INVENTING WITH LIGHT
A Personal Journey

Nabeel A. Riza

UCC Chair Professorship in Electrical Engineering
Head of UCC Department of Electrical & Electronic Engineering
& Associate Academic Member, Tyndall National Institute
University College Cork (UCC)
Ireland
http://eee.ucc.ie

Note: The EEE Dept. LOGO Above is also an Example of an Invention by Prof. Riza.

Public Lecture at the LUMS School of Science & Engineering (SSE), Lahore, April 6, 2012.
Sponsor: Khwarizmi Society; Physics Dept. LUMS and SSE LUMS.
UNIVERSITY COLLEGE CORK, CORK, IRELAND.
Founded 1845
WHAT IS AN INVENTION?

SOMETHING NEW

No One in the World
Has Proposed the Invention
Per Dated and Witnessed
Written, Video & Audio Records
(in Patents, Books, Papers, Presentations)

EXAMPLES OF INVENTIONS:

A New Physical LAW --- Force = Mass x Acceleration

A New Chemical Process ---- Chemical Vapour Deposition (CVD)

A New Made-Made Material --- Silicon Carbide, Synthetic Diamond

A New Design ---- Vacuum Sealing the Filament Light Bulb

A New Language --- Braille (Physical Bumps Coding); Morse Code

A New Concept --- The Internet (interconnected computers)

A New Contraption --- Radar, Television, Camera, Electronic Transistor
IS IT AN INVENTION?

So Called “NEW IDEA” IS BORN in Human Thought

The New Idea is Presented & Recorded (Patent Application, Article, Presentation)

Peer Review of Idea via Check of Prior Art - New or Not New?

NO

Proof Given that IDEA is Not New So NOT an Invention

YES

Improve Idea

“I NEW IDEA” IS BORN & CONFIRMED IN THE WORLD

IDEA DOES WORK and IDEA IS PROVABLE

Idea Does NOT Work

Yes, Idea is New

Idea Presently Not Provable

Idea in Wait-Mode

New Idea Launched
AN INVENTION USING LIGHT

A NEW THERMOMETER IS NEEDED FOR DIRECTLY MEASURING GAS TEMPERATURE IN POWER PLANTS OPERATING OVER 1500 DEGREE-C.

Note: Present Thermometers Break-Down under the Extreme Long-Term Power Plant Conditions

Why?
OPERATING PLANT AT HIGHER TEMPERATURE LEADS TO BETTER SYSTEM EFFICIENCY & GREENER OPERATIONS

The Issued 3 Patents of the New Thermometer


TRUE FRIEND ➔ TRUST & BELIEF ➔ CAN MAKE A NATURAL CO-INVENTOR

• Dr. Frank Perez, Ph.D. Mechanical Engg. Caltech, Caltech Apartment-Mate (1987-89), Co-Founder KAOS Caltech Soccer Team, True Friend, and Colleague & Business Partner on Start-Ups Nuonics, Inc. and Nusensors, Inc.
GE’s H system Gas Turbine

Uses Firing Temperature of 1430 °C

How does Extreme temperature Measurement get done today?

Platinum/Rhodium High Temperature Thermo-Couple (TC) All-Electrical Technology is used to Measure Extreme Temperature

Note: Need to Encase in Custom Magnesia (MgO) or Alumina Insulating Ceramics

TC Thermometers Break-Down under Next-Gen Design (> 1500 °C) Combustion Chamber Conditions

Image courtesy: Cybernetics Technical Industries Inc.
Thermocouple Design

- Dissimilar materials A and B

- Net EMF as measured by the voltmeter is a function of the temperatures $T_0$ and $T_1$ and composition of the two materials (Seebeck effect* --- Thomas Johann Seebeck 1821)

- Net EMF = $V_A(T_1,T_0) - V_B(T_1,T_0)$ measured in volts

EMF: Electromotive Force – Measure of Electric Potential/Voltage

*http://www.uni-konstanz.de/FuF/Physik/Jaeckle/papers/thermopower/node1.html
Is There An Extreme Temperature Sensor Design Without the TC & Optical Fiber Probe Packaging & Reliability Issues?

James Bond --- “Diamonds Are Forever”

Movies Can Inspire an Invention!

Look for a Carbon Base Material – They are Indestructable!
RELIABLE OPTICAL CHIP SOLUTION: THICK SINGLE CRYSTAL SILICON CARBIDE

Melting Temperature ~ 2500 °C
Resistant to Chemical Attack (Acids, Hot Gases)

Excellent Atomic Scale Flatness
Minimal Optical Wavefront Spoiling

High 2.55 Refractive Index
Strong 20% SiC/Air Reflectivity
At EYE SAFE Infrared Band (1550 nm)

Natural Interferometer Chip

Mechanically Robust
-- Handles 1 GPa (10,000 atm) Yield Stress
-- Allows Elastic Deformation in the Small Deflection Regime Due to Pressure

* Refractive Index “n” Changes With Temperature T & dn/dT (Thermo-Optic Coeff.) Changes Quadratically with T

For SiC, can make the 2-Beam Interference Approximation:

\[ P_m = K \cdot R_{FP} \approx K \left[ R_1 + (1 - R_1)^2 R_2 + 2(1 - R_1)\sqrt{R_1 R_2} \cos \theta \right] \]

\[ \theta = \frac{4\pi n(T)d(T)}{\lambda} \]
What is new about our Thermometer?
Uses a Hybrid Access/Packaging Approach

Wireless + Wired Optics

Extremely Hot Thermal Cool Section Isolation
Summary: What is new about our approach?

- Single Crystal SiC + Sintered SiC Probe
- Single material (CTE matched) – Robust frontend for extreme zone
- Temperature Reading Independent of Intrinsic % Increasing Temperature Error

Eliminated Fundamental TC Limitations

Front-End Probe

Unassembled

Assembled
SIGNS OF A PURE INVENTOR OVER A LIFE-TIME  
(Some Inherent & Some Developed Over Time)

• LOVES WHAT HE/SHE DOES

• INDEPENDENCE OF THOUGHT AND ACTIONS

• FEARLESS – AT EASE AT BEING ALONE/ISOLATED- A LONE EXPLORER

• SELF BELIEF IN ONE’S STRENGTHS AND LIMITATIONS

• OBSERVANT OF EVERYTHING [Sight, Sound, Smell, Behaviour (human, animal), etc]

• HUNGER TO LEARN FROM ALL (Competitors, Friends, Strangers)

• ACCEPTANCE OF MISTAKES WITH HUMILITY
SIGNS OF A PURE INVENTOR
OVER A LIFE-TIME
(Some Inherent & Some Developed Over Time)

• SHORT CELEBRATIONS OF SUCCESS AND DOWN TIME FOR FAILURES

• DEEP CONCENTRATION ABILITY AND ABILITY TO BLOCK-OUT (Trance)

• ABILITY TO CHANGE THOUGHT DIRECTIONS WITHOUT REGRET

• ABILITY TO FOCUS AND DEFOCUS WITH EASE (Switch between The BIG picture and The Super Zoomed-In View)

• SEEKS THE TRUTH WITH PROOF VIA HIS/HER INVENTION

• INNOVATION WORKS MOSTLY HAVE SINGLE INVENTORSHIP

• ENHANCED SENSE OF HUMOUR!! (State of a Relaxed Mind)
Proof of Single Inventorship
(26 out of 42 Patents)

INVENTOR OR OTHER?

NOT ANYONE

CAN BE

SHOULD BE

WILL BE

CAN BE TRAINED TO BE

AN INVENTOR

THE ENTIRE BACHELOR’S DEGREE GRADUATING CLASS OF A UNIVERSITY

SOCITIES AND LEARNING INSTITUTIONS MUST FIND AND FOSTER INVENTORS FOR THE BETTERMENT OF HUMANKIND

PURE INVENTORS IN THE CLASS
INVENTORS - PAST and PRESENT
– CONNECTED BY THE KNOWLEDGE TREE –

Strangers Connected by:

• Study the Same Field (e.g., Light, Computing)
• Study the Same Problem (e.g., Making a Better Liquid Crystal Optical Switch)
• Study at the Same Location (e.g., University, Corporation)
• Belong to the Same Culture (e.g., Country)
• Belong to the Same Tradition (e.g., Religion)

Past Inventors - An Inspiration for Present Inventors
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT

MY FIRST YEAR AT CALTECH

RICHARD FEYNMAN (1918 – 1988)
Nobel Prize
Professor, Caltech
Co-Inventor of the Quantum Theory
For Electrodynamics (Light-Matter Interaction Explained via quantum fields)

My Course Instructor: Computation Class 1985

PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT

FELLOW CALTECH ALUMNUS

CHARLES TOWNES
(1918 – )
Nobel Prize

Ph.D. Caltech
Co-Inventor of the LASER

Photo: Orlando, USA Jan. 11, 1999.
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT
TEACHER @ CALTECH

