

# Talha Manzoor

Department of Electrical Engineering  
SBA School of Science and Engineering  
LUMS, Lahore, Pakistan

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## EDUCATION

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Lahore University of Management Sciences  
Ph.D. in Electrical Engineering  
Advisor: Dr Abubakr Muhammad  
Courses include: Dynamical Systems, Topics in Systems and Control,  
Convex Optimization, Digital Control,  
Biological Networks, Advanced Graph Theory  
Lahore, Pakistan  
*2013- to date*

Lahore University of Management Sciences  
M.S. in Computer Engineering  
*Gold medal in Academics*  
Courses include: Parameter and State Estimation, Intelligent Computing,  
Advanced Algorithms, Calculus on Manifolds,  
Applied Probability, Geometric Mechanics and Control  
Lahore, Pakistan  
*June 2013*

National University of Science and Technology  
B.S. in Mechatronics Engineering  
*Gold medal in Academics*  
Courses include: Control Systems, Introduction to Robotics,  
Mechanical Vibrations, Design of Mechatronics Systems,  
Theory of Machines, Engineering Statics & dynamics  
Islamabad, Pakistan  
*June 2010*

## AREAS OF INTEREST

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Systems Analysis, Network Science for natural resource governance, Control Theoretic applications in Environmental Economics and Robotics, Optimal Control and State Estimation for real world problems

## DISSERTATION

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Title: "Towards a Cybernetic Foundation for Natural Resource Governance"  
Advisor: Abubakr Muhammad (LUMS)  
Co-advisor: Elena Rovenskaya (IIASA)

My thesis explores the potential of the cybernetic method of inquiry for the problem of natural resource governance. The work includes developing a cognitive model of resource consumption and demonstrating the potential of the model by examining it under various system-theoretic frameworks that include dynamical systems, optimal control theory, game theory, network science and the theory of learning in games.

## WORK EXPERIENCE

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- **Systems Analyst** *Jan 2016 - present*  
LUMS Center for Water Informatics & Technology
- **Teaching Fellow** *Jan 2017 - May 2017*  
Department of Electrical Engineering, LUMS
- **Research Assistant** *Oct 2010 - Dec 2015*  
Laboratory for Cyber Physical Networks and Systems, LUMS

## TEACHING EXPERIENCE

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- **Instructor.** EE561: Digital Control Systems, Spring 2017, LUMS.
- **Teaching Assistant.** EE361: Feedback Control Systems, Dr Abubakr Muhammad, Spring 2011, Spring 2012 and Spring 2013, LUMS.
- **Teaching Assistant.** CMPE-633A: Robot Motion Planning, Dr Abubakr Muhammad, Fall 2010, LUMS

## ACADEMIC HONORS

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- Best poster (Electrical Engineering), PhD Colloquium, SBA School of Science and Engineering, LUMS, 2016.
- NMF gold medal for academics, MS Computer Engineering, LUMS, 2013.
- Selected for the Young Scientists Summer Program (YSSP) at the International Institute for Applied Systems Analysis (IIASA), Austria, 2013.
- Member of team awarded first place in “Vision and Ground Sweeping Algorithms” category, National Instruments Robot Design Contest, Beirut, 2011.
- LUMS merit scholarship award for academics, for standing first in LUMS admission examination, 2010.
- Prime Ministers gold medal for academics, BS Mechatronics Engineering, NUST, 2010.
- NUST high achiever’s award for academics, awarded throughout undergraduate studies, 2006-2010.
- Member of team awarded 3rd runner-up position (PKR 35,000), National Engineering Robotics Competition (NERC), NUST, 2009.
- Academic Roll of Honor for standing first in Higher Secondary School Examination, PAF Public School, Lower Topa, Murree, 2006.

## VISITING POSITIONS

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- **Visiting Researcher** *Dec 2016 (1 month)*  
International Institute for Applied Systems Analysis, Austria
- **Visiting Researcher** *Jul 2015 (1 week)*  
International Institute for Applied Systems Analysis, Austria
- **Visiting Researcher** *Nov 2014 (1 month)*  
Robotics Research lab, TU Kaiserslautern, Germany
- **Visiting Researcher** *Oct 2014 (1 month)*  
International Institute for Applied Systems Analysis, Austria

- **Young Scientist Summer Program** Jun 2013 - Aug 2013 (3 months)  
International Institute for Applied Systems Analysis, Austria
- **Visiting Researcher** Dec 2011 - Jan 2012 (2 months)  
Robotics Research lab, TU Kaiserslautern, Germany

## INTERNATIONAL PROJECTS

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- **Team Member.** Robotic Profiling for Clearing Watercourses (RoPWat), 2014-16.  
Project no. 57068307, funded by DAAD in collaboration with TU Kaiserslautern, Germany.
- **Team Member.** Autonomous Land Vehicles for Agriculture and Demining (ALVeDA), 2011-13.  
Project no. 54378619, funded by DAAD in collaboration with TU Kaiserslautern, Germany.

