“Through the Faculty for the Future fellowships, we aim at bringing down the economic barrier that would otherwise prevent outstanding women scientists from pursuing their education and life dream.”

Ms. Roseline Chapel
President,
Schlumberger Foundation
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Introduction

Word from the President

Through the Faculty for the Future program of the Schlumberger Foundation, we are committed to supporting talented women scientists from developing countries by helping them to pursue advanced graduate studies at leading universities abroad. By tackling the economic barrier that prevents outstanding women scientists from pursuing PhD and postdoctoral level research, this program is focused on reducing the gender gap in STEM.

Upon completion of their studies and returning to their home country, the Alumnae of the Faculty for the Future program sow the seeds that will help nourish economic, social and technological growth by strengthening the academic and research faculties of their institutions, and actively engage in public policy issues to advance societal development.

The progressive growth of a solid international network of women scientists and researchers who are now part of this program provides a platform where they can interact with one another, encourage each other and help strengthen their confidence in their own abilities to promote and become part of the decision-making process in the key socio-economic developments of their home regions.
Financial Overview

In 2015, the Schlumberger Foundation continued to focus entirely on its flagship Faculty for the Future program providing advanced academic opportunities in STEM disciplines to female scientists from the developing world by supporting their studies in renowned universities and research institutes to gain international experience and become equipped with new sets of technical and research skills.

Key to this program is the goal of contributing to decreasing the gender gap in STEM activities by reducing barriers that prevent women from achieving their educational aspirations. The progressive growth of a solid international network of women scientists and researchers who are now part of this program provides a platform where they can interact with one another, encourage each other and gradually strengthen their confidence in their own abilities to promote and become part of the decision-making process in the key socio-economic developments of their home regions.

The Faculty for the Future program continued to attract high quality applications. A record 1,033 new applications representing an 84% increase year-on-year (YoY) were submitted for the 2015 selection.

In addition, 137 renewal applications were submitted marking a 51% increase from the previous year. Following a rigorous, elaborate selection process involving 4 different rounds and the dedicated involvement of over 35 Schlumberger scientists, 155 new fellows were admitted in 2015 bringing the total population who has received financial support from this program to 560 female scientists coming from 78 developing countries and studying in 27 host countries around the world.

Grant spend increased by 16% YoY reaching $8.6M. A total of $3.5M was disbursed to grantees studying in universities in the US (vs $3M last year) while $3M was disbursed to grantees in the UK (vs $2.3 last year). The remainder was disbursed to students at universities in Australia, Canada, Europe, Japan, Malaysia and South Africa.
Faculty for the Future Program

Recipients of the 560 Faculty for the Future Fellowships awarded to date come from developing and emerging economies representing most of the world’s continents. They have benefitted from attending leading research institutes in 27 host countries around the world.

In 2015 the choice of disciplines continued to embrace the core scientific domains (chemistry, physics and mathematics) while other fields such as civil & environmental engineering, agriculture, bioengineering, environmental sciences, computer engineering, hydrology, nutrition and medicine were also prominent with many research projects directly focused on home country related issues.
THE FACULTY FOR THE FUTURE PROGRAM IN 2015 CITIZENSHIP VS STUDY

560 FELLOWS FROM 78 COUNTRIES STUDYING IN 27 HOST COUNTRIES

AMERICAS
1. United States: 206
2. Canada: 24
3. Mexico: 1 / 13
4. Colombia: 11
5. Brazil: 7
6. Peru: 4
7. Argentina: 3
8. Ecuador: 3
9. Costa Rica: 2
10. Nicaragua: 2
11. Venezuela: 2
12. Bolivia: 1
13. Dominican Rep.: 1
14. El Salvador: 1
15. Guatemala: 1
16. Guyana: 1
17. Paraguay: 1
18. Trinidad & Tobago: 1

EUROPE
19. United Kingdom: 153
20. Germany: 26
22. France: 10
23. Belgium: 9
24. Sweden: 7
25. Italy: 4
26. Finland: 2
27. Spain: 2
28. Austria: 1
29. Denmark: 1
30. Ireland: 1
31. Norway: 2
32. Russia: 1 / 13
33. Switzerland: 1
34. Ukraine: 2