WILLIAM BRIDGES (1934 – )
Professor Emeritus, Caltech
Inventor of the Argon Ion Gas Laser

My Course Instructor: Guided Waves Class 1984-85

Photo: Caltech EE 100 Year Celebration
Nov. 5-6, 2010.
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT
ROLE MODEL INVENTOR @ CALTECH

CARVER MEAD, Ph.D. Caltech (1934 – )

Professor Emeritus, Caltech
Inventor * of the
HEMT Semiconductor Device
Amplifier Circuit used in RF
Electronics
for cell phones, radar, and satellite communications

*Also Co-Invented
VLSI Electronics Design

HEMT: High Electron Mobility Transistor

Photo: Caltech EE 100 Year Celebration
Nov. 5-6, 2010.
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT

MY LAST YEAR AT CALTECH

Born in Pakistan

ABDUS SALAM
(1925 – 1996)
Nobel Prize

Co-Inventor of the
Theory Unifying the
Electromagnetic Force with
The Weak Nuclear Force

Photo: Caltech, 1989, The Year I completed my PhD from Caltech to start my independent invention-based career.

A Role Model
For a Pakistani
Student in his
Formative Years

The Timing
Was Perfect!
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT

@ UNIVERSITY COLLEGE CORK (UCC), IRELAND

George Boole (1815 – 1864)

UCC CHAIR Professor (1849-1864)

Inventor of Boolean Algebra

FOUNDATIONS OF DIGITAL COMPUTERS
John Tyndall
Born Ireland, 1820 – 1893

Discoverer of The Tyndall Effect
Light is scattered by very small particles in its path and SCATTERING IS STRONGER FOR SMALLER WAVELENGTHS

Demonstrator of the water light-pipe, a forerunner To The Optical Fibre

University College Cork is Home to the Tyndall National Institute
PERSONAL JOURNEY WITH INVENTORS - PAST and PRESENT

ACCLAIMED WORLD-WIDE AS THE FATHER OF OPTICS

Iraqi Muslim Scientist

ALHAZEN
(965 – 1039)

Inventor of the
Principle of Light Travels
In a Straight Line &
Design of the Pin-hole Camera
Iraqi Muslim Scientist

KHWARIZMI (770 – 840)

Inventor of Algebra
- Linear & Quadratic Equation Solutions
- Algorithm (Namesake) Methodology
WHY DOES AN INVENTOR INVENT?

MOST HUMANS CAN BE MOTIVATED TO TRY INVENTING BY PROVIDING:

• MONEY

• TITLES AND POSITIONS

• LOCAL, NATIONAL, INTERNATIONAL AWARDS/PRIZES

• SPECIAL WORKING ENVIRONMENTS

• FREE-TIME

• TRAVEL OPPORTUNITIES

• TEACHING TIME REDUCTION OR ELIMINATION FOR ACADEMICS

ACCLAIMED URDU WRITER INTIZAR HUSSAIN (my Uncle) WHEN ASKED:

Why Does He Write? He Replied: Do you Ask a Nightingale why it Sings! IT JUST DOES!

PURE INVENTORS WILL INVENT ANYWAY AS THAT IS WHAT THEY NATURALLY LOVE TO DO!
HOW DOES AN INVENTOR INVENT?

Human Senses/Inputs

- **Light** (Vision: Optical Image)
- **Sound Waves** (Hearing)
- **Mechanical Waves** (Body Vibrations)
- **Radiation Absorption** (Heat)
- **Food & Drink Consumption**
- **Physical Contact & Flows** (Solid, Liquid, Gas)

INFO Flows IN and OUT

- **BRAIN**
  - Long-Term Retained INFO
  - Timed INFO Flows IN and OUT
  - INFO Leaves the Brain

Output

- **NEW IDEA BORN in SUB-SECONDS**
- **NEW IDEA RECORDED** (Can take sub-minutes to Years!)

* Personal Experience
Starting the Invention Process:
“INTUITION”
AND/OR Some times Like a Leap-of-Faith

Indiana Jones – The Last Crusade
The Ravine Crossing Scene
“BREAKING” THE INVENTION

WHEN AN INVENTION IS DECLARED, IT COMES UNDER CRITICISM

THE BETTER THE INVENTION, THE STRONGER THE CRITICISM

GENUINE CRITICISM MAKES THE INVENTION STRONGER FOR A LONGER REIGN

UNINFORMED CRITICISM DIVERTS AND DISTRACTS FROM THE INVENTION

SIMPLER AND CLEARER THE INVENTION, THE HARDER TO “BREAK” THE INVENTION REIGNS SUPREME FOR A LONG TIME

Example Inventions

The DOT

Connect Dots = Line (A New Invention)

The Wheel
Ludwig Mies van der Rohe (1886-1969) – Inventor Architect

“Less is More*”
Finding Perfection in Purity

Illinois Institute of technology (IIT)*, Chicago

Google Doodle March 27, 2012 Celebrating Mies’s Birthday

** Author: BS EE IIT 1984.

THE INVENTOR’S CLimb

SMALL STEPS IN THE CLIMB FOR CLEAREST VISION

Year Count

Patent Count

Becoming a Dept. Head in the EU Academic Framework

Becoming an Independent Academic Research Lab. Leader & Entrepreneur and Optimizing Inventive Efficiency

THE BIG TEST: Becoming an Independent Inventor (Soaring Confidence in Time)

Intense Pressure & Soul Searching Years

Increasing Hard Competitive Study Years

Loafing Years (Fishing, Pranks)

Area of Triangle = Acquired Knowledge

* 1982 MIT Transfer Offer from Marilee Jones MIT Admissions Officer Turned Down by N. Riza as Transfer Not Allowed To EE Dept.

July 2011 (Leave USA @ 48)

Jan. 1995 (Leave a Major Corporation @ 32)

Oct. 1989 (Leave College @ 26)

August 1981 (Leave Home @ 18)

Born 1962

July 2011 (Leave USA @ 48)

Jan. 1995 (Leave a Major Corporation @ 32)

Oct. 1989 (Leave College @ 26)

August 1981 (Leave Home @ 18)

Born 1962

5 Years Home, Karachi

4 Years Convent

3 Years Grammar School

2 Years Aitchison College

* 3 Years IIT Chicago

5 Years St. Anthony’s Lahore

4 Years Home, Karachi

People Count

Area of Triangle = Acquired Knowledge

* 1982 MIT Transfer Offer from Marilee Jones MIT Admissions Officer Turned Down by N. Riza as Transfer Not Allowed To EE Dept.
Feb. 2002, Dr. Khurram Afridi (Colleague from Caltech days) Requests I Give a Talk on People and Technology at the April 2002 Pak-Millennium Conference on Higher Education in Pakistan, being held Boston, USA. (Official Invitation Letter March 20, 2002 from Dr. Adil Najam, Chairman Conference)

Dr. Afridi says: Prof. Hoodbhoy will do “People”, so I should address the Topic of “Money”

I wonder! What can I Say about Money? I Start Thinking in “Invention” Mode

Uh! People with Money & Concern for Education Will be at the Conference!

Why not Show Them a Plan that shows that Investing Money in a Small World Class Technology University WILL MAKE EVERYONE MONEY

The Investors, University Administrators, Faculty, Staff, and Student Graduates A WIN-WIN FOR ALL (I WAS IN VENTURE CAPITAL (VC) PRESENTATION MODE IN 2002)

Delivery of the “Plea” and Blue-Print for the Small Technological University on April 14, 2002.
Towards a World-Class Research University in Science and Technology -
Money is Critical but Not Enough

By
Nabeel A. Riza
April 14th, 2002
Boston, USA

N. A. Riza is Full Professor at College of Optics/CREOL, University of Central Florida, USA and Founder of Nuonics, Inc.
# PAK-MILLENNIUM CONFERENCE 2002

**Higher Education in Pakistan – Challenges for Reform**

Hariri Auditorium  
Boston University School of Management  
595 Commonwealth Avenue, Boston, MA 02215

Sunday, April 14, 2002

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<tr>
<td>8:30 – 9:00 am</td>
<td>Registration</td>
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<td>9:00 – 10:30 am</td>
<td>Setting the Stage</td>
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| Dimensions of the crisis | Dr. Tariq Banuri  
Senior Research Director, Stockholm Environment Institute-Boston |
| Current reform efforts | Dr. Shamsh-Kassim Lakha  
President, Aga Khan University and Chair, Steering Committee on Higher Education |
| Moderator: | Hasan Usmani  
Axim Systems |
| 10:30 – 12:15 pm | Reform at the University Level |
| People | Dr. Pervez Hoodbhoy  
Professor of Physics, Quaid-e-Azam University, Islamabad |
| Money | Dr. Nabeel Riza  
Professor of Optics and Electrical Engineering, University of Florida and CEO, Nuonics, Inc. |
| Governance | Dr. Hamid Kizilbash  
Ali Institute of Education, Lahore and Former Professor of Political Science, Punjab University, Lahore |
| Management of Reform | Dr. Tahir Andrabi  
Associate Professor of Economics, Pomona College |
| Moderator: | Duria Farooqui  
Research Associate, Kennedy School of Government, Harvard University |
PROOF
OF
INVENTION

The Stage is SET.

Mr. Syed Babar Ali
Founder & Benefactor, LUMS
Financial Engine of a Research University

Traditional Sources of Money
Federal, State, Industry

Equity Positions

Joint Research Projects

Output of University Research

Incubator Spin-off Companies

Technology Transfer Patent Income

Taxes

Jobs

Donations

Qualified Professionals
New Ideas
New Companies

Regional Economic Growth

Direct

The PATH to the LUMS School of Science & Engineering (SSE)

ALL INVENTIONS MUST PROVIDE VERIFIABLE PROOF

The Official Boston 2002 Conference Report States:

Dr. Nabeel Riza

Dr. Nabeel Riza dwelled on the idea of establishing a world class research university in science and technology in Pakistan. Money is a critical factor, he stated, but it is not enough. Although a society needs educated people at all levels including high school, college, and university graduates, it is important to invest in few to create a quality institution of research. You need few highly educated and competent people to pursue and sustain high technology research activities, he argued. Very few people, for instance, in the US are supported by the industry. Dr. Riza suggested that a team of world class researchers should be brought to Pakistan to build institutions of excellence. Active or former successful scientists and engineers should be gathered for this purpose, he further added. Dr. Riza stressed the importance of creating a “pristine” small environment that would have a great impact on the nation. He advised that traditional and novel sources of money should be exploited for the purpose of establishing the institute. In the US, for example, federal government, state, and industry are major sources of finances for research institutes. In addition, alumni and community also provide funds for research. The research institute in Pakistan could carry out small-scale innovative and balanced research programs supported by the industry, he suggested. Furthermore, the enormous investment should connect to concrete and new products for the industry. He also suggested that a multi-university research center could be established in Pakistan to pursue inter-university collaborative projects.
INVENTING FOR HIGHER EDUCATION IN PAKISTAN
The PATH to the LUMS School of Science & Engineering (SSE)

Boston Conference Talk Slides on Request Provided to Dr. K. Afridi April 2002

2002-2004 Mr. Syed Babar Ali appoints Dr. K. Afridi as LUMS SSE Projector Director & Project Office & Admin. Team Assigned on the LUMS Campus

N. Riza involved in Early SSE Planning (Faculty Ads & Selection, Tenure Debate, Dean Recommendation (A. Abidi)

1st SSE Development Workshop at LUMS, Jan 2-3, 2005
1st SSE Virtual Project Development Team (VPDT) Meeting, Woburn, MA, March 26, 2005

N. Riza UCLA EE Dept Seminar March 14, 2005 (Briefs A. Abidi on formation of SSE and Available Dean Position)
Early SSE Faculty Applicant M. Sabieh Anwar May 19, 2005 (now with Physics, SSE)
1st SSE Advisory Committee Meeting, Boston, MA, July, 2005

1st SSE Dean Appointed @ LUMS March 2007 – Prof. A. Abidi (from UCLA)

1st Batch of SSE Students Admitted Fall 2008
1st Batch of SSE Student Graduates Expected Spring 2012
Actions and Not Words – Educating the Next Inventors

Prof. Abdus Salam’s Advice to Me (1989)

Remember to Help the 3rd World even if you need to make your Career Elsewhere.

*Sample of Ph.D. Students & Post-Docs (PD) Trained 1995-2011 from the 3rd World

From Thailand

Dr. Sarun (Ph.D.)
Director
Thai National Lab. (NECTEC)

2005 Winner
ICTP/ICO Award

Abdus Salam ICTP
Trieste, Italy

From Pakistan

Dr. Junaid, M.Phil. QAU (PD)

GIKI EE Dept. Head

Dr. Zahid, M. Phil. QAU (Ph.D.)
Dr. Muzammil, BS NED (Ph.D.)
Dr. Sajjad BS Naval College/NUST (Ph.D.)
Dr. Farzan BS GIKI (Ph.D.)

Dr. Mumtaz (Ph.D.) BS Comp. Science 2004, LUMS
Accepted LUMS Offer April 2012.

4 SSE LUMS Applicants
for 2012 UCC EE PhD Position with FULL Scholarship

1 SSE Student Selected for UCC

* A Special Thank You to ALL my Co-workers including colleagues at GE, Nuonics, & PIPS Lab. Undergraduate and graduate students and Post-Docs.
Request to the LUMS Board

THE TIME IS RIGHT!

*LUMS
SSE
Building

GRADUATION PRESENT
FOR THE 1ST GRADUATING SSE CLASS 2012

LUMS:
LAHORE UNIVERSITY OF MANAGEMENT SCIENCES

LUMS:
LAHORE UNIVERSITY OF MANAGEMENT AND SCIENCE

Slight Name Change – Global Impact

The “New” LUMS:
LAHORE UNIVERSITY OF MANAGEMENT AND SCIENCE *

The New York Times

DEC. 18, 2009

“Mr. Ali is an institution in Pakistan. He has started some of the country’s most successful companies. But perhaps his most important contribution has been his role in creating the Lahore University of Management and Science, or L.U.M.S., begun as a business school but now evolved into the approximate equivalent of Harvard University in Pakistan.”

Note: The LUMS Name Change Originally Suggested by author in 2004. This name also appeared in: “One Pakistani Institution Places His Faith in Another,” New York Times Article by SABRINA TAVERNISE Published in The Saturday Profile Section, December 18, 2009.
THANK YOU TO MY TEACHERS & MENTORS

Mr. Fardy (Science/Physics – St. Anthony’s Lahore 1973)
Ms. Zareen Bashrat (Biology – St. Anthony’s Lahore 1975-78)

Mr. Hafeez Farouqi (Maths – Private Tutor, Education Dept. Lahore– 1976-78)

Mr. A. D. Bhatti (Maths – Aitchison College – 1979-80)

Prof. Deborah Holdstein (English, IIT Chicago, 1981-84)
Prof. Thomas Wong (Electrical Engg, Circuits & Networks,  IIT Chicago, 1981-84)
Prof. S. Meerkov (Electrical Engg, Controls, IIT Chicago, 1981-84)
Prof. H. Messenger (Electrical Engg, E & M, IIT Chicago, 1981-84)

Prof. E. Posner (Electrical Engg, Comm., Caltech, 1984-89)
Prof. C. Papas (Electrical Engg, E & M, Caltech, 1984-89)
Prof. D. Psaltis (Ph.D. Supervisor; Electrical Engg, Caltech, 1984-89)

Dr. Bruce Griffing (Lab. Head, GE Corp. Research Center, Schenectady, 1989-95)
THANK YOU
FOR THE INVITATION

“Special Thank You to My Family Members”
Inventing with Light - A Personal Journey

Personal journey of an inventor in optics, rising from Karachi to solving pressing problems in global engineering and higher education...

Date: Friday, April 06, 2012 at 2:30 p.m.
Venue: SSE Building Complex 10-301
Lahore University of Management Sciences (LUMS)
Opposite Sector U, DHA, Lahore 54792

Speaker

Professor Dr. Nabeel A. Riza

UCC Chair Professorship in Electrical Engineering
Head of Electrical Engineering
University College Cork, Ireland
Recipient of Abbe Medal
International Optical Society Fellow Award
2007 IEEE Fellow Award and the 2010 IEEE Distinguished Lecturer Award

For abstract:
http://www.khwarizmi.org
http://physics.lums.edu.pk
Inventing with Light - A Personal Journey

Abstract

This talk highlights the inventing process – the preparation involved and the small steps to the greater achievements. From his early days as a school boy in Karachi and Lahore to the foundational technology training sites in Chicago, Pasadena, and Schenectady-New York, relayed is a personal journey as an inventor for solving pressing problems in international level engineering and in higher education for Pakistan.

Author N. A. Riza Brief Biography

Born in Karachi, 1962, Dr. Riza attended secondary school at St. Anthony’s High School (SC 78) and Aitchison College (HSC 80). He received his BS (EE 84) degree from the Illinois Institute of Technology (IIT) and his MS (EE 85) and PhD (EE 1989) degrees from the California Institute of Technology (Caltech). In 2001, he received the International Commission for Optics ICO Prize and the E. Abbe Medal from Carl Zeiss Foundation-Germany, considered the world’s top prizes for optical scientists under 40 years of age. His other notable awards include the 1998 International Optical Society Fellow Award, 2007 IEEE Fellow Award, 2009 Ireland Science Foundation Walton Award, and the 2010 IEEE Distinguished Lecturer Award. Dr. Riza has been awarded 42 Patents and has 300 international publications to his credit.