Checklist for Institutional documentation

Institutional documents submitted	
University Research Strategy;	
Programme and Qualification Mix approved by the Department of Higher Education and Training;	
Details of current academic and research staff, in the disciplines in which the university proposes to host Research Chairs; and	
Statistics on research outputs for the period 2006 to 2010, in disciplines in which the university proposes to host Research Chairs	
Statistics on postgraduate students trained and graduated for the period 2006 to 2010, in disciplines in which the university proposes to host Research Chairs	

Details of proposals submitted for hosting of Research Chairs

Name of proposed Research Chair	Thematic area of the proposed Research Chair (descending order of preference)
REAL-TIME POWER AND INTELLIGENT SYSTEMS	(1) Innovation, Engineering and Technology Development and Commercialisation: Industry Research
	(2) Open Category: Computational Sciences

NB: There are no limitations to the number of proposals that may be submitted by each university.

Approval by Deputy Vice Chancellor responsible for research

Name:	
Designation:	
Institution:	

Signature:	Date

Please complete all sections of this form for each Research Chair that the university proposes to host.

1   University Background

1.1   Host University

Name of host university	University of Kwa-Zulu Natal (UKZN)
Name of co-host/s (where applicable)	Council for Scientific and Industrial Research (CSIR Meraka Institute)
Physical location of Chair	University of Kwa-Zulu Natal, Durban

1.2   Alignment of the proposed Research Chair with the university Research Strategy and the identified directed or thematic research areas

Briefly describe the:
Alignment of the proposed Research Chair with the research strategy of the host university and the co-host where applicable.
Alignment of the proposed Research Chair with relevant national strategies e.g. the National Research and Development Strategy.
Alignment with an identified directed or thematic research area.
Relevance of the proposed research area.

(Suggested maximum length of four A4 pages, Arial font, 11 point and 1.5 spacing)

ALIGNMENT TO THE RESEARCH STRATEGY OF UKZN:

The proposed Research Chair in Intelligent Real-Time Power Systems (IRTPS) is well aligned with the research strategy of UKZN, in terms of its strategic goal to raise its international profile by addressing society's need for new knowledge and human capacity through research. UKZN has identified "energy and technology for sustainable development" as one of its research thrusts. This chair, with its focus on energy security, is well aligned with the energy and technology for sustainable development research thrust.

The Chair in IRTPS will work towards the university's indicators of success, i.e.

•   Increased research productivity (publications, products)

•   Increased postgraduate numbers and throughput rates

•   Enhanced postgraduate environment

•   Clear evidence of inter-disciplinary and trans-disciplinary research

•   Established and active international and national networks

•   Collaboration with partners to sustain innovation

- Successful innovation and commercialisation of appropriate research products.

ALIGNMENT TO THE RESEARCH STRATEGY OF THE COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE

The college aims to develop high end research capacity in the form of SARChI chairs, research professorships, industry chairs, and the appointment of staff to key areas of weakness to create critical mass within our strategic growth areas and computing is one of them. Also, it aims to increase the postdoctoral capacity from around 70 to 120 by 2013, and the postgraduate enrolment from around 22% to about 35% by 2016. Moreover, this chair fits into the college priority areas of computational intelligence, ICT, power and energy which have been identified as a niche areas for exploitation and development, especially to support growth in Engineering and the M-stream in Science. This chair will then be one of the vehicles that will help:

One of the goal of this will ultimately be to facilitate synergy between the different units involved in research in Computing and Communications in the college.

ALIGNMENT TO THE RESEARCH STRATEGY OF THE CSIR:

The CSIR has a number of Research Impact Areas (RIA) that promote multidisciplinary collaborative research in the national interest. The IRTPS chair is aligned with the following RIA strategies: Built Environment – smart infrastructure (roads, pipelines, water quality, electricity grid); Energy – the promotion of renewable energy sources and storage through smartgrid enablement; Defence and Security – border security and critical infrastructure protection; and Digital environment/Information Society – smart city, Smart Grid.

ALIGNMENT TO NATIONAL STRATEGIES

DST ICT R&D and Innovation Strategy : there is alignment under "Intervention 5: ICT R&D in Industry programme". In this regard, the IRTPS chair is intended to contribute towards the benefits intended by the ICT R&D and Innovation Strategy of "a highly competitive economy based on the comprehensive integration of ICT into all aspects of society and the economy, including smart infrastructure and effective service delivery," as envisaged in the Advanced Manufacturing Technology Strategy; and a vibrant, sustainable and indigenous ICT industry with a strong export focus.

There is further alignment under the domains of intervention proposed in the ICT R&D and Innovation Strategy. IRTPS may contribute to the following domains: ICT in manufacturing (automation,

networks, process control and communication; and sensor and item tracking systems); mobile, wireless and satellite technologies.

ICT R&D and Innovation Roadmap: The DST is currently developing an ICT R&D and Innovation Roadmap for the country to refresh and implement the ICT R&D and Innovation strategy. While not completed yet, the process has already shown that smartgrid and ICT (IRTPS is a critical competence of both) are high-value market opportunities for South Africa to create a local innovation ecosystem. It is therefore a very strong candidate for government intervention to create critical mass in this field.

DST 10-year plan: The IRTPS chair is intended to play a role in the following two of the five grand challenge areas: Energy Security and Global Change.

Other national priorities addressed are: The green economy (able to add renewable energy sources to the grid, etc.); job creation (creating a local innovation system with industry partnerships linked to R&D; Service delivery at municipalities (e.g. smart grid energy management); and Multi-national investment in R&D (especially for the smart grid).

ALIGNMENT WITH IDENTIFIED THEMATIC AREAS

The identified thematic area for the IRTPS chair is in the "Innovation, Engineering and Technology Development and Commercialisation: Industry Research".

The IRTPS chair is intended to help build a local innovation system, therefore industry R&D partnerships are key (which is also an objective of the ICT Technology Mission). This chair will be supported by Eskom to develop IRTPS R&D for the future electricity grid. Eskom (as per their strategic bilateral agreement with the CSIR co-host) intend to participate in a joint product development centre for Smart Grid solutions in the electricity network – the intellectual property developed will be used by local suppliers. At this stage the IRTPS chair is also intended to be part of the Eskom Centre of Excellence programme on Smart Grid. There are very challenging R&D aspects for which the chair's work will be crucial.

The DST's ICT R&D and Innovation Strategy (which was adopted as a national strategy under the Information Society and Development Plan) is the elaboration of the ICT Technology Mission identified in the National R&D Strategy. The current exercise to refresh this strategy and develop an implementation and monitoring plan has identified Smart Infrastructure (e.g. Smart Grid) as a priority area for intervention. The research chair proposed in IRTPS is a direct consequence of this DST exercise and is intended to leverage existing instruments (such as SARChI) to build R&D capacity for the national intervention being planned. This chair is intended to be focussed on the Smart Grid and

will collaborate with the Centre for Advanced Sensor Networks at the University of Pretoria, Centres for Radio Access Technologies and Artificial Intelligence at UKZN.

RELEVANCE OF IRTPS

IRTPS considers the utilisation of computational intelligence techniques for use on power systems in a smart grid utilising wireless networked systems for monitoring and control.. The chair will consider utilisation of intelligence embedded in the grid to perform dynamic optimisation of power grid resources to ensure grid stability, energy efficiency, etc. IRTPS is essential for the control and intelligence (and learning) needed for the electricity grid to become "smart".

South Africa is facing considerable challenges in terms of energy and there are significant market opportunities (as emerging from the DST ICT R&D and Innovation Roadmap process) which can be exploited by developing a core capability in IRTPS and a linked capability in advanced sensor networks (ASN). Examples include: smart grid and the green economy.

Solutions in this area will require multidisciplinary R&D, but IRTPS is a critical field since it focuses the disciplines of computational intelligence, pattern recognition, power systems, wireless communications etc. to operate within resource constrained environments which are very sensitive to computational and energy requirements needed for security, communications, cooperative processing, etc. IRTPS is therefore a priority area to build significant competence and excellence.

South African capability to respond to smart grid opportunities is currently fragmented and sub-critical (not only for IRTPS, but also for the linked ASN environment). The IRTPS research chair is thus to be part of a significant government intervention to stimulate use and development of indigenous applications. The IRTPS research chair is one part of the strategy to coordinate the fragmented national capability and build critical mass in IRTPS. This will be complemented with a significant Eskom partnership in the Smart Grid niche area for R&D and product development along with schemes to leverage government procurement power to build local industrial and service capability.

The intention with this IRTPS Research Chair is to build up core R&D capability in IRTPS at UKZN and link this to sensor networks research at the University of Pretoria and the CSIR and other capacity programs nationally to create critical R&D mass with the ability to solve hard R&D challenges and develop products for niche areas through joint product development with industry.

1.3   University Research Strength and Competencies

Briefly describe your university research strengths, capabilities and competencies and the alignment of the proposed Research Chair with that of existing research activities and capacity. Please focus on the areas that are relevant to the proposed Research Chair. Provide the same information for the co-host, where necessary.

(Suggested maximum length of four A4 pages, Arial font, 11 point and 1.5 spacing)

A number of current research activities in the School of Computer Science and the School of Electrical, Electronic & Computer Engineering at UKZN are complementary to the activities of the proposed research chair.

1. The **Power System Dynamics Group** the School of Electrical, Electronic and Computer Engineering is at present concentrating on methods to transfer more electric power on existing power lines without jeopardising the reliability of the supply. The group has been involved in research on power systems protection and protection coordination. The group has access to a Real-time Digital Simulator (RTDS) at the Durban University of Technology. The RTDS has the capability of simulating the whole South African power grid in real-time and is one of only a few comparable machines available to academic researchers.

2. The **Control Systems Group** in the School of Electrical, Electronic and Computer Engineering has world leading expertise in quantitative feedback design for robust multivariable control. It also has competence in system identification and state estimation. This expertise has been used in robust power systems stabiliser design synchronous machine system identification and control system studies of sub-synchronous resonance.

3. A significant research group within the School of Electrical, Electronic and Computer Engineering is the **Centre for Radio Access Technologies**, which was established in 1997 as part of the Telkom Centres of Excellence Programme. Of particular focus in the centre is future wireless networks which will see the merging of computing and communication in the true spirit of the ICT era. Topics under research include wireless sensor networks, high-speed digital communications. Cooperative communication networks and network protocol design.

4. In the School of Computer Science (**Knowledge Representation and Reasoning Group**) most staff work on topics related to Artificial Intelligence. The main research endeavors are centered around computational logic, ontologies, hyper-heuristic and evolutionary-computing-based scheduling.

5. The **Pattern Recognition** group in the School of Electrical, Electronic & Computer Engineering concentrates on research projects in Image Processing, in particular behavior detection and classification, with application in surveillance.

6. The **High Voltage** Direct Current Centre (HVDC), in the School of Electrical, Electronic and Computer Engineering, is an established laboratory that was formed in 200 and focuses on research in HVDC technologies ranging from voltage levels of 533 kV up to 800 kV, The centre has established a good international reputation and is well supported by ESKOM and the DTI through the TRIP programme. The School of Electrical, Electronic and Computer Engineering also houses a high voltage AC laboratory.

The CSIR co-host has significant research strength and competencies in disciplines related to IRTPS and is currently building up its research strength in IRTPS:

1. CSIR Meraka Institute is the largest concentration of ICT R&D researchers and participates in the largest number of EU FP7 projects on the African continent:
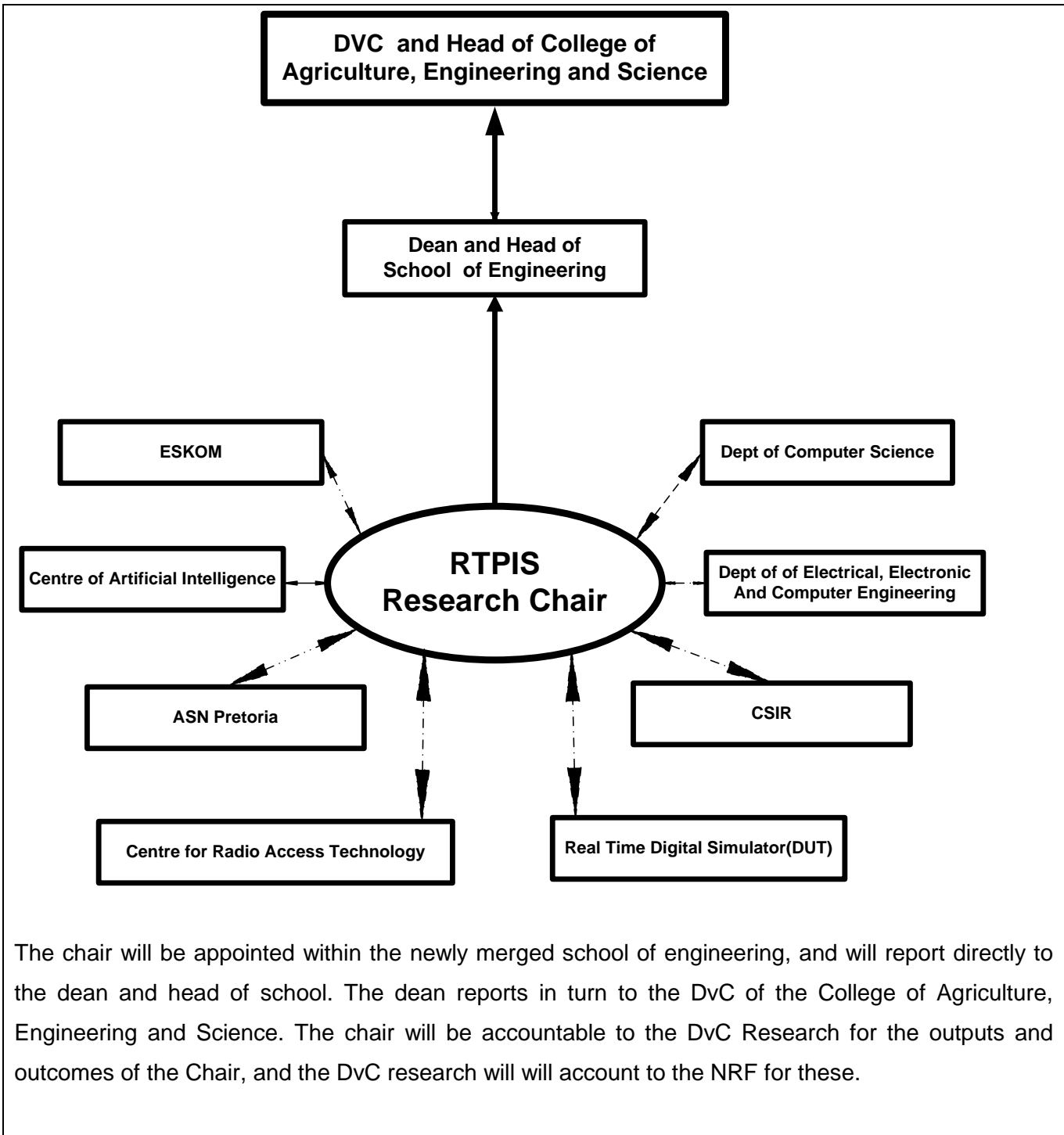
   - In 2010/11 financial year, it had about 180 research and engineering staff, 34 of whom have PhDs (five are chief scientists/engineers) and were responsible for supervising or co-supervising about 100 masters and PhD students within the South African university system. It earned contract R&D income of about R167 million, generated about 65 publication equivalents, and 4 technology demonstrators of over R10 million.

   - Research groups particularly pertinent to IRTPS are:

     a. Wireless Communication Networks (for large-scale easy-to-deploy wireless systems and wireless communication R&D needed for IRTPS);

     b. Very Large Database group (the data processing and management requirements for the IRTPS and the Smart Grid generally is expected to be very large);

     c. Centre for High Performance Computing (general competence in setting up high performance computing, but IRTPS will have specific High Performance requirements to be situated in Durban in its laboratory);

     d. Internet of Things (for platforms linking various ASNs for higher level decision making and sensing);

     e. ICT for Earth Observation (for SensorWeb enablement middleware that fuses and visualises data from ASNs and remote sensing data which may play a role for higher-level decision making in IRTPS);

     f. Knowledge Representation and Reasoning (This is the CSIR partner research group in the UKZN Centre for Artificial Intelligence Research. Computational Intelligence and reasoning is an important component of IRTPS); and

g. The ASN Research group (the co-host for the IRTPS chair) tightly collaborates with University of Pretoria to drive the national agenda to establish coordination and critical mass in ASN and allied areas. This group focuses on smart infrastructure and underground ASN applications. It will link the various CSIR competencies related to IRTPS and has international collaborations useful for the IRTPS chair.

2. CSIR Material Science and Manufacturing has a sensor science research group that makes sensors and also develops some applications especially related to the electricity grid. They are collaborating with University of Pretoria to develop a Centre of Competence on Microsystems which will work closely with the IRTPS chair.

3. CSIR Built Environment have domain knowledge for IRTPS applications for the electricity grid.

4. CSIR Modelling and Digital Sciences have strengths in intelligent data systems. They also have strength in Information Security but this will have to be further developed for application in IRTPS.

5. CSIR Defence Peace Safety and Security have expertise in critical infrastructure protection and the electricity grid is a critical infrastructure. Furthermore, because they are responsible for military research they also have a strong competence on systems engineering and the Smart Grid is expected to be the most complex system designed by man.

1.4 Organisational Structure

Describe the reporting lines and organisational position of the Chair. Note that the accountability for the Research Chair must reside with the Deputy Vice Chancellor responsible for research.

(Suggested maximum length of one A4 page, Arial font, 11 point and 1.5 spacing)

The chair will be appointed within the newly merged school of engineering, and will report directly to the dean and head of school. The dean reports in turn to the DvC of the College of Agriculture, Engineering and Science. The chair will be accountable to the DvC Research for the outputs and outcomes of the Chair, and the DvC research will will account to the NRF for these.

2   University support of the proposed Research Chair

2.1 Academic Support

How will the host university support the Research Chair using non-financial means? Consider integration with other research initiatives, library, linkages, etc.

(Suggested maximum length of one A4 page, Arial font, 11 point and 1.5 spacing)

UKZN will provide a conducive research environment to support the chair in IRTPS.

UKZN will support the integration and collaboration with other large initiatives of the university through joint projects, e.g. with the Centre on Artificial Intelligence Research, Centre for Radio Access Technologies, RTDS project etc. Furthermore, various sub disciplines of Engineering and Computer Science pertinent to the work of the research chair will be linked together via joint projects and sharing of capacity.

UKZN has excellent research support infrastructure and facilities such as libraries, computer facilities, etc. Furthermore, UKZN has an excellent researcher development programme which will be available to the staff, postdocs and students associated with the research chair.

The chair will actively recruit and develop black and female students through the undergraduate pipeline for IRTPS and will market the opportunities to this target group.

2.2   Infrastructure

How will the host university support the Research Chair with infrastructure? Consider provision of office and laboratory space for the Chair and her/his research team, office furniture, IT facilities, access to necessary research equipment and infrastructure, etc.

(Suggested maximum length of two A4 pages, Arial font, 11 point and 1.5 spacing)

The research chair will be provided with a dedicated research lab of about 100 m^2 which will equipped with cubicles for postdocs, doctoral students and masters students, and a work area for honours students. Extra laboratory space to accommodate additional postgraduate students as and when these students are enrolled will be provided in the Faculty of Engineering.

The chair and associated staff will have offices in addition to laboratory space indicated above. Two fully equipped offices will also be provided for visiting scientists to IRTPS on a time-shared basis with other groups.

Permission will be given to fit out other premises of the university for real-situation IRTPS testbeds, e.g. in the high voltage labs for electricity grid applications of IRTPS.

Eskom invested in research infrastructure at the Durban University of Technology. This RTDS equipment will be available to the IRTPS chair as the knowledge to operate and perform further research on it is currently mainly at UKZN.

Further assistance from Eskom and the NRF Research Infrastructure Support Programme will be solicited by the chair for new research infrastructure especially related to high performance

computing.

Further facilities may be made available through the CSIR co-host within their Advanced Sensor Networks Research Group including access to joint ASN testbeds.

Some large ASN deployments can generate very large amounts of data. The CSIR Meraka Institute manages the Centre for High Performance Computing and the Very Large Database Programme of the DST. Such computing facilities may be available for the IRTPS Research Chair.

2.3 Financial Support

How will the host university support the Research Chair financially, both directly and indirectly? Consider provision for administrative support, technical support or necessary research equipment and infrastructure.

(suggested maximum length of one A4 page, Arial font, 11 point and 1.5 spacing)

UKZN will financially support the IRTPS research chair in the following ways:

(1) Postgraduate student funding:

The student bursaries provided by the chair budget will be topped up to attract good students. Funding will be sourced from contract R&D projects and the postgraduate scholarship funds allocated to Faculty of Engineering. In addition, UKZN and CSIR intend to establish a ring-fenced scholarship fund for IRTPS with matching contributions to particularly support black and female South Africans in postgraduate research in IRTPS. The NRF's PDP programme will also be accessed for PhD students.

(2) Postdoctoral funding

The postdoctoral fellowship provided by the chair budget will be topped up to attract good candidates so that they will receive two to three times the amount budgeted under the SARChI programme. The College of Agriculture Engineering and Science will provide funding for postdoctoral fellow.

In addition, the NRF's PDP programme will also be accessed for South African PhD graduates to pursue postdoctoral research in IRTPS.

(3) Faculty of Engineering support

Indirect financial support is available for the Chair via equipment, research labs, administrative and research personnel and other Faculty of Engineering activities. As the Faculty of Engineering will be able to absorb promising postdoctoral candidates, a number of support instruments for emerging researchers is available such as the research development programme, the research fellowship programme and the Thuthuka programme (in conjunction with NRF).

(4) Other funding:

- Seed Funding for Projects: Specific large projects may receive seeding funding for an approved business plan that the IRTPS Chair will participate in.
- Capital Equipment Grant: Funding available from the Faculty of Engineering to support the acquisition of large items of capital equipment that are required to provide for an active research environment. Other funding through the NRF Research Infrastructure Support Programme can also be accessed.
- Visiting Lecturers and Conference Grant: Funding available from the Faculty of Engineering to support staff to attend local and international conferences. Financial support for exchanges to bring relevant researchers to IRTPS and build collaboration programmes of interest to the IRTPS chair will be provided.

2.4 Leadership and Management Support

How will the host university provide the necessary leadership and management support to the Research Chair to ensure effective functioning of the Chair?

(suggested maximum length of one A4 page, Arial font, 11 point and 1.5 spacing)

UKZN has a very strong leadership and management support system in place to assist the IRTPS Research Chair. The College Agriculture, Engineering and Science will be appointing an Academic Leader for research, who will champion research within the school, including prioritizing and facilitating interdisciplinary research, and linkages will partner institutions. The head of school is appointed at the level of Dean, and will provide a high level capacity for engagement with school issues and linkages to outside agencies and institutions. At the college level, we will be appointing a dean of Research, who will be driving the college research strategy, and especially pour identify strategic areas, which includes the area covered by this chair. The dean of research will provide an operational linkage between the chair and college and university structures, and college dean of research sits on the college management team, and also represents the interests of e college at the university research strategy group. The interests of the chair will be represented at the University Executive by both the DvC Research and DvC College.

3.   Approval by University Research Management

All proposals to host Research Chairs must be approved by, and submitted under signature of the University Deputy Vice-Chancellor responsible for research.

Name:	
Designation:	
Institution:	

Signature:	Date

Template for providing details of current academic and research staff for each discipline in which the university proposes to host a Research Chair

ENGINEERING

Name	Sex	Race	Rank	Highest qualification	Emerging researcher (Yes/No)	Established researcher (Yes/No)	Permanent/ Contract appointment	Appointment term	
								From	To
Academic Staff									
Takawira, Fambirai	M	A	Prof	PhD		Yes	P		
Boje, Edward	M	W	Prof	PhD		Yes	P		
Mneney, Stanley	M	W	Prof	PhD		Yes	P		
Eitelberg, Eduard	M	W	Prof	PhD		Yes	C		
Ijumba, Nelson	M	A	Prof	PhD		Yes	P		
Tapamo, Jules	M	A	Prof	PhD		Yes	P		
Harley, Ronald	M	W	Prof	PhD		Yes	Research Associate		
Xu, Hongjun	M		Assoc Prof	PhD		Yes	P		
Saha, A	M	I	Senior Lecturer	PhD	Yes		P		
Pillay Carpenen, R	M	I	Lecturer	MSc	Yes		P		
Rigby, B	M	W	Assoc Prof	PhD		Yes	P		

Template for providing details of current academic and research staff for each discipline in which the university proposes to host a Research Chair

COMPUTER SCIENCE

Name	Sex	Race	Rank	Highest qualification	Emerging researcher (Yes/No)	Established researcher (Yes/No)	Permanent/ Contract appointment	Appointment term	
								From	To
Academic Staff									
Els, R	F	W	Lecturer	MSc	Yes		P		
Gwetu, M	M	B	Lecturer	MSc	Yes		P		
Murrell, H	M	W	Prof	PhD		Yes	P		
Pillay, N	F	I	Lecturer	MSc		Yes	P		
Adewumi, A	M	B	Senior Lecturer	PhD		Yes	P		
Keet, M	F	W	Senior Lecturer	PhD		Yes	P		
Moodley, D	M	I	Senior Lecturer	PhD		Yes	P		
Pillay, A	M	I	Lecturer	MSc	Yes		P		
Viriri, S	M	B	Lecturer	PhD		Yes	P		
Meyer, T	M	W	Prof	PhD		Yes	P		
Varzinczak, IJ	M	W	PostDoc	PhD		Yes	P		

Template for providing details of research outputs for each discipline in which the university proposes to host a Research Chair. Complete a separate table for each discipline and provide information for up to five (5) years.

ENGINEERING

Category	2006	2007	2008	2009	2010	Total
Peer reviewed journal articles	15	18	24	19	6	82
Peer reviewed books	0	0	1	0	0	1
Peer reviewed book chapters	0	0	0	0	0	0
Products	0	0	0	0	0	0
Artifacts	0	0	0	0	0	0
Patents	0	0	0	0	1	1

APPENDIX B

Template for providing details of research outputs for each discipline in which the university proposes to host a Research Chair. Complete a separate table for each discipline and provide information for up to five (5) years.

COMPUTER SCIENCE

Category	2006	2007	2008	2009	2010	Total
Peer reviewed journal articles	2	3	5	3	7	20
Peer reviewed books						
Peer reviewed book chapters			1		1	2
Products						
Artifacts						
Patents						

APPENDIX C

Template for providing details of **full-time masters and doctoral students.** Complete a separate table for each discipline and provide information for up to five (5) years.

ENGINEERING

Category	Number of full-time students					Total
	2006	**2007**	**2008**	**2009**	**2010**	
Doctoral students						
Continuing	5	6	12	11	10	44
New	1	7	3	4	3	18
Graduated	1	1	1	0	4	7
Masters students (minimum 50% research component)						
Continuing	11	15	18	11	7	62
New	6	5	2	4	14	31
Graduated	16	2	8	6	13	45
Masters by coursework						
Continuing	0	0	0	0	0	0
New	0	0	0	0	0	0
Graduated	0	0	0	0	0	0

Template for providing details of **full-time masters and doctoral students.** Complete a separate table for each discipline and provide information for up to five (5) years.

COMPUTER SCIENCE

Category	Number of full-time students					Total
	2006	2007	2008	2009	2010	
Doctoral students						
Continuing						
New						
Graduated					1	1
Masters students (minimum 50% research component)						
Continuing						
New						
Graduated		2	3	4	5	14
Masters by coursework						
Continuing						
New						
Graduated						

Template for providing details of **part-time masters and doctoral students**. Complete a separate table for each discipline and provide information for up to five (5) years.

ENGINEERING

Category	Number of part-time students					Total
	2006	**2007**	**2008**	**2009**	**2010**	
Doctoral students						
Continuing	0	0	0	0	0	0
New	0	0	0	0	0	0
Graduated	0	0	0	0	0	0
Masters students (minimum 50% research component)						
Continuing	17	16	20	17	13	83
New	3	7	3	1	0	14
Graduated	1	4	3	5	6	19
Masters by coursework						
Continuing	0	0	0	0	0	0
New	0	0	0	0	0	0
Graduated	0	0	0	0	0	0

ENGINEERING

2010 Doctoral Graduates
Liu, Yi-Sheng
Thesis: Hybrid token-CDMA medium protocol. Supervisor: Professor F Takawira and Professor H Xu
Quazi, Tahmid Al-Mumit
Thesis: Cross-layer design for the transmission of multimedia traffic over fading channels. Supervisor: Professor H Xu and Professor F Takawira
Scriba, Stefan Martin
Thesis: Analysis of the EDF family of schedulers. Supervisor: Professor F Takawira
Walingo, Tom Mmbasu
Thesis: Traffic modeling and analysis of next generation networks. Supervisor: Professor F Takawira

2008 Doctoral Graduates
Akol, Roseline Nyongarwizi
Thesis: Residue number system coded differential space-time-frequency coding. Supervisor: Professor F Takawira

2007 Doctoral Graduates
Huang, Feng-Wei
Thesis: Modelling and analysis of inverter-based FACTS devices for power system dynamic studies. Supervisor: Professor B Rigby

2006 Doctoral Graduates
Ngatched Nkouatchah, Telex Magloire
Thesis: Compound codes based on irregular graphs and their iterative decoding. Supervisor: Professor F Takawira

2010 Masters Graduates
Leoaneka, Moketjema Clarence
Dissertation: Dynamic performance of numerical distance protection relays in heavily series compensated networks. Supervisor: Professor BS Rigby
Mahomed, Veruschia
Dissertation: Wavelet based compression integrating error protection via arithmetic coding with forbidden symbol and map metric sequential coding
Supervisor: Professor SH Mneney
Matadin, Sunveer
Dissertation: Research and design of an embedded controller and GUI for the automation of the armature volt-drop test.
Supervisor: Professor ES Boje
Modisane, Thabo

Dissertation: Performance analysis of voltage regulating relays with circulating current control algorithms using hardware-in-loop real-time simulator techniques. Supervisor: Professor BS Rigby

Moodley, Thessygan
Dissertation: Development of a model helicopter based flight test platform for multivariable feedback control. Supervisor: Professor ES Boje

Padayachee, Laneil
Dissertation: Asynchronous cooperative communication with channel and delay estimation. Supervisor: Professor H Xu and Professor F Takawira

Rampersad, Vaughan
Dissertation: PLC implementation of online, PRBS-based tests for mechanical system parameter estimation. Supervisor: Professor RG Harley

Syed, Jameel
Dissertation: Effect of amplifier non-linearity on the performance of CDMA communication systems in Raleigh fading environment
Supervisor: Professor F Takawira

Begemann, Morné
Dissertation and coursework: Integrated and synchronised approach to DSM and DMP initiates. Supervisor: Professor NM Ijumba

Chetty, Rajandren
Dissertation and coursework: Residential time-of-use electricity pricing - an econometric assessment. Supervisor: Professor NM Ijumba

Mkandawire, Burnet O'Brien
Dissertation and coursework: Integrated systems thinking for refurbishment: the blueprint for optimizing returns on assets managed
Supervisor: Professor NM Ijumba

Ntusi, Marathon
Dissertation and coursework: Optimal placement of capacitors on a transmission network. Supervisor: Professor NM Ijumba

Nzimande, Timothy Mbusi
Dissertation and coursework: Voltage dip performance analysis. Supervisor: Professor NM Ijumba

2009 Masters Graduates
Beharie, Sannesh Rabiechand
Dissertation: Cross layer hybrid ARQ 2 cooperative diversity. Supervisor:Professor H Xu. Co-supervisor: Professor F Takawira

Govender, Dhevandhran
Dissertation and coursework: A study of the electrical environment below HVDC transmission lines. Supervisor: Professor NM Ijumba

Naidoo, Pathmanathan
Dissertation: Investigations into recycling and upgrading existing high voltage alternating current transmission lines for direct current applications
Supervisor: Professor NM Ijumba

Pillay, Narushan
Dissertation: Repeat-punctured turbo codes and superorthogonal convolutional turbo codes. Supervisor: Professor H Xu. Co-supervisor:
Professor F Takawira

Van Heerden, Pieter Robert
Dissertation and coursework: Development of a model of the alpha/beta 765kV line for the evaluation of auto-reclosing
Supervisor: Professor NM Ijumba

Govender, Dhevandhran
Dissertation and coursework: A study of the electrical environment below HVDC transmission lines. Supervisor: Professor NM Ijumba

2008 Masters Graduates
Chetty, Manogaran
Dissertation and coursework: Reliability analysis of power transformers. Supervisors: Professor N M Ijumba
Groenewald, Abraham Johannes Smit
Dissertation and coursework: A probabilistic based application design guide for the use of tubular conductors in the design of high voltage substations. Supervisors: Professor N M Ijumba
Lekganyane, Mokwape Johannah
Dissertation and coursework: A study of HVDC transmission line audible noise and corona loss in an indoor corona cage.
Supervisors: Professor N M Ijumba
Matshidza, Rhulani Daphney
Dissertation and coursework: Improved transmission line protection performance concerning high resistance faults
Supervisors: Professor N M Ijumba
Mouatcho Moualeu, Jules Merlin
Dissertation: Repeat-punctured turbo coded co-operation
Supervisors: Dr H Xu and Professor F Takawira
Persadh, Ajith Koowarlall
Dissertation and coursework: A study of pole top fires on 22kV wooden pole power lines in KwaZulu-Natal. Supervisor: Professor N M Ijumba
Pillay, Anand
Dissertation: A DSP-based digital controller for a thryristor controlled series capacitor. Supervisor: Professor B Rigby
Ramlakhan, Niven Bhimraj
Dissertation: Downlink call admission control in mixed service DCMA cellular networks. Supervisor: Professor F Takawira

2007 Masters Graduates
Makasa, Kangombe Joseph
Dissertation: Real-time simulator studies and model development for time-domain voltage stability analysis. Supervisor: Professor BS Rigby
Naidoo, Kribashen
Dissertation and coursework: Bird streamer initiated breakdown under HVDC conditions. Supervisor: Professor NM Ijumba

2006 Masters Graduates
Ally, As'Ad
Dissertation: Analysis of the impact of closed-loop flow control strategies on power system stability characteristics. Supervisor: Professor B Rigby
Bonner, Mark James
Dissertation and coursework: Safety implications of introduction of a specially tested assembly into the South African National Standard for low voltage assemblies. Supervisor: Professor N M Ijumba

Chetty, Somasundran
Dissertation and coursework: Application of HVDC technology in medium voltage distribution systems. Supervisor: Professor N M Ijumba
Jin, Wei
Dissertation: Hybrid list decoding and Chase-like algorithms of Reed-Solomon codes. Supervisors: Dr H Xu and Professor F Takawira
Mahlaba, Simon Bonginkosi
Dissertation: A MAC protocol for IP-based CDMA wireless networks. Supervisor: Professor F Takawira
Mathew, Jerry George
Dissertation: MIMO eqalization. Supervisors: Dr H Xu and Professor F Takawira
Mpako, Vuyolwethu Maxabiso Wessels
Dissertation: Capture effects in spread-aloha packet protocols. Supervisor: Professor F Takawira
Mtika, Steve Davidson
Dissertation: Traffic modeling in mobile internet protocol version 6. Supervisor: Professor F Takawira
Mukosa, Dunn
Dissertation: Modelling and control of a Benson boiler during start-up. Supervisor: Professor E Boje
Naidoo, Divoloshanan
Dissertation and coursework: Protection of ultra HVDC transmission lines.   Supervisor: Professor N M Ijumba
Pillai, Jayesh Narayana
Dissertation: Super orthogonal space-time turbo codes in Rayleigh fading channels. Supervisor: Professor S H Mneney
Pillay Carpanen, Rudy
Dissertation: Enhancing the transient stability of power systems using a thyristor controlled series capacitor. Supervisor: Professor B Rigby
Sithole, Petros Simon Vusi
Dissertation and coursework: Assessment of the electrical performance of the Cahora Bassa HVDC scheme. Supervisor:Professor N M Ijumba
Sokoya, Oludare Ayodeji
Dissertation: Performance of high rate space time trellis coded modulation in fading channels. Supervisor: Professor F Takawira and Dr H Xu
Van Niekerk, Brett
Dissertation: Blind iterative multiuser detection for error coded CDMA systems. Supervisor: Professor S H Mneney
Yin, Rui
Dissertation: Opportunistic scheduling algorithms in downlink centralised wireless networks. Supervisors: Professor D Dawoud and Dr H Xu

COMPUTER SCIENCE

2010 Doctoral Graduates
Moodley, Deshendran
Thesis: Ontology driven multi-agent systems: an architecture for the sensor web: Professor J.R. Tapamo

2010 Masters Graduates
McGuiness, John
Dissertation: Investigation of Techniques for Automatic Polyphonic Music Transcription Using Wavelets. Supervisors:Professor H. Murrell
Naidoo, Wayne Chelliah
Dissertation: A Model of an Intelligent Video-based Security Surveillance System. Supervisor: Professor J.R. Tapamo
Murrell   Benjamin
Dissertation: Structure discovery in Hidden Markov Models Supervisor: Prof. J.R. Tapamo
Parbhoo   Chetna
Dissertation: An Ontoloty Driven Sensor Web Application for Detecting and Classifying Informal Settlements. Supervisor: Dr. D. Moodley
Price   Catherine Suzane
Dissertation: Specifying a forest harvest scheduling system which includes wood properties Supervisor: Prof. J.R. Tapamo and F Blakeway

2009 Masters Graduates
McDonald   Brendon
Dissertation: The Development of an Agent-based Simulation Tool for Sugarcane Transport Logistics Systems.
Supervisor: Mr E. Dube and Prof. H. Murrell
Fonou Dombeu   Jean Vincent
Dissertation: Component-based Face Recognition. Supervisor: Prof. J.R. Tapamo
Naidoo   Amashini
Dissertation: The Application of Genetic Programming to the Evolution of Automata Supervisor: Prof. N. Pillay
Szpak   Ladyslaw Zygmunt
Dissertation: An Investigation of Active Contours for Segmentation and Motion Tracking Supervisor: Prof. J.R. Tapamo

2008 Masters Graduates
Mulholland   Hayden
Dissertation: Genetic Programming for Document Images Segmentation and Classification Supervisors: Prof. J.R. Tapamo and Prof N. Pillay
O'Neill Karen
Dissertation: Relieving the Cognitive Load of Constructing Molecular Biological Ontology Based Queries by Means of Visual Aids. Supervisor: Prof. H. Murrell
Jimenez Romeo
Dissertation: Vector Graphics to Improve Blast Graphic Representations Supervisor: Prof. H. Murrell
2007 Masters Graduates
Bachoo   Asheer Kasar
Dissertation: Comparison of Segmentation Methods for Accurate Iris Extraction. Supervisor: Prof. J.R. Tapamo
Lin   Ming-Wei
Dissertation: A Model of Modularized Real-Time Indoor Video Surveillance System Supervisor: Prof. J.R. Tapamo

ENGINEERING

Peer reviewed journal articles

1. N. Pillay, H. Xu and F. Takawira, "Repeat-Punctured Superorthogonal Convolutional Turbo Codes on AWGN and Flat Rayleigh Fading Channels", Vol. 106 No. 9/10 , pp:1-11, South African Journal of science, Sep./Oct. 2010.

2. J. Mathew, H. Xu and F. Takawira, "An Adaptive Receiver for STBC in Frequency Selective Channel with Improved Robustness and Pilot Requirements", SAIEE Africa Research Journal, Vol. 101, No. 2, pp:46-59, June 2010.

3. T. M. Wolbank, M. A. Vogelsberger, R. Stumberger, S. Mohagheghi, T. G. Habetler, and R. G. Harley, "Autonomous self-commissioning method for speed-sensorless-controlled induction machines", IEEE Transactions on Industry Applications, Vol. 46, No.34, pp. 946-954, May/June 2010.

4. D. Das, D. Divan, R. Harley, "Power Flow Control in Networks Using Controllable Network Transformers", IEEE Transactions on Power Electronics, Vol. 25, Issue 7, pp. 1753-1760, July 2010.

5. J. Liang, W. Qiao, and R. G. Harley, "Feed-forward transient current control for low-voltage ride-through enhancement of DFIG wind turbines", IEEE PES Transactions on Energy Conversion, Vol. 25, Issue 3, pp. 836-843, Sept. 2010.

6. Riaan Stopforth (ZS5RSA), Glen Bright and Ronald Harley, "Performance of the improvements of the CAESAR Robot", International Journal of Advanced Robotic Systems, ISSN: 1729-8806, INTECH, pp. 217-226, Sept. 2010.

7. J.M. Mouatcho Moualeu, H. Xu and F. Takawira, "Cooperative Diversity using repeat-punctured turbo codes," SAIEE Africa Research Journal, Vol. 100, No. 2, pp:34-39, June 2009.

8. Tahmid Quazi, Hongjun Xu, Fambirai Takawira Quality of Service for Multimedia traffic using Cross-Layer Design. IET proceedings Communications, pp83-90, Vol. 3 No 1, January 2009.

9. H. Xu, "Symbol error probability for generalized selection combining reception of M-QAM", *SAIEE Africa Research Journal, Vol. 100, No. 3, pp:68-71, September 2009.*

10. Olutayo O Oyerinde and Stanley H Mneney, Variable step size algorithms for network Echo cancellation, UbiCC Journal, Volume 4, Number 3, August 2009.

11. A.K. Bachoo and J.R. Tapamo Comparison of Features Response in Texture-based Iris Segmentation, SAIEE Africa Research Journal, vol 100, No 1, pp 2-10, 2009.

12. A, Brits and J.R . Tapamo, A Shape and Energy Based Approach to Vertical People Separation in Video Surveillance, Advances in visual computing, Lecture Notes in Computer Science, vol 5876, pp. 345-356, 2009.

13. A, Brits and J.R . Tapamo, A Shape and Energy Based Approach to Vertical People Separation in Video Surveillance, Advances in visual computing, Lecture Notes in Computer Science, vol 5876, pp. 345-356, 2009

14. T.M. Ngatched, F. Takawira and M. Bossert, " An Improved Decoding Algorithm for Finite-Geometry LDPC codes" IEEE Trans. Communications, Vol 57, 302-306, 2009.

15. T.M. Ngatched, F. Takawira, A. Farner and M. Bossert, " Two Bit-flipping decoding algorithms for low-density parity-check codes" IEEE Transactions on Communications, Vol 57, 591-596, 2009.

16. Z. Gao, T. G. Habetler, and R. G. Harley, "A Complex Space Vector Approach to Rotor Temperature Estimation for Line-Connected Induction Machines with Impaired Cooling", IEEE Transactions on Industrial Electronics, Vol. 56, No. 1, January 2009, pp. 239-247.

17. J. C. Hernandes-Meija, J. Perkel, R. Harley, R. N. Hampton, and R. Hartlein, "Correlation between Tan-delta Diagnostic Measurements and Breakdown Performance at VLF and MV XLPE Cables", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 16, No. 1, pp. 162-170, February 2009.

18. W. Qiao, G. K. Venayagamoorthy, and R. G. Harley, "Real-time implementation of a STATCOM on a wind farm equipped with doubly fed induction generators," IEEE Trans. on Industry Applications, Vol. 45, No. 1, pp. 98-107, Jan/Feb 2009.

19. W. Qiao, G. K. Vanayagamoorthy, and R. G. Harley, "Missing-sensor-fault-tolerant control for SSSC FACTS device with real-time implementation," IEEE Trans. on Power Delivery, Vol. 24, No. 2, pp. 740-750, April 2009.

20. W. Qiao, L. Qu, and R. G. Harley, "Control of IPM synchronous generator for maximum wind power generation considering magnetic saturation," IEEE Trans. on Industry Applications, Vol. 45, No. 3, pp. 1095-1105, May/June 2009.

21. J. C. Hernandes-Meija, R. G. Harley, R. N. Hampton, and R. Hartlein, "Characterization of ageing for MV power cables using low frequency Tan δ diagnostic measurements", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 16, No. 3, pp. 862-870, June 2009.

22. S. Mohagheghi, G.K. Venayagamoorthