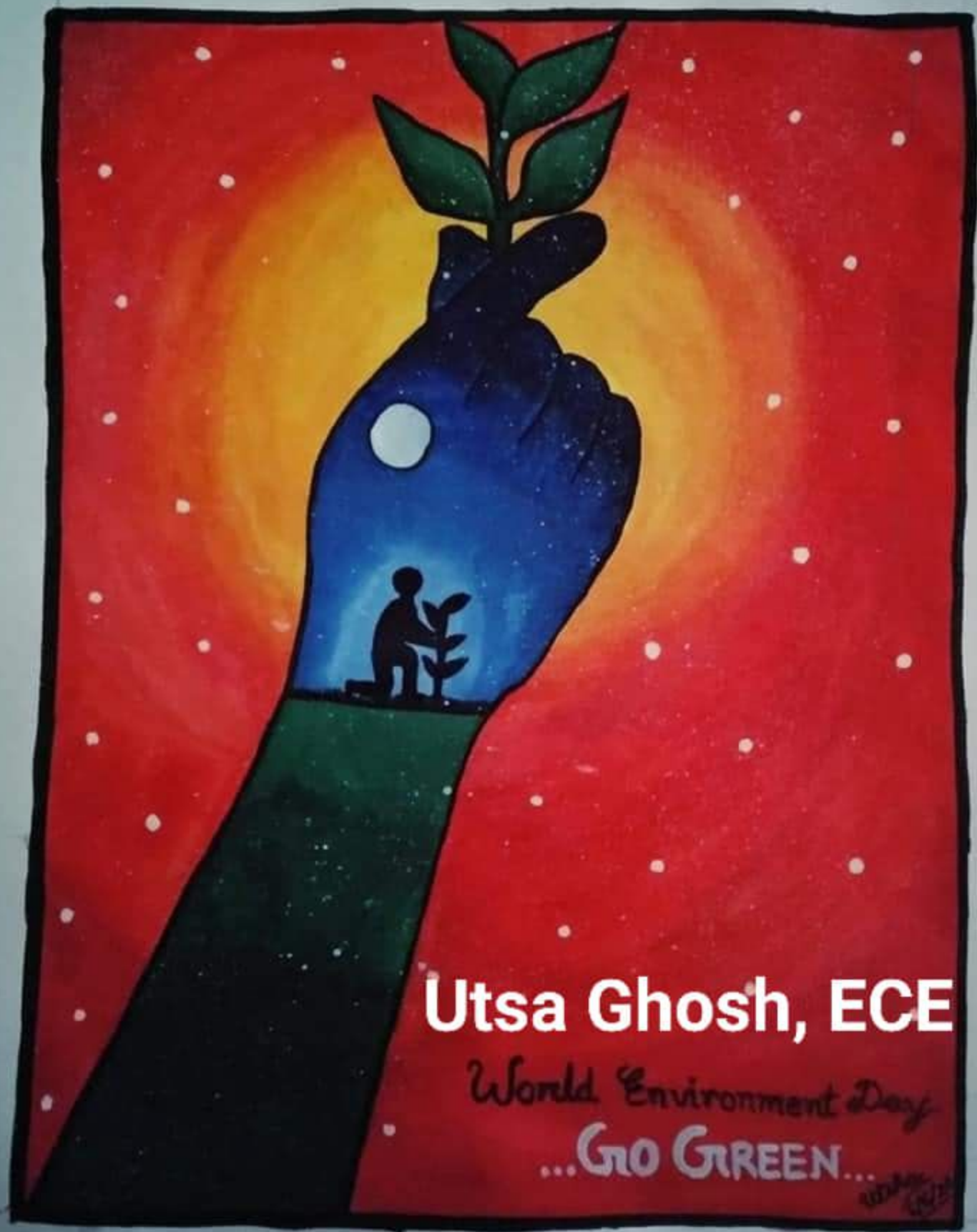


ACDOS





Shroyeta Chakraborty, ECE



Utsa Ghosh, ECE

World Environment Day

...GO GREEN...







Simantika Saha, EE

**OFFICE OF THE SENIOR SECTION ENGINEER (ELECTRICAL),
NEW JALPAIGURI RAILWAY POWER HOUSE**

Northeast Frontier Railway



TO WHOM IT MAY CONCERN

Mr. SRINJOY GHOSH, student of 7th Semester in Electrical Engineering has completed his Industrial/Vocational Training successfully from 17.06.2019 to 29.06.2019 ; 13 days at NJP Power House at this Establishment.

Wishes for his/ her bright future.

[Signature] 29-06-19
Sr. Section Engineer/IC/Elect.(P)/NJP

व० अ० विद्युत अभियंता (प्रभारी)

पू०सी० रेलवे, न्यूजलपाईगुड़ी

SR. SECTION ENGINEER/IC/ELECTIP

N. F. RAILWAY/NJP

Northeast Frontier Railway



**OFFICE OF THE SENIOR SECTION ENGINEER (ELECTRICAL),
SILIGURI JN. POWER HOUSE**

TO WHOM IT MAY CONCERN

Mr. SRINJOY GHOSH, student of 7th Semester in Electrical Engineering has completed his Industrial/Vocational Training successfully from 01.07.2019 to 12.07.2019 ; 12 days at Siliguri JN. Power House at this Establishment.

Wishes for his/ her bright future.



Sr. Section Engineer/IC/Elect.(P)/SGUJ

उपर अनुभाग अधिकारी (विद्युत)

पू. सी. रेलवे / शिलीगुड़ी जं.

Senior Section Engineer (Elect.)

N. F. RLY. SILIGURI JN.

**OFFICE OF THE SENIOR SECTION ENGINEER (ELECTRICAL),
NEW JALPAIGURI RAILWAY POWER HOUSE**

Northeast Frontier Railway



TO WHOM IT MAY CONCERN

Mr. SRINJOY GHOSH, student of 7th Semester in Electrical Engineering has completed his Industrial/Vocational Training successfully from 17.06.2019 to 29.06.2019 ; 13 days at NJP Power House at this Establishment.

Wishes for his/ her bright future.

[Signature] 29-06-19
Sr. Section Engineer/IC/Elect.(P)/NJP

व० अ० विद्युत अभियंता (प्रभारी)

पू०सी० रेलवे, न्यूजलपाईगुड़ी

SR. SECTION ENGINEER/IC/ELECTIP

N. F. RAILWAY/NJP

Northeast Frontier Railway



**OFFICE OF THE SENIOR SECTION ENGINEER (ELECTRICAL),
SILIGURI JN. POWER HOUSE**

TO WHOM IT MAY CONCERN

Mr. SRINJOY GHOSH, student of 7th Semester in Electrical Engineering has completed his Industrial/Vocational Training successfully from 01.07.2019 to 12.07.2019 ; 12 days at Siliguri JN. Power House at this Establishment.

Wishes for his/ her bright future.



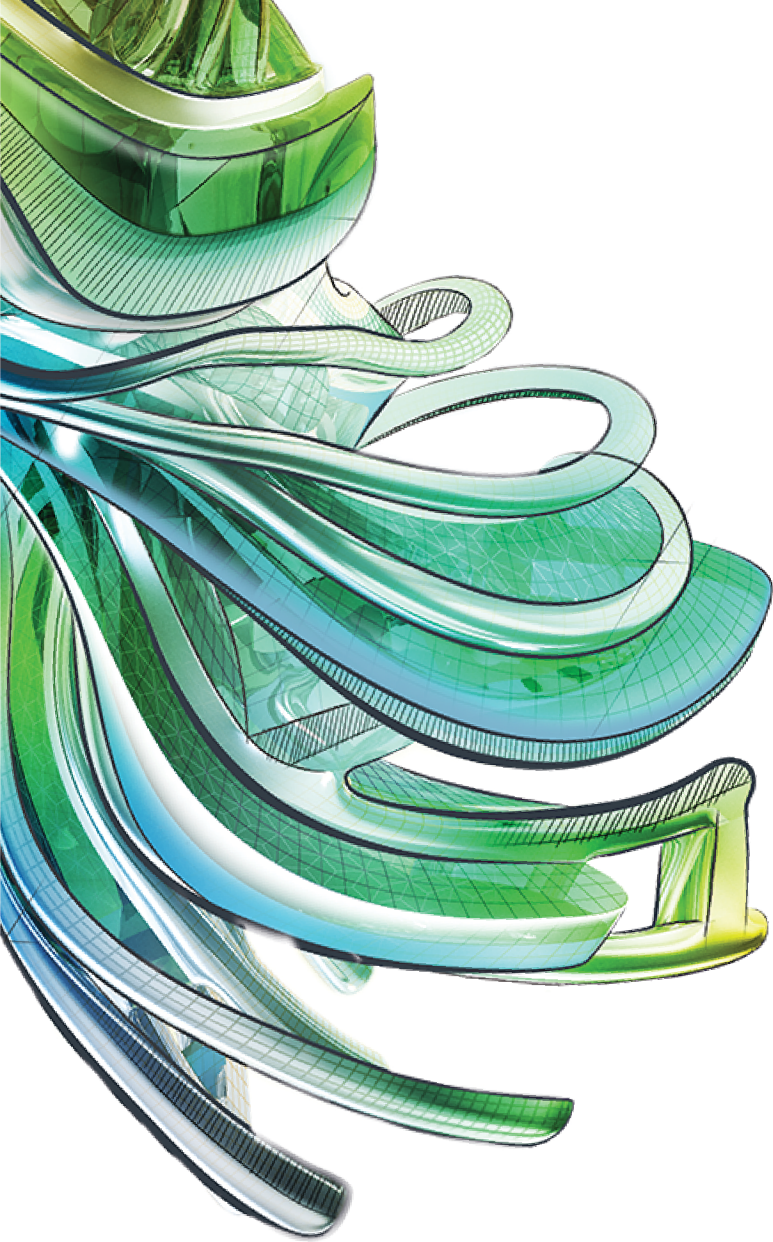
Sr. Section Engineer/IC/Elect.(P)/SGUJ

उपर अनुभाग अधिकारी (विद्युत)

पू. सी. रेलवे / शिलीगुड़ी जं.

Senior Section Engineer (Elect.)

N. F. RLY. SILIGURI JN.



CERTIFICATE OF PARTICIPATION

THANK YOU!

Thank you for participating in this Autodesk® Authorized Academic Partner® event. Autodesk's vision is to help people imagine, design, and create a better world.

Certificate No. AP702719096511634849286

SUBHAJIT ACHARJEE

PARTICIPANT NAME

AUTODESK REVIT MEP WEBINAR

EVENT

WEST BENGAL

11-MAY-2021

EVENT LOCATION

DATE

WEBFLEX CONSULTANCY SERVICE PRIVATE LIMITED (BURDWAN DISTRICT)

AUTODESK AUTHORIZED ACADEMIC PARTNER

