



**University of Nairobi**

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Second Biennial Conference

## **Africa and the Fourth Industrial Revolution: Defining a Role for Research Universities**

**University of Nairobi  
18-20 November 2019**

**Programme**

**Day 1: Monday, 18<sup>th</sup> November 2019**

**(Conference Opening: Chandaria Auditorium)**

9.00 am	Introductory Remarks:	<b>Professor Madara Ogot</b> , Deputy Vice Chancellor (Research) University of Nairobi and Chair of Local Organising Committee  <b>Professor Ernest Aryeetey</b> , ARUA Secretary-General
	Welcome Remarks:	<b>Professor Isaac Mbeche</b> , Acting Vice Chancellor, University of Nairobi
	Brief Remarks:	<b>Professor Idowu Olayinka</b> , Vice Chancellor, University of Ibadan and Board Chair, ARUA
9.20 am	First Keynote Address:	<b>Professor Zebon Vilakazi</b> , Deputy Vice Chancellor (Research and Innovation), University of the Witwatersrand
9.50 am	Opening of Conference:	<b>Hon. Prof. George Magoha</b> , Cabinet Secretary Ministry of Education, Republic of Kenya
10.00 am	Tea/Coffee Break	
10.30 am	First Plenary Session: (Chandaria Auditorium)	<b>Universities and the Fourth Industrial Revolution: Any Best Practices?</b>

(Chair: Professor Barnabas Nawangwe, Vice  
Chancellor, Makerere University)

1. **Professor Margaret J. Dallman**, Imperial College, London; *The STEM and Skills Drivers of the Fourth Industrial Revolution - An International Perspective*
2. **Professor Njuguna N'dungu**, Executive Director, African Economic Research Consortium, Nairobi, Kenya; *The Challenges and Opportunities of Technological Change and the Fourth Industrial Revolution in Africa*
3. **Professor Jan Palmowski**, Guild of European Research Universities, *Preparing for the Fourth Industrial Revolution: The case of Universities and Research Funders in Europe*

12.00 am First Parallel Sessions

1.30 pm Lunch

2.30 pm Second Keynote Address: **Professor Andrew Thompson**, Oxford University,  
(Chandaria Auditorium) *The Age of the "Techno-cene": Why We Will Need  
the Arts and Humanities to Tame the Tiger of the 4<sup>th</sup>  
Industrial Revolution and AI*

3.05 pm Second Plenary Session: **The Humanities and Social Sciences in the Fourth  
(Chandaria Auditorium) Industrial Revolution**  
(Chair: Professor Adam Habib, Vice Chancellor University of the  
Witwatersrand)

1. **Professor Tade Aina**, Executive Director, Partnership for African Social and Governance Research, Nairobi, Kenya; *In the End, Would We Still be Human?*
2. **Professor Fraser McNeill**, University of Pretoria; *Posthumanism, Industrial Revolutions and the New Politics of Difference*
3. **Professor Paul Tiyambe Zeleza**, United States International University, Nairobi

4.30 pm Tea/Coffee Break

5.00 pm Second Parallel Sessions

6.30 pm Light Refreshment/Cocktails

7.15 pm Meeting of ARUA VCs/DVCs and UKRI at Safari Club Hotel (By Invitation)  
Meeting of ACU and ARUA Centre Heads at Safari Club Hotel (By Invitation)

## Day 2: Tuesday, 19<sup>th</sup> November 2019

9.00 am	Third Keynote Address: (Chandaria Auditorium)	<b>Professor Alison Lewis</b> , Dean, Faculty of Engineering and the Built Environment, University of Cape Town; <i>Leaders, Followers or Spectators: African Research Universities and 4IR</i>
9.40 am	Third Plenary Session (Chandaria Auditorium)	<b>Strengthening STEM Education in Africa</b> (Chair: <b>Professor Idowu Olayinka</b> , Vice Chancellor, University of Ibadan and Chair of ARUA Board)  <ol style="list-style-type: none"><li>1. <b>Professor Alex Ezeh</b>, Drexel University; <i>Priorities for Strengthening Institutional Research Capacity in Africa</i></li><li>2. <b>Dr. Karin Wolff</b>, Stellenbosch University; <i>Insights into STEM education in Africa for the 21st century</i></li><li>3. <b>Professor Bitange Ndemo</b>, University of Nairobi</li></ol>
11.15 am	Tea/Coffee Break	
11.45 am	Third Parallel Session:	
1.15 pm	Lunch	
2.15 pm	Fourth Plenary Session: (Chandaria Auditorium)	<b>Ethics and the Fourth Industrial Revolution</b> (Chair: <b>Professor Tassew Woldehanna</b> , President, Addis Ababa University) <ol style="list-style-type: none"><li>1. <b>Professor Moses Chimbari</b>, University of KwaZulu Natal; <i>The African Paradox of Wanting to Become Relevant Before Catching Up</i></li><li>2. <b>Ms Jessica Breakey</b>, School of Electrical and Information Engineering, University of Witwatersrand; <i>Teaching Justice in a Time of AI</i></li><li>3. <b>Professor Modupe Omirin</b>, University of Lagos; <i>Ethical Considerations and Preparing for the 4IR in Urban Land Management</i></li></ol>
3.45 pm	Tea/Coffee Break	
4.15 pm	Fourth Parallel Sessions	
6.00 pm	Buses Depart for Conference Dinner at Safari Park Hotel (Dinner Speech by <b>Professor Adam Habib</b> , Vice Chancellor, University of the Witwatersrand)	



**ARUA CONFERENCE**  
**SCHEDULE OF PARALLEL SESSIONS**  
**Monday, 18<sup>th</sup> November 2019**

<p style="text-align: center;"><b>Parallel Session 1.1:</b> <b>12.00 pm</b> <b>Economic Performance, Diversification and Employment</b></p> <p style="text-align: center;"><b>Chair: Ernest Aryeetey</b> <b>(Room: MLT 401)</b></p>	<p style="text-align: center;"><b>Parallel Session 1.2:</b> <b>12.00 pm</b> <b>Food Security and Digital Technologies</b></p> <p style="text-align: center;"><b>Chair: Madara Ogot</b> <b>(Room: MLT 402)</b></p>	<p style="text-align: center;"><b>Parallel Session 1.3:</b> <b>12.00 pm</b> <b>New Approaches to Higher Education</b></p> <p style="text-align: center;"><b>Chair: Beatrice Muganda</b> <b>(Room: MLT 403)</b></p>	<p style="text-align: center;"><b>Parallel Session 1.4:</b> <b>12.00 pm</b> <b>Climate Change and the Fourth Industrial Revolution</b></p> <p style="text-align: center;"><b>Chair: Eugene Cloete</b> <b>(Room: MLT 404)</b></p>	<p style="text-align: center;"><b>Parallel Session 1.5:</b> <b>12.00 pm</b> <b>Energy and the Fourth Industrial Revolution</b></p> <p style="text-align: center;"><b>Chair: Cuthbert Kimambo</b> <b>(Room: MLT 405)</b></p>
<p><b>Kwabena Gyimah-Brempong, University of South Florida;</b> Service Exports, and Youth Unemployment in Africa</p>	<p><b>Hettie Schönfeldt, University of Petoria;</b> Challenges and Opportunities for Food Security and Health in Africa</p>	<p><b>Mojisola Aderenike Bolarinwa, University of Ibadan;</b> The Impact of Educational Technology in South-Western Nigeria: Case Study of Final Year Engineering Students from University of Ibadan</p>	<p><b>Shem O. Wandiga, University of Nairobi;</b> Africa and the Fourth Industrial Revolution: Climate Change Challenges Demand Shifts in Education Models</p>	<p><b>Arinola B. Ajayi, University of Lagos;</b> Sustainable Renewable Energy Solutions for GSM Base Stations</p>
<p><b>Romanus Osabohien, Covenant University, Ota, Nigeria;</b> Agricultural Transformation Agenda in Africa: Redirecting Social Protection Programmes for Rural Agripreneurial Engagement</p>	<p><b>Patrick Miremebe, Uganda Technology and Management University;</b></p>	<p><b>G. Outa, University of Nairobi;</b> Humanities-Science and Social Research Collaboration: An Agenda for the Africa Research University in Pursuit of the Fourth Industrial Revolution</p>	<p><b>Britta Rennkamp, University of Cape Town;</b> Gearing the Fourth Industrial Revolution Towards Climate Compatible Development in Africa</p>	<p><b>Amsalu Mossissa, Stellenbosch University;</b> Biogas Application in Agriculture Value Chains</p>
<p><b>Peter Quartey, University of Ghana;</b> Technological Innovation, Firm Value-Added and Employment in Ghana</p>	<p><b>Jane Ambuko, University of Nairobi;</b></p>	<p><b>Anastacia Mamabolo, University of Pretoria;</b> Bridging Africa Skills 4.0 Gap: Repositioning Learning, Teaching and Research of Skills in African Higher Education Institutions</p>	<p><b>Adelina Mensah, University of Ghana;</b> The 4IR: The Case for Disruptive Universities in Africa</p>	<p><b>Jan Greyling, Stellenbosch University;</b> Digital field trials using IOT sensor arrays</p>

