

Manash Chakraborty, Ph.D.

SOFTWARE ENGINEER · KLA CORPORATION®

415 E. Taylor Street, Apt. #3118, San Jose, CA, 95112.

☎ (+1) 612-961-0716 | ✉ mcb.me72@gmail.com | 🔗 LinkedIn (Manash Chakraborty)

Summary

- Experience in developing software tools for semiconductor inspection and metrology devices.
- 4+ years of experience in solving robust/optimal controller synthesis problems for various dynamical systems.
- 3+ years of experience in precision servo controls.
- 1+ years of experience in industrial control, automation, and machine vision system.
- Experience in developing MATLAB toolbox to analyze dynamical systems (e.g., nonlinear analysis tools).

► Professional Experience

KLA Corporation

Milpitas, California

SOFTWARE ENGINEER

Dec. 2022 - Present

- Developing diagnostic tools for reticle inspection devices for the purpose of increasing yield in chip inspection process.
- Developing software tools to map stage position error and monitor vibrations for reticle/mask inspection devices.

Seagate Technology U.S.

Shakopee, Minnesota

INTERN

May. 2021 - Aug. 2021

- **Disturbance Modeling for Hard Disk Drive (HDD) in Cabinet Settings:** Modeled frequency contents of the disturbance experienced by individual HDDs, operating in a data storage cabinet.
- **Predicting Actuator Stroke Usage for a Given Disturbance Environment:** Developed a set of MATLAB tools to predict actuator (*piezoelectric*) stroke usage of the dual-stage actuator system for a given disturbance environment.
- **Mixed Controller Synthesis for Dual-stage Actuator System in Hard Disk Drive (HDD):** Developed an LMI-based $\mathcal{H}_2/\mathcal{H}_\infty$ -mixed controller synthesis method to achieve the desired level of closed-loop \mathcal{H}_∞ performance while avoiding actuator saturation by imposing a \mathcal{H}_2 -norm constraint.

Seagate Technology U.S.

Shakopee, Minnesota

INTERN

May. 2020 - Aug. 2020

- **Optimal Control Synthesis for Dual-stage Actuator System in Hard Disk Drive (HDD):** Developed an LMI-based optimization method to synthesize a \mathcal{H}_∞ -optimal controller for the dual-stage actuator system in HDD.

University of Minnesota

Twin Cities, Minnesota

TEACHING ASSISTANT

Aug. 2017 - Dec. 2018

- **Responsibilities:** Lecture recitation, instruction to solve problems, grading exam papers and office hours to meet students.

Unipolar Automation Ltd.

Dhaka, Bangladesh

PROJECT MANAGER (R&D)

Feb. 2016 - June. 2017

- **Generator Shaft Vibration Monitoring System:** Installed and coded for Siemens PLC/HMI(s) and Allen-Bradley *Dynalox* measurement modules to monitor shaft vibration of a power generator.
- **A Prototype of Two Degree of Freedom Industrial SCARA Robot:** Developed the inverse kinematic model and necessary software tools for a prototype 2 DOF industrial SCARA robot, aimed for sorting small objects on a production line.
- **Industrial Machine Vision System:** Developed industrial machine vision system using *OpenCV* for barcode reading, printed label validation, and object sorting on production lines.

► Research Experience

University of Minnesota

ADVISOR: DR. RYAN J. CAVERLY¹

2017-present

- **A Nonlinear Analysis In the Presence of Saturation to Determine Worst-case Controller Performance:** Developed an LMI-based nonlinear analysis tool in MATLAB to evaluate the worst-case sensitivity performance of a controller in the context of dual-stage actuator system in hard disk drives (HDDs).
- **A Gain-scheduled Approach to Synthesize Optimal and Robust Conic Controller:** Developed an optimal and robustly stable controller synthesis method using the *Internal Model Principle* and *Conic Sector Theory* with an intended application on gain-scheduled controls.
- **Convex Synthesis of Strictly Negative Imaginary Feedback Controllers:** An LMI-based optimization technique to synthesize robustly stable and optimal *Strictly Negative Imaginary* output feedback controllers, with intended application on flexible manipulators.
- **A Study on WAAS for GPS Solution and Implementation of a Code-Based Differential GPS:** A study on *Wide Area Augmentation System* (WAAS) and a MATLAB implementation of a *Code-Based Differential GPS* for ionospheric error mitigation.