MIDDLE EAST
35. Turkey: 10
36. Iran: 9
37. Jordan: 4
38. Iraq: 3
39. Palestinian Territories: 3
40. Syria: 2
41. Kuwait: 1
42. Oman: 1
43. Yemen: 1

AFRICA
44. South Africa: 40 / 4
45. Kenya: 1 / 22
46. Nigeria: 78
47. Ghana: 20
48. Uganda: 14
49. Zimbabwe: 14
50. Egypt: 11
51. Tanzania: 10
52. Ethiopia: 8
53. Sudan: 7
54. Cameroon: 5
55. Madagascar: 5
56. Algeria: 4
57. Namibia: 4
58. Rwanda: 4
59. Zambia: 4
60. Lesotho: 3
61. Malawi: 3
62. Benin: 2
63. Botswana: 2
64. Mozambique: 2
65. Liberia: 1
66. Libya: 1
67. Mauritius: 1

OCEANIA
68. Australia: 25
69. New Zealand: 3
70. Papua New Guinea: 2
71. Fiji: 1

*Fellows* refers to current and former grantees of the program.
### The Faculty for the Future Program in 2015: University vs Degrees

560 Fellows from 78 Countries Studying in 27 Host Countries

#### United States
- 15 Massachusetts Institute of Technology
- 12 Texas A&M University
- 9 Georgia Institute of Technology
- 9 Harvard University
- 7 University of Texas at Austin
- 6 Pennsylvania State University
- 6 University of California, Irvine
- 6 University of Illinois at Urbana–Champaign
- 5 California Institute of Technology
- 5 Carnegie Mellon University
- 5 Purdue University
- 5 Stanford University
- 5 University of Florida
- 4 Columbia University
- 4 Cornell University
- 4 Rice University
- 4 University of Georgia
- 4 Auburn University
- 3 Duke University
- 3 Johns Hopkins University
- 3 Louisiana State University
- 3 North Carolina State University
- 3 University of Arizona
- 3 Arizona State University
- 2 Boston University
- 2 Iowa State University
- 2 Northeastern University
- 2 Northwestern University
- 2 Ohio State University
- 2 Oklahoma State University–Stillwater
- 2 Princeton University
- 2 Rutgers University–New Brunswick
- 2 South Dakota State University
- 2 Syracuse University
- 2 Texas Tech University
- 2 University of California, Berkeley
- 2 University of Michigan
- 2 University of North Carolina at Chapel Hill
- 2 University of Notre Dame
- 2 University of Pittsburgh
- 2 University of South Florida
- 2 University of Texas at Austin
- 2 University of Wyoming
- 2 Yale University
- 1 Argonne-Northwestern Solar Energy Research Center
- 1 Arizona State University
- 1 Brandeis University
- 1 Colorado School of Mines
- 1 Drexel University
- 1 George Mason University
- 1 Indiana University—Purdue University Indianapolis
- 1 Michigan State University
- 1 Missouri University of Science and Technology
- 1 Montana State University
- 1 National Institutes of Health (NIH, Bethesda)
- 1 New Jersey Institute of Technology
- 1 New York University
- 1 Ohio University
- 1 Polytechnic Institute of New York University
- 1 State University of New York, University at Buffalo
- 1 Tennessee Technological University
- 1 The Scripps Research Institute
- 1 University at Buffalo
- 1 University of California, Santa Barbara
- 1 University of California, Davis
- 1 University of California, Santa Cruz
- 1 University of Colorado Boulder
- 1 University of Connecticut
- 1 University of Houston
- 1 University of Illinois at Chicago
- 1 University of Maryland, College Park
- 1 University of Massachusetts
- 1 University of Miami
- 1 University of Minnesota
- 1 University of Nebraska–Lincoln
- 1 University of South Florida
- 1 University of Utah
- 1 University of Washington
- 1 Vanderbilt University