### Parallel Sessions: Monday, 18<sup>th</sup> November 2019

Parallel Session 2.1: 5.00 pm Higher Education Responses to the 4IR  Chair: Oluwole Familoni (Room: MLT 401)	Parallel Session 2.2: 5.00 pm Producing Goods in the 4IR  Chair: Kwabena Gyimah- Brempong (Room: MLT 402)	Parallel Session 2.3: 5.00 pm Governance Challenges and the 4IR  Chair: Nelson Ijumba (Room: MLT 403)	Parallel Session 2.4: 5.00 pm Organising Research for the 4IR  Chair: Nelson Torto (Room: MLT 404)	Parallel Session 2.5: 5.00 pm Social Issues and the 4IR  Chair: Umar Kakumba (Room: MLT 405)
<b>Oluwole Coker, Obafemi Awolowo University;</b> Indigenising Research in African Universities for Sustainable Development: The Missing Link	<b>Emmanuel Abbey, University of Ghana;</b> Exploring Differences in Innovation between Start-Ups and Established Firms: The Case of Ghana and Kenya	<b>Oluwatobi A. Ajayi, Obafemi Awolowo University;</b> Governance and Disruption: Redefining Public Engagement and Policymaking in Africa in the 4IR	<b>Abel E. Ezeoha, Ebonyi State University Abakaliki;</b> R&D Investments and Industrial Productivity in Africa: The Intervening Role of University-based International Centres of Excellence, Nigeria	<b>Lukman Abdulrauf, University of Ilorin;</b> Personal Information as the 'New Oil' of the Digital Economy: Is Africa Ready for the Ensuing Risks?
<b>Noel Drake Kufaine, University of Malawi;</b> The Impact of Internationalisation on Higher Education Response to the 4IR	<b>K.K. Nyirenda, University of Malawi;</b> Harnessing the Potential of Nanomaterials from African Biodiversity for Biomedical Applications	<b>Tendai Chigware, University of Fort Hare;</b> A Reflection on Africa's Universities Capacity to Embrace the 4IR	<b>Wilson Okaka, Ebonyi State University Abakaliki;</b> Effectiveness of Communication Strategy for University Community Research for Emerging Research Universities in Uganda	<b>Nonhlanhla Cynthia, Futurehands Junior Researchers;</b> The Idea and Preparations for 4IR in Rural Areas
<b>Rasheed Olaniyi, University of Ibadan;</b> The 4IR: Reversing Brain-Drain in African Universities	<b>Karen-Ann Dicken, University of Dundee;</b> Digital Tooling	<b>John A. Mushomi, Makerere University;</b> Re-imagining the 4IR Higher Education Space and Place Dynamics in Sub-Saharan Africa	<b>Watu Wamae, University of Oxford;</b> Research and the African University: Shaping Trajectories for Alternative Futures	<b>Afatakpa Fortune, University of Ibadan;</b> Artificial Intelligence and the Future of Nigerian Youth

### Parallel Sessions: Tuesday, 19<sup>th</sup> November 2019

Parallel Session 3.1: 11.30 am The Research Environment  Chair: Mitike Molla (Room: MLT 401)	Parallel Session 3.2: 11.30 am African Spatial Development and the 4IR  Chair: Timothy Nubi (Room: MLT 402)	Parallel Session 3.3: 11.30 am STEM Education and the 4IR  Chair: Zeblon Vilakazi (Room: MLT 403)	Parallel Session 3.4: 11.30 am Social Issues and the 4IR (2)  Chair: Sarah Ssali (Room: MLT 404)	Parallel Session 3.5: 11.30 am Universities and the World of Work  Chair: Sunday Adebisi (Room: MLT 405)
<b>Tracey October, Clarivate Analytics;</b> Navigating Scholarly Publishing: Opportunities and Pitfalls	<b>Francois Viruly, University of Cape Town;</b> The Implications of the 4IR for Real Estate Markets in Africa	<b>Simon Ngalomba University of Cape Town;</b> Developing Undergraduate Biomedical Engineering Curriculum for the 4IR in Tanzania and Kenya	<b>Sandra Bhatasara, University of Zimbabwe;</b> The Gender and Labour Question in the future of Work Discourses within the 4IR in Southern Africa	<b>Oluyemi Theophilus Adeosun, University of Lagos;</b> University Internship Systems and Preparation for the World of Work in the 4IR
<b>Maliamungu Habib Uthuman;</b> Africa and the 4IR: Defining a Role for Research Universities	<b>Luke Boyle, University of Cape Town,;</b> In Pursuit of an African Smart City	<b>Adetunmbi I Akinyemi , University of Ibadan;</b> The Effect of Game-based Learning (GBL) and Gamification on Students' Academic Achievement, Attitude and Motivation in Learning Physics	<b>Manase Kudzai Chiweshe, University of Zimbabwe,;</b> 4IR and Academia in Africa: Does Sociology Have a Role to Play in Zimbabwe?	<b>J.O. Okebiorun, University of Lagos;</b> Strengthening Universities' Education for the 4IR through Lifelong and Life-Wide Learning
<b>Akon O. Ekpezu, University of Ghana;</b> Addressing Educational Needs for Industry 4.0 in Africa: The Role of Recommender System	<b>Taibat Lawanson, University of Lagos;</b> Why urban research matters for Africa's 4th industrial revolution	<b>Jeremy Takrama, Central University, Ghana;</b> National Centres of Excellence in Molecular Biology and Genomics for Next Generation African Scholars	<b>Katharina Vones, University of Dundee;</b> Whose Revolution? Utilising Maker Spaces as Locations for Building Ethical Communities	<b>Amaka G. Metu, Nnamdi Azikiwe University;</b> The 4IR and Industrial Labour Employment in SSA: The Role of Tertiary Education

## Parallel Sessions: Tuesday, 19<sup>th</sup> November 2019

Parallel Session 4.1: 4.30 pm Water and the 4IR	Parallel Session 4.2: 4.30 pm Materials Development, Nanotechnology and 4IR	Parallel Session 4.3: 4.30 pm Inequalities, Innovations and the 4IR	Parallel Session 4.4: 4.30 pm The Role of Universities	Parallel Session 4.5: 4.30 pm Enhancing Productivity
<b>Chair: Stephanie Burton (Room: MLT 401)</b>	<b>Chair: Lesley Cornish (Room: MLT 402)</b>	<b>Chair: Murray Leibbrandt (Room: MLT 403)</b>	<b>Chair: Deresh Ramjugernath (Room: MLT 404)</b>	<b>Chair: Sue Harrison (Room: MLT 405)</b>
<b>Jane Tanner, Rhodes University;</b> Water Resources Assessment Uncertainty in Africa and the Promise of Global Datasets	<b>David Dodoo-Arhin, University of Ghana;</b> Innovative Materials Science and Engineering towards the 4IR	<b>Priscilla Twumasi Baffour, University of Ghana;</b> Innovation and Employment in Sub-Saharan Africa	<b>David Mills, University of Oxford;</b> The Epistemic Politics of Doctoral 'Capacity-Building' in Africa's Research Universities ( <i>By Skype</i> )	<b>Girma Fana Dinsa, University of Dundee;</b> Can Molecular Breeding Cooperation between Ethiopia and the UK Help Unlock Genetic Information to Feed the Increasing Population?
<b>Isa Kabenge, Makerere University;</b> Big Data and Cloud Computing in Water Resources Management: A Case Study on Land-Use Change in Planted Forests. Considerations for African Universities	<b>Ernest N. Kamavuako, King's College, London;</b> Affordable Embroidered EMG Electrodes for Myoelectric Control of Prostheses	<b>Robert Osei, University of Ghana;</b> Understanding the Relationship between Economic Inequality, Inequality of Opportunity and Inequality of Education Outcomes	<b>Norman Nhede, University of Pretoria;</b> Re-defining the Role of Universities in the Era of Digitisation	<b>Adebusuyi Olubusayo Foluso;</b> In-Service Teachers Technological Pedagogical Content Knowledge and Students Learning Outcomes in Practical Chemistry Classroom
<b>Serigne Faye, Université Cheick Anta Diop;</b> The Value of Bibliometric Methods to Track and Assess High Impact Research in African Soil and Water Literature	<b>Sella Terrie Jwan, Moi University;</b> The 4IR: Preparedness of African Research Universities	<b>Moses Uloma, University of Calabar;</b> Evaluating the Potential Impact of Cryptocurrencies on the Nigerian Economy	<b>Martin A.M. Khamala, Technical University of Kenya;</b> Adapting Technology Enhanced Learning for Future Minds: The PedAL Experience with African Universities	<b>Joshua Temitope Owolabi, University of Lagos;</b> Emerging Technologies and the 4IR: Implications for Human Resource Management in Nigeria