

## **MOHD. AALIM KHAN**

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### **Profile**

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- **Research Associate** at LKC and Nanyang Technological University Singapore, since May 2019.
- **Assistant Manager (R&D Optics & Metrology)** in multi-tasking team at **Green Optics Co. Ltd. South Korea**, since October 2013 to till March 2018.
- **Optics Engineer (R&D)** at **i2n Technologies Pvt. Ltd. (IISc. Bangalore)**, since February 2011 to September 2013
- Junior Engineer (Quality Assurance and Control) at JSL Ltd Hisar, India, since June 2005 to January 2011

### **Work Experience**

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#### **LKC Nanyang Technological University (Singapore)**

##### **Roles and Responsibilities:**

Designing and developing optical systems and modules to bridging biological and physics research i.e.

- Two Photon laser scanning and excitation system designing
- Different kind of spectrometers designing
- Optical coherence tomography
- Optical system for large field of view and highly curved cornea surface fluorescence imaging at chief ray surface normal angle, cornea positioning and homogenized fluorescence excitation systems.

#### **Green Optics Co. Ltd. (South Korea):**

##### **Roles and Responsibilities:**

- Imaging and Non-Imaging Optical Systems Designing for various applications (Military, Ground to space, Night Vision, Machine Vision and general optics etc.)
- Budgeting Optical Systems and Tolerancing
- Co-working with international institutions on various projects (Astelko Germany, ISRO India, Glwynder UK etc)
- Athermalizing optical designs/systems as per military or other norms
- MTF measurement of UV, Visible, MWIR and LWIR optical designs
- Establishing **Metrology tools** and procedures for Large Flat Mirrors, Spherical, Aspheric, Conic and cylinder optics testing
- Designing optical null for optical metrology and testing

- Setting-up the tools and procedures for Large Telescope and Large optics assembly **alignment and testing**
- Planning and scheduling the alignment and measurement methods (Interferometer, Auto-collimator, Wavefront Sensor, sub aperture stitching etc.)
- Conceptualizing and implanting new techniques for optical systems designing and testing
- Prototyping, Analyzing and Designing new optical systems
- Re-optimizing and modifying optical systems to upgrade and make sure the best performance
- Designing customized optics and developing test procedures for testing, measurement, alignment as per project's and customer's need
- Co-operating with marketing team, management team and customers
- Co-operating with Production and Quality Assurance team to solve the issues and new product development
- Discussing and explaining different methods, concept and techniques to our teams for better productivity
- Time to time training, supporting and educating team members to troubleshoot various optical system alignment and performance related issues

## **i2n Technologies Pvt. Ltd.(India):**

### **Roles and Responsibilities:**

- Working as a key role player for AFM optics development
- Conceptualizing, designing and implementing imaging optical techniques as per project and customer's need
- Designing Laser Interferometers prototypes (Fiber, Free Space, Homo-dyne and Hetero-dyne)
- Optical systems testing and alignment
- High speed displacement detection of MEMS devices with very high precision
- MEMS device characterization using optical techniques
- Upgrading and optimizing optical systems

### **Skills**

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#### **Technical:**

- Excellent command over optical tools and systems used for **Optical Metrology**
- Excellent command over imaging **optical systems designing** (Visible/LWIR/MWIR)
- **Narcissus analysis** for IR Optical Systems and **Athermalization analysis** for any optical systems
- Excellent command over high precision **measurement and alignment** of Optical Systems and components
- Excellent command over optical systems/ **Interferometric alignments**
- Excellent command over **Wavefront Sensor** implantation for system **performance evaluation and alignment** (aspheric and off-axis components also)

- Excellent command over terms **Zernike coefficients analysis & calculation, MTF, PSF, Lens Aberration** etc. and their importance in opto-mechanical alignment and optical performance optimization
- Good command over Optical Techniques for **Linear and Angular Displacement Detection & Measurement**
- Good skill in optical techniques **conceptualization, designing, developing, prototyping and testing** for complex optical systems and optical components
- Good command over optical system **performance evaluation**
- Good command over **optical nulls designing and aligning** for aspheric mirror testing
- Good understanding of different kinds of **CGHs** and very comfortable to utilize them
- Excellent command over image processing, high precision data analysis and custom curve fittings
- Good understanding of optical techniques like: **Generalized Interferometer, Free Space and Fiber Interferometers, Vibrometer and Optical Super Resolution Microscopy, Nano-spectroscopy.**
- Comfortable to use and handle **Atomic force microscopy and Scanning Tunneling Microscopy**
- Capable to handle any kind of sophisticated optical systems and devices
- Good understanding of long trace profiler
- Knowledge of 5S

#### **Softwares and Instruments:**

- **ZEMAX, Code V and LightTools** optical designing Softwares
- Good knowledge of **MATLAB,**
- Good Knowledge of **Shack-Hartmann Wavefront Sensor**
- Good knowledge of **NI Lab-VIEW 8.6** (Real Time Modules, FPGA, DAQ)
- Good knowledge of **SOLIDWORKS**
- Good Knowledge of **Atomic Force Microscope (AFM) and Scanning Tunneling Microscope (STM)**
- Familiar with **Optiwave FDTD** software for photonic band gap material simulation
- **Zygo Verifier XPZ Interferometer and White Light Interferometer**
- **4D AccuFiz Interferometer**
- **Mahr ESDI Interferometer: MarSurf FI 3100 VB**
- **Image Master (Trioptics) MTF measurement: UV, Visible, MWIR and LWIR Optics**

#### **Career Achievements and Work Progress**

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- Presently reviewing Optical Design for space satellite application from one of our International client, preparing proposal for test and performance analysis.
- Conceptualizing the Long Trace Profiler (LTP) for analyzing very large radius measurement and high special frequency surface analysis of conic optics (One meter of large optics)
- Conceptualizing Automatic Sub-Aperture Analysis of large optics Wavefront error measurement and global sub aperture stitching coordinates detection measurement

- Designed a Dual Band Large Survey Telescope (Visible and MWIR), assembled and tested successfully for Korean Air Force. Performances as per Military Standards have (Operating Temperature range  $-32^{\circ}\text{C}$  to  $+43^{\circ}\text{C}$ ) been validated by Korean Government Institutes. It is 1<sup>st</sup> 100% Korea made telescope.
- 1.2 Meter Visible and MWIR Surveillance Telescope: Tolerance budgeting and Athermalized the MWIR Relay Optics unit (Visible Design by Astelko Germany and LIGNex1 Korea) for Defense Application. MWIR Relay MTF test done successfully
- Astronomical Large Telescope Conic Mirrors (0.5 meter to 1.2meter diameter) testing on-machine
- Developed Matlab based tools and procedure for Large telescope assembly alignment (on-site and off-site)
- Designed Null lens for parabolic mirror testing and different kind of conventional optics like beam expander, collimator etc.
- Designed a 5mmx0.05mm Homogenized Laser Line Beam Shaper with Homogeneity better than 85% for Lithography application
- Cylindrical surface testing process developed using Computer Generated Hologram (CGH), up to one-meter cylindrical surface auto stitching is under progress
- Designed Dual Field of View (DFV) LWIR 4X zoom camera objective for Defense Agency
- Designed Fixed Focus and High Numerical Aperture SWIR objective for Defense application
- Designed optical detection unit for Atomic Force Microscopy, to control and manipulate MEMS cantilever
- Upgraded and made more users friendly our Scanning Probe Microscope by integrating Optical Video Microscope. It reduces initial settling time to half of it. Enables users to work in comfort, enhancing their performance and ultimately improving the quality of their work.
- Developed a Fiber Interferometer for MEMS devices manipulation with the NI LabVIEW real time interfacing
- Prototyped a precise Optical Angular Measurement Technique for MEMS device
- Designed and fabricated a Fizeau Interferometer for flatness testing of optical flat, to provide a good testing tool to local optics industries and university/colleges. Facilitated by HARTRON Ambala and funded by Department of Science and Technology Delhi.

### **Educational Qualification**

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Guru Jambheshwar University of Science and Technologies – Hisar, India, M. Tech

(Optical Engineering), CGPA 8.01/10 (74%), May 2010.

CCS University – Meerut, Uttar Pradesh, M. Sc. (Physics with specialization in Electronics), 60%, May 2005.

CCS University – Meerut, Uttar Pradesh, B. Sc. (Physics), 60%, May 2003.

**Master's Project:**

- “DESIGNING OF LASER INTERFEROMETER” for optical flatness testing with a computer interface, using NI Lab-VIEW (Optical Surface Profilometer).
- Machine Vision Based Identification and Interferometric Flatness Measurements of Optical components, using NI Lab-VIEW.

**Workshop and Training Programs**

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- Participated in three Days “**Workshop on Optical Thin Film Coating and Its Industrial Applications**” program sponsored by IDP (DST New Delhi)” at IDDC Ambala, August 2010.

**Publications:**

1. “Simulation of metallic and Metallic Dielectric Photonic Structure using the OptiFDTD software”, ICPO 2009, International Conference on Optics and Photonics, India,
2. Oscillation control electronics for a Quartz Tuning Fork Atomic Force Microscope (AFM) - International Journal of Electrical and Electronics Engineering (*IJEEE*), ISSN (*PRINT*): 2231 – 5284, Volume-I, Issue-II, 2011

**Other Activities:** Membership of Optical Society of India since 2009