Chittagong University of Eng. & Tech.

ADVISOR: DR. SHEIKH MUHAMMAD HUMAYUN KABIR²

2011 - 2015

- **Virtually Interactive Environment for Autism and Lateral Physiotherapy:** An interactive hardware-software environment for physically challenged people with intended application on exercise equipment.
- **Development of a GPS-Guided UAV System for Site Surveillance:** Developed a remotely operable GPS guided drone (quad-copter) for surveillance of construction sites.

► Tools & Skills

- 🔧 **Programming Languages:** C/C++, Python, FORTRAN, LabVIEW.
- 🔧 **Software Tools:** MATLAB, Simulink, LabVIEW, Wolfram Alpha, SolidWorks, Git, RTC.
- 🔧 **Embedded Platform:** Arduino, Raspberry Pi, PIC & ATMEL Micro-controllers.
- 🔧 **Semidefinite Programming:** Parser: YALMIP, CVX. Solver: Mosek, Sedumi, SDPT3.

► Publications

- R.J. Caverly, M. Chakraborty, B. Huang, R. Sosseh, **Robust Mixed $\mathcal{H}_2/\mathcal{H}_\infty$ Control Synthesis for Dual-Stage Hard Disk Drives Using Convex Optimization**, IFAC World Congress, 2023, July, Yokohama, Japan.
- M. Chakraborty, **Controller Design and Analysis of Dual-stage Hard Disk Drives in the Presence of Micro-Actuator Stroke Limitation**, Ph.D. Thesis, University of Minnesota, 2022, Link.
- M. Chakraborty, R. J. Caverly, **Disturbance Modeling and Prediction of Closed-Loop Micro-Actuator Stroke Usage in Dual-Stage Hard Disk Drives**, ASME Letters in DSC, 2022, DOI:10.1115/1.4056025.
- R. J. Caverly, M. Chakraborty, **Convex Synthesis of Strictly Negative Imaginary Feedback Controllers**, 58th IEEE Conference on Decision and Control (CDC), 2019, pp. 7578-7583, DOI:10.1109/CDC40024.2019.9029323.
- S. Hossain, B. Salam, A. Shahriar, M. Chakraborty, **Azimuth-Altitude Dual Axis Solar Tracker**, 2nd International Conference on Mechanical Engineering and Renewable Energy (ICMERE) 2015, Chittagong, Bangladesh. DOI: 10.13140/RG.2.1.2255.8807.
- M. Chakraborty, A. N. Hossain, **Implementation of Computer Vision to detect driver fatigue or drowsiness to reduce the chances of vehicle accident**, Electrical Engineering and Information and Communication Technology (ICEEICT), 2014, pp. 1-5. DOI: 10.1109/ICEEICT.2014.6919054.

► Education

🏛️ University of Minnesota, Twin Cities

MN, USA

DOCTORATE PROGRAM, AEROSPACE ENGINEERING AND MECHANICS

2017 - 2022

- Graduated.

🏛️ Chittagong University of Engineering and Technology

Chittagong, Bangladesh

BACHELOR OF SCIENCE (B.SC.), MECHANICAL ENGINEERING

2011 - 2015

- CGPA: 3.53/4.00

► Extracurricular Activity

- ➡ Participated and led *Team Bangladesh* at ROBOCON (Asia-Pacific Robot Contest), 2014, Pune, India.
- ➡ Former IT & Research Secretary (2014-2015) at Robo-Mechatronics Association, Chittagong University of Engineering and Technology (CUET).
- ➡ Organizing member of ROBORACE-2013, National inter-university robotics competition in Bangladesh.
- ➡ IEEE committee member (2013) of IEEE Student Chapter, Chittagong University of Eng. & Tech.

¹Dr. Ryan J. Caverly, Assistant Professor, Department of Aerospace Eng. & Tech., Univ. of Minnesota, Twin Cities.

²Dr. S. M. Humayun Kabir, Professor, Department of Mechanical Eng., Chittagong Univ. of Eng. & Tech.