

Talha Manzoor

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

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EDUCATION

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

Cybernetic applications for Environmental Problems, Robotics and Computer Vision, Systems Analysis, Sustainability, Network Science, Control and Estimation for Real-world Problems

DISSERTATION

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 systems-theoretic frameworks that include dynamical systems, optimal control theory, game theory, network science and the theory of learning in games.

EMPLOYMENT

- **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 - present*
Laboratory for Cyber Physical Networks and Systems, LUMS

TEACHING EXPERIENCE

- **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

- 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

- **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

- **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

JOURNAL ARTICLES

1. **Talha Manzoor**, Elena Rovenskaya, Alexey Davydov, Abubakr Muhammad, “Learning through Fictitious Play in a Game-theoretic Model of Natural Resource Consumption”, *IEEE Control Systems Letters*, Nov 2017 (in press).
2. **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

3. 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).
4. **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.
5. 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

6. 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.
7. **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.
8. **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.
9. **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.
10. **Talha Manzoor**, Abubakr Muhammad, “Disparity as a Separate Measurement in Monocular SLAM”, *IEEE International Conference on Robotics and Biomimetics (Robio)*, Shenzhen, China, Dec 2013.

11. **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

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

OTHER REPORTS

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

GRANTS RECEIVED

- **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

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

- 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

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

REFERENCES

Abubakr Muhammad (PhD Advisor)
Associate Professor
Dept. of Electrical Engg.
Lahore University of Management Sci-
ences
Lahore, Pakistan
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Elena Rovenskaya (PhD Co-advisor)
Program Director
Advanced Systems Analysis
International Institute for Applied Sys-
tems Analysis
Laxenburg, Austria
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Sergey Aseev (collaborator)
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Steklov Mathematical Institute
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