#### United Kingdom
- 29 University of Cambridge
- 11 University of Manchester
- 11 University of Nottingham
- 9 Imperial College London
- 8 University of Southampton
- 7 University College London
- 7 University of Oxford
- 6 University of Leeds
- 5 Lancaster University
- 5 University of York
- 4 University of Reading
- 4 University of Strathclyde
- 4 University of Surrey
- 3 King’s College London
- 3 Newcastle University
- 3 University of Glasgow
- 3 University of Leicester
- 3 University of Sheffield
- 2 Loughborough University
- 2 University of Aberdeen
- 2 University of Bath
- 2 University of Birmingham
- 2 University of Dundee
- 2 University of Stirling
- 2 Cardiff University
- 2 Cranfield University
- 2 Durham University
- 2 Keele University
- 2 Plymouth University
- 2 Queen’s University
- 2 Robert Gordon University
- 2 St George’s, University of London
- 2 The University of Edinburgh
- 2 University of Essex
- 2 University of Greenwich
- 2 University of Huddersfield
- 2 University of Hull
- 2 University of London
- 2 University of Portsmouth
- 2 University of Wolverhampton

#### South Africa
- 15 University of Cape Town
- 8 Stellenbosch University
- 5 University of the Witwatersrand
- 3 Rhodes University
- 3 University of Pretoria
- 2 Tshwane University of Technology
- 1 Pretoria University
- 1 Nelson Mandela Metropolitan University
- 1 University of Johannesburg
- 1 University of KwaZulu-Natal
- 1 University of the Western Cape

#### Germany
- 2 Hamburg University of Technology
- 2 Technical University of Berlin
- 2 University of Bonn
- 2 University of Leipzig
- 1 Carl von Ossietzky University
- 1 Centre for Solar Energy and Hydrogen Research Baden-Württemberg
- 1 Chemnitz University of Technology
- 1 Darmstadt University of Technology
- 1 Europa University Flensburg
- 1 Free University of Berlin
- 1 GEOMAR Helmholtz Centre for Ocean Research
- 1 Hamburg University of Applied Science
- 1 University of Düsseldorf
- 1 Humboldt University of Berlin
- 1 Ruhr University Bochum
- 1 Hertie School
- 1 Saarland University
- 1 Technical University of Munich
- 1 University of Konstanz
- 1 University of Kassel
- 1 University of Saarland
- 1 University of Ulm

#### Australia
- 23 University of Queensland
- 3 University of Sydney
- 2 James Cook University
- 2 University of New South Wales
- 2 University of Technology Sydney
- 2 Curtin University
- 2 Flinders University
- 1 The Australian National University
- 1 Queensland University of Technology
- 1 University of Melbourne

#### Canada
- 4 McGill University
- 3 McMaster University
- 3 University of British Columbia
- 3 University of Waterloo
- 2 University of Alberta
- 2 University of Toronto
- 1 University of Western Ontario
- 1 École Polytechnique de Montréal
- 1 Institut National de la Recherche Scientifique
- 1 Queen’s University
- 1 University of Calgary
- 1 University of Victoria
- 1 University of Western Ontario

#### Belgium
- 7 Ghent University
- 1 Katholieke Universiteit Leuven
- 1 University of Mons

#### France
- 2 University of Paris Sud 11
- 1 Centrale Graduate School
- 1 Ecole Superieure du Bois
- 1 ICube, University of Strasbourg
- 1 Joseph Fourier University
- 1 National Graduate School of Engineering and Research Center
- 1 SUPAERO Institute of Aeronautics and Space Technology
- 1 University of Franche-Comté

#### Sweden
- 4 Stockholm University
- 3 Uppsala University
- 2 University of Gothenburg
- 2 University of Lund
- 1 Uppsala University

#### Italy
- 2 Politecnico University of Milan
- 1 University of Pisa
- 1 University of Trieste

#### New Zealand
- 2 Auckland University of Technology
- 1 University of Canterbury

#### Netherlands
- 7 UNESCO-IHE Institute for Water Education
- 4 Delft University of Technology
- 3 University of Groningen
- 3 Utrecht University
- 2 University of Amsterdam
- 2 University of Groningen
- 1 University of Medical Center Groningen
- 1 University of Twente
- 1 Wageningen University

#### Japan
- 4 Kyoto University
- 2 Kyushu University
- 2 Tokyo Institute of Technology
- 1 Chiba University
- 1 Hokkaido University
- 1 Keio University
- 1 The University of the Ryukyus
- 1 Tokyo University of Agriculture and Technology

#### Finland
- 1 University of Helsinki
- 1 University of Oulu

#### Indonesia
- 1 Bandung Institute of Technology
- 1 Telkom Institute of Technology

#### Malaysia
- 1 Technological University of Malaysia
- 1 Universiti Teknologi Mara

#### Norway
- 1 Norwegian University of Life Sciences
- 1 Norwegian University of Science and Technology

#### Spain
- 1 Polytechnic University of Valencia
- 1 University of Barcelona

#### Austria
- 1 Vienna University of Technology

#### China
- 1 China University of Petroleum

#### Denmark
- 1 Technical University of Denmark

#### Ireland
- 1 University College Cork

#### Kenya
- 1 Jomo Kenyatta University of Agriculture and Technology

#### Mexico
- 1 National Autonomous University of Mexico

#### Russian Federation
- 1 Moscow Institute of Physics and Technology

#### Switzerland
- 1 Eawag, Swiss Federal Institute of Aquatic Science and Technology
Grant Selection Process Revised

The online application website opens in September of each year and closes by mid-November. The final selection of candidates is made by the Schlumberger Foundation Board in March of the following year following a rigorous Selection Process. In 2015, over 800 new grant applications and 186 renewal grant applications were submitted to the Faculty for the Future program.

The competition for a grant is keen and highly selective. In light of the increasingly high volume of applications received each year and in order to ensure continued impartial evaluation of each candidate, the Selection Process was revised at the end of 2015 to render it even more rigorous and objective. This newly revised Selection Process outlined below will be used to evaluate applications going forward.

The Selection Process is comprised of 3 distinct rounds. 

In Round 1, all applications are reviewed for general eligibility: i.e., quality, completeness, coherence and relevance of the discipline chosen in line with the core objectives of the Faculty for the Future program. In Round 2, a panel of scientists from different Schlumberger Research Centers is invited to review a set of applications each. The reviewers are tasked with the selection of the most appropriate applications in their batch to go forward for an interview in Round 3 by Schlumberger Foundation Board Managers and other Management Executives of Schlumberger.

A set of scoring guidelines has been devised to help Scientists in Round 2, and Interviewers in Round 3, to assign an objective score to a pre-defined set of criteria. So, in Round 2 for instance, scientists evaluating an application will be provided with a scale of scores from “0” to “3” for criteria relating to such items as academic performance, references from home and host university supervisors, or the collaboration potential between host and home universities. Each score has a pre-defined expectation level that indicates the extent or the lack of achievement or success that each criterion might demonstrate. To illustrate, an application possessing stellar academic grades and reference letters that clearly endorse the candidate from her past experience and future potential would receive a “3” while a candidate with average academic grades and satisfactory reference letters would receive a “2”. However, the Faculty for the Future Selection Process does not rely entirely on total overall scores in order for an applicant to be approved for an award. Other equally important factors are taken into account such as the relevance of the research topic to the home country of the applicant and the choice of Host University in relation to the research proposal. Lastly, each applicant is considered in light of the overall fit with the principal objective of the program which is to close the gender gap in STEM in developing countries.

In Round 3, during the interview phase, the same approach as above is applied to a pre-defined set of criteria that cover a range of skills including the applicant’s past and current engagement with youth or women in STEM, communication skills and role model potential, as well as the prospective future impact an applicant may have on the core goals of the Faculty for the Future program.

This revised Selection Process will be applied for the first time to applications submitted for the 2016-2017 grant awards.
Boston Faculty for the Future Forum

Faculty for the Future Forums are organized each year to bring together current and former Faculty for the Future Fellows and Alumnae.

Since the program’s inception in 2004, the Schlumberger Foundation has hosted 13 meetings for its Faculty for the Future community of Fellows and Alumnae in the United Kingdom (London and Cambridge), in France (Paris and Clamart), in the United States (New York, Cambridge and Houston) and in the United Arab Emirates (Abu Dhabi). These in-person meetings are hosted in close proximity to and in association with universities where the grantees are pursuing their studies. With approximately 30 to 70 grantees in attendance, a regional Forum provides an opportunity for participants to share research and life experiences, to initiate international collaborations, to learn techniques to communicate their research, to meet and network with well-known scientists and other accomplished leaders who might act as career mentors, and to discuss such topics as work / life balance.

The ultimate goal is to create a community of women leaders in science, technology, engineering and mathematics (STEM) who will support the socio-economic development of their native regions by strengthening the faculties in their home universities through teaching and conducting research into relevant local challenges, inspiring other young women to pursue STEM careers, and use their scientific expertise to influence policy making and catalyze socio-economic development locally and internationally.
The Schlumberger Foundation hosted its 13th Faculty for the Future Forum for the community in Cambridge, Massachusetts from November 10th to 13th, 2015. The overall theme was STEM entrepreneurship, and the attendees included 55 Fellows from 26 developing countries and studying at 40 universities in the US and Canada.

Throughout the three-day session, the Fellows had the opportunity to collaborate, learn from each other and to network with accomplished scientists who could act as mentors for these Fellows during their future careers. Through learning sessions, panel discussions and breakout meetings, participants heard from leaders in STEM on topics such as overcoming obstacles that could still be preventing women from pursuing these fields, and how to support the up and coming generation of young women in STEM.

"Through the Faculty for the Future Forum" says Roseline Chapel, President of the Schlumberger Foundation, “our ambition is to ignite the power of each Fellow within a network of like-minded women who have the potential to change the world beyond their own actions. Not only do they bring innovation and knowledge to resolve world challenges in their countries of origin, they also offer extremely powerful and inspiring guidance to generations to come through the role model that they are becoming.”

The next Faculty for the Future Forums are planned to take place, in Cambridge in the United Kingdom and Cape Town in South Africa in 2016.
Research Impact on Home Country and Regions

This section takes a look at some of the positive impacts that the advanced research projects of a selection of Fellows of the Faculty for the Future program are having on their home country or region. The five projects below illustrate how skilfully these women have used their scientific talents to tackle major issues in their home countries and come up with new, innovative solutions that will have a long term impact at local and country level and in many cases, with a global outcome as well.

These research topics take us on a voyage to cities such as Bangalore in India where intelligent transportation networks help alleviate traffic jams currently inflicting up to 500% increased travel times on its commuters; or to Kabul in Afghanistan where the health of the country’s population will soon benefit from an award-winning, novel radiation detector; or to the top of the Andean mountains, for instance, in Peru where the adaptive response mechanisms of important crops are studied to understand how they survive in extremely harsh environmental conditions.
Arifa FAROOQI

Identification of Quantative Trait Loci (QTL) for resistance to Fusarium Head Blight (FHB) in wheat

Arifa FAROOQI was born in Thana, Malakand, in the Khyber Pakhtunkhwa (KPK) province of Pakistan—one of the most remote and least developed areas of the country, surrounded by high mountains rich with natural resources. Her father died suddenly when she was fourteen years old and her mother had to quickly learn how to manage the family finances. The example, encouragement, and support shown by her mother inspired Arifa to strive for a meaningful and productive life.

Arifa obtained a BSc in Agriculture at the KPK Agricultural University in Peshawar, specializing in plant breeding and genetics. As a top student, she received a prestigious Presidential Award and stayed on at KPK University to earn an MPhil in Biotechnology and Genetic Engineering. Once again, her results were acclaimed with a higher education commission merit scholarship.

Returning to her hometown, Arifa took a position as a lecturer at the University of Malakand (UOM), the first newly established institute in the region. In 2013, she was awarded the Schlumberger Foundation Faculty for the Future Fellowship in addition to the Vice-Chancellor’s Scholarship for Research Excellence to pursue a PhD in Crop Pathology in the School of Biosciences, at the University of Nottingham in the United Kingdom.

Arifa’s PhD research has focused on fungal diseases that affect wheat, Pakistan’s principal crop, and more specifically on Fusarium Head Blight (FHB) resistance in wheat, a devastating disease causing yield losses and grain contamination with harmful mycotoxins representing a serious health hazard to humans and animals when they exceed regulatory levels. Studies at Nottingham have identified traits in wheat that could be used to map and characterize stretches of DNA known as quantitative trait loci (QTL), linked to diseases. Arifa’s research has focused primarily on identifying the morphology traits and novel QTLs for resistance to FHB in wheat.

Arifa is on track to successfully defend her PhD thesis next Winter, after which she plans to return to teach at UOM where she is keen to establish her own laboratory and continue research on wheat. The outcome of her research is threefold: it will enable producers to grow wheat varieties in a short time span with high FHB resistance, thereby reducing the risk of mycotoxins accumulating in grains; this in turn will help small scale farmers to combat FHB disease and reduce the high costs of fungicide use. Lastly, the food and livestock industries will benefit from control over heavy economic losses due to contaminated food and feed stuff, enabling them to compete on the international market.

Developing a research network and building on collaborations with her colleagues and experts in this field will be a high priority for Arifa upon her return, to help implement wheat disease control strategies with special focus on food quality control systems. The outcome of her research will ultimately benefit both the health of the consumer and the country’s economy.
Thais HUARANCCA REYES

Adaption in Andean Crops to Environmental Changes: physiological and molecular traits in response to UV stress

Thais HUARANCCA REYES was born in Lima, the capital of Peru. She grew up in a family that faced economic hardship but placed great value on equal opportunities for men and women. In 2006, Thais obtained a BSc in Chemistry from the Pontifical Catholic University of Peru (PUCP) followed two years later by a Licentiate degree—a professional chemist title. After an assignment as a lecturer in the Chemistry Department at PUCP for a couple of years, Thais started a doctoral course at Hokkaido University, in Japan, jointly financed by her home university and the Japanese government. Three years later she obtained a PhD in Life Science followed by a brief postdoctoral research fellowship at Hokkaido University.

Thais was awarded a Faculty for the Future Fellowship this year to enable her to bring her research to a level that will position her in a distinct and strategic niche in the field of global change biology which will be a priority for future funding that both the Peruvian National Science and Technology Council (CONCYTEC) and the National Agricultural Innovation Program (PNIA) plan to allocate within the next five years. Upon completion of her post-doctoral research work in the department of Agriculture, Food and Environment in the University of Pisa in Italy, Thais will also be in a position to develop a research line robust enough to apply to the Peruvian CONCYTEC MAGNET program which awards funds for the repatriation of young Peruvian researchers.

Thais’s research is focused on understanding how plants can survive in severe environmental conditions using crops found in Peru that can survive long periods of drought, freezing temperatures and high ultraviolet radiation. The crops being studied include Quinoa (Chenopodium quinoa), Maca (Lepidium meyenii) and Mashua (Tropaeolum tuberosum) all of which have particular importance not only in South America but also worldwide for their high energy value and nutraceutical properties. Thais is exploring the adaptive response mechanisms of these plants to environmental stresses that are the direct result of factors including climate change, ozone depletion and ultraviolet radiation, the latter which is especially elevated in crops cultivated at high altitudes such as in the Andean region.

Since there is little information currently available on the effects of UV radiation on these Andean crops, this research will open up new perspectives for scientists trying to improve environmental stress management and crop productivity.

In addition, the social impact at a local level has enriched her work even more as Thais has had to work closely throughout the whole research period with local farmers in Peru who are also keen to improve their crop yield and manage environmental stress.

Thais has the strong support and encouragement of her home university because of her involvement with a recognized host institution, the University of Pisa and the new, pertinent angle of her research involving Andean crops. It is her goal to lead a research group back home taking the extensive flora of Peru as her research topic and studying their survival mechanisms in extreme environmental conditions while building on the international networks and collaborations she has already begun to nurture abroad.
Shakardokht JAFARI

Novel Applications of Glass Beads as Dosimeters in Radiotherapy

Shakardokht JAFARI was born in Daikondi province, Afghanistan. As there was no school in her village, her father—a teacher—taught lessons in their home. When Shakardokht was six years old, her family was forced to flee Afghanistan for security reasons. All through her childhood and adolescent years as a refugee, she continued to attend school and gently but firmly opposed her family’s wish that she take the traditional route of an arranged marriage at a young age. Through sheer determination and love of science she secured an UNHCR DAFI refugee scholarship which enabled her to obtain a BSc in Radiology.

Shakardokht returned to Afghanistan in 2004 as an assistant lecturer at Kabul Medical University (KMU) where she developed her research interest in the field of cancer treatment facilities which are practically nonexistent in Afghanistan. Today, with international support, KMU is establishing its own Radiation Oncology center with a Radiation Therapy facility which is an effective but complex treatment for cancer that presents medical physicists with several challenges. Shakardokht, who was struck by the low global (five-year) survival rates of cancer patients—51% overall, and as low as 8% for lung cancer cases—decided to focus on improving quality control in radiation therapy. So in 2011, she began a PhD in Medical Physics at the University of Surrey, Guilford in the United Kingdom and found financial support along the way from 3 Faculty for the Future program grants. She set out to develop a detection system that could function inside patients to pinpoint errors in the administration of radiotherapy at an early stage. She sought a method which would yield three-fold results: high performance, facility of use and affordability.

Shakardokht quickly stumbled upon a novel radiation detector through the form of silicon-glass beads—a cheap and commercially available material. These simple glass beads performed well in the lab and were tested voluntarily in 20 radiotherapy centers in the UK. Her PhD research project helped her understand how glass beads can help provide accurate direct measurements of the scale and location of radiation, providing the potential to prevent secondary harm to patients, improve recovery from cancer, and save lives.

This PhD research thesis was defended with a rare outcome of no-correction and has received great interest and support from NPL. It was presented at The Royal Society of Medicine 2015 Innovation Summit and has received an award for commercialization from Setsurared Partnership and UKTI. It also won an innovation award from InnovateUK. Finally, this research made Shakardokht the sole winner of 2015 Grant Thornton Entrepreneurial Excellence Award.

Now an internationally recognized researcher with a visiting position at the University of Surrey, Shakardokht is supervising undergraduate MSc and PhD students in Afghanistan and internationally. With support from the University of Surrey she has applied for a patent application and registered a company to enable the fruits of her research to become commercially available.

Shakardokht will have an academic position at KMU when she returns there and will also work as a clinical scientist at the KMU teaching hospitals. She plans to establish a postgraduate medical physics course in KMU to help students who cannot afford to go abroad for completion of their studies. In the longer term, her dream is to set up a training foundation to promote and support girls from everywhere to pursue science and innovation.
Abby ONENCAN

A Model River Basin Commission (MRBC) game for the Nile Basin

Born in Nairobi Kenya, Abby ONENCAN grew up competing with her siblings in math games created by her scientist father. She pursued her Bachelors at Moi University, located in Rift-Valley, Kenya. She later studied at the University of Antwerp, Belgium and at London South Bank University before starting her PhD in 2014 with a Faculty for the Future Fellowship at the Delft University of Technology in The Netherlands. Abby's research focuses on engineering and policy analysis with an emphasis on the Nile Basin and aims to advance scientific progress on water governance, scenario analysis and game simulation.

With the support of the research team at Delft University of Technology, Abby has developed a web-supported board game for policy makers, dedicated to the Nzoia catchment area (3.5 million inhabitants). The game, played with the use of iPads, aims at strengthening water partnerships between five county governments and the water services companies across critical sectors such as energy and agriculture. It has highlighted the importance of sustainable water resources management in the face of climate change. Feedback was collected through questionnaires and debriefing sessions. The game helped to partner with other counties, prioritize actions, understand competing interests, make resource allocation decisions and better prepare for climate change induced disasters.

In the meantime, Moi University has accepted to engage Abby every year during the summer holidays to contribute to its Executive Training Programs. An agreement has been signed between Moi University and the Delft University of Technology for her PhD supervision. Based on these executive trainings and the projects they are currently jointly working on together they will discuss the possibility of a long-term engagement, when she completes her PhD.

In October 2015, both Universities jointly organized a session with the Ministry of Water where the first phase of the game was successfully demonstrated. Abby played a major part in bringing the two organizations together, discussing the opportunities for cooperation and drafting a Memo of Understanding (MOU). Following lengthy negotiations, the MOU was signed by both institutions and work then immediately began on joint resource mobilization and project implementation.

The impact of this collaboration has led to informed decision making and has greatly assisted in reconstructing dialogue and negotiations aimed at the establishment of a permanent Nile River Basin Commission.

Upon completion of her research Abby is seeking to take a faculty position at Moi University where currently a new degree program on Climate Change and Sustainable Agriculture is being developed and to which Abby can potentially make a strong contribution.
Sivaranjani SEETHARAMAN

Designing control strategies for optimal and safe operation of intelligent transportation networks (ITN)

Sivaranjani SEETHARAMAN was born in the Tirunelveli district, Tamil Nadu in India and she grew up in Bangalore with her sister. Her mother—an engineer and entrepreneur in power systems—was a strong role model for her throughout her childhood and it was natural for her to follow in her footsteps and pursue an education in a scientific domain.

She graduated with a Bachelor’s degree in Electrical and Electronics Engineering from the PES Institute of Technology, Bangalore after which she was accepted into the Master’s program in Electrical Engineering at Indian Institute of Science (IISc), where she focused her research on applying control theoretic tools to make power grids smarter. Since 2014, Sivaranjani has been pursuing her doctoral studies in control systems at the University of Notre Dame, Indiana, in the United States with the financial support of two Fellowships so far from the Faculty for the Future program.

Sivaranjani’s research aims to develop distributed control techniques that make large scale infrastructure networks such as transportation networks and the power grid smarter and more reliable, by optimally using information from integrated communication infrastructure. The control techniques developed in her research will directly help create next generation smart city technologies in a variety of applications, from enhancing grid stability and preventing blackouts in power grids, to enabling intelligent transportation networks with verifiable guarantees on performance reliability and human safety.

Over the last decade, explosive economic growth in Bangalore has placed an enormous strain on the existing infrastructure, causing traffic jams that have increased travel times by as much as 500%, with drivers consistently forced to travel at speeds under 20 kmph. Motivated by the need to solve this pressing problem, Sivaranjani initiated a collaboration project with researchers at the Indian Institute of Science, to combine statistical physics models and learning theory with the distributed control designs proposed in her doctoral research to develop a realistic control strategy to mitigate traffic jams in Bangalore.

Preliminary simulation results from this work, which demonstrated that traffic congestion in intelligent transportation networks can be decreased by as much as 61% by implementing these designs throughout the city, were presented to a panel of control engineers and scientists in Bangalore, resulting in a seed funding award of 500000 INR to further develop and pilot these designs in the city. Through her research team at IISc, Sivaranjani also initiated discussions with the Bangalore Traffic Management Center to explore the possibility of collaborating to implement the proposed traffic control strategies in pilot projects around Bangalore. The results of her research with IISc will enable the next generation of smart traffic control algorithms to be implemented in road conditions that are unique to Indian transportation networks.

Upon her return to India, Sivaranjani plans to set up a state-of-the-art traffic research center in India, where she will work jointly with academic researchers, city planning authorities and other stakeholders to address the challenges faced in Indian transportation networks.