## PUBLICATIONS

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### JOURNAL ARTICLES

1. **Talha Manzoor**, Elena Rovenskaya, Abubakr Muhammad, “Game-theoretic insights into the role of environmentalism and social-ecological relevance: A cognitive model of resource consumption”, *Ecological Modelling*, vol. 340, pp. 74-85, Nov 2016.

### BOOK CHAPTERS

2. Sergey Aseev, **Talha Manzoor**, “Optimal Exploitation of Renewable Resources: Lessons in Sustainability from an Optimal Growth Model of Natural Resource Consumption”, *Lecture Notes in Economics and Mathematical Systems*, Springer, 2017 (in press).
3. **Talha Manzoor**, Abubakr Muhammad, “Investigating the Observability of Monocular SLAM: Obscured Beacons and Disparity Measurements”, *Field and Assistive Robotics: Advances in Systems and Algorithms*, Shaker Verlag, 2014.
4. Abubakr Muhammad, Syed M. Abbas, **Talha Manzoor**, Adnan Munawar, Syed A. Abbas, Mhequb Hayat, Ali Abbas, Mian M. Awais, “Marwa: A Rough Terrain Landmine Detection Robot For Low Budgets”, *Field and Assistive Robotics: Advances in Systems and Algorithms*, Shaker Verlag, 2014.

### CONFERENCE PROCEEDINGS

5. Abubakr Muhammad, Ali Ahmad, Saad Hassan, Syed M. Abbas, **Talha Manzoor**, Karsten Berns, “Using Unmanned Aerial Vehicles to Inspect Siltation in Irrigation Canals”, *37th IAHR World Congress*, Malaysia, 2017.
6. **Talha Manzoor**, Elena Rovenskaya, Abubakr Muhammad, “Structural Effects and Learning in a Social-Network Model of Natural Resource Consumption”, *20th World Congress of the International Federation of Automatic Control (IFAC)*, Toulouse, France, 2017.
7. **Talha Manzoor**, Abubakr Muhammad, “An Extension of the Kalman Filter for a Class of Measurement Models Inspired by Wide-Baseline Stereo”, *European Control Conference (ECC)*, Linz, Austria, Jul 2015.
8. **Talha Manzoor**, Sergey Aseev, Elena Rovenskaya, Abubakr Muhammad, “Optimal Control for Sustainable Consumption of Natural Resources”, *19th World Congress of the International Federation of Automatic Control (IFAC)*, Cape Town, South Africa, Aug 2014.
9. **Talha Manzoor**, Abubakr Muhammad, “Disparity as a Separate Measurement in Monocular SLAM”, *IEEE International Conference on Robotics and Biomimetics (Robio)*, Shenzhen, China, Dec 2013.
10. **Talha Manzoor**, Adnan Munawar, Abubakr Muhammad, “Visual Servoing for Landmine Detecting Robot Marwa”, *7th German Conference on Robotics (Robotik)*, Munich, Germany, May 2012.

## WORKING PAPERS

11. Sergey Aseev, **Talha Manzoor**, “Optimal Growth, Renewable Resources and Sustainability”, *IIASA Working Paper* WP-16-017, IIASA, Laxenburg, Austria, Dec 2016.

## PAPERS UNDER REVIEW

12. **Talha Manzoor**, Elena Rovenskaya, Alexey Davydov, Abubakr Muhammad, “Learning through Fictitious Play in a Game-theoretic Model of Natural Resource Consumption”, *Control Systems Letters*.

## OTHER REPORTS

13. **Talha Manzoor**, “Observability and Disparity in Monocular SLAM: A Study”, *Masters Thesis Report*, May 2013, LUMS.

## GRANTS RECEIVED

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- **Travel Grant.** HEC (271.90/TG/R&D/HEC/2017/22059) for attending the 20th World Congress of the International Federation of Automatic Control (IFAC), Toulouse, France, Jul 2017.
- **Travel Grant.** HEC (228.60/TG/R&D/HEC/2015/660) for attending the European Control Conference (ECC), Linz, Austria, Jul 2015.
- **Travel Grant.** HEC (201.100/TG/R&D/HEC/2014/664) for attending the 19th World Congress of the International Federation of Automatic Control (IFAC), Cape Town, South Africa, Aug 2014.

## TALKS

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### CONFERENCE / WORKSHOPS

1. “Structural Effects and Learning in a Social-Network Model of Natural Resource Consumption”, *20th World Congress of the International Federation of Automatic Control (IFAC)*, Toulouse, France, Jul 2017.
2. “An Extension of the Kalman Filter for a Class of Measurement Models Inspired by Wide-Baseline Stereo”, *European Control Conference (ECC)*, Linz, Austria, Jul 2015.
3. “Optimal Control for Sustainable Consumption of Natural Resources”, *19th World Congress of the International Federation of Automatic Control (IFAC)*, Cape Town, South Africa, Aug 2014.
4. (*Video Recording*) “Sedimentation and Silt Cleaning in Waterways”, *6th Workshop on Field and Assistive Robotics*, Villa Denis, Germany, Jul 2014.
5. “Toward Sustainable Consumption of a Renewable Resource by a Network”, *IIASA Young Scientists Summer Program Late Summer Workshop*, Laxenburg, Austria, Aug 2013.
6. “LUMS Mine-Detector: An Affordable and Scalable Robotic Swarm for Landmine Detection”, *National Instruments NIWeek*, Austin, Texas, Aug 2012.
7. “Visual Servoing of Manipulators for Outdoor Sensing Applications”, *1st Pak-German Workshop on Field Robotics*, Lahore, Pakistan, Oct 2011.

### OTHER TALKS

8. (*Guest Lecture*) “An Optimal Control Resource Governance Problem”, *EE 566: Optimal Control Theory*, Dr Abubakr Muhammad, LUMS, Pakistan, Oct 2017.
9. “Modifications to the EKF for wide-baseline-stereo type measurements”, *Robotics Research Lab*, TU Kaiserslautern, Germany, Oct 2014.

10. “Control Theory Gone Green: Sustainable Consumption of Renewables by a Consumer Network”, *PhD Seminar*, LUMS, Pakistan, Apr 2014.
11. (*Guest Lecture*) “Simultaneous Localization and Mapping (SLAM)”, *MTS 804: Motion Planning for Mobile Robots*, Dr Kunwar Faraz Ahmed, CEME, NUST, Pakistan, May 2010.

## PROFESSIONAL ACTIVITIES

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- Organizing Committee
  - *Summer School on Water Informatics, Science and Systems (WISS)*, LUMS, May 2017.
  - *Fall School on Water Science, Policy and Governance (WSPG)*, LUMS, Nov 2016.
  - *Spring School on Water Systems, Science and Practice (WSSP)*, LUMS, Mar 2016.
  - *Fifth Workshop on Field and Assistive Robotics (WFAR 5)*, LUMS, Nov 2013.
  - *Workshop on Intelligent Water Grids (IWG)*, LUMS, Mar 2013.
  - *Third Workshop on Field and Assistive Robotics (WFAR 3)*, LUMS, Nov 2012.
- LUMS Student Council - Batch representative, 2014-15.
- Judge - Starfall Foundation First Lego League (FLL), Regional Chamionship, LUMS, Feb 2014.
- Resident Fellow - LUMS Housing Office, Jan 2014 - May 2014.

## SERVICE

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- Reviewer (Journals) - *Ecological Modelling*.
- Reviewer (Conferences) - *IEEE CPSNA, ASCC, WFAR*.
- Session co-chair - *IFAC 2014*.

## REFERENCES

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Abubakr Muhammad (PhD Advisor)  
Associate Professor  
Dept. of Electrical Engg.  
Lahore University of Management Sci-  
ences  
Lahore, Pakistan  
abubakr@lums.edu.pk

Elena Rovenskaya (PhD Co-advisor)  
Program Director  
Advanced Systems Analysis  
International Institute for Applied Sys-  
tems Analysis  
Laxenburg, Austria  
rovenska@iiasa.ac.at

Sergey Aseev (collaborator)  
Principal Research Scholar  
Steklov Mathematical Institute  
Moscow, Russia  
Research Scholar, IIASA, Austria  
aseev@mi.ras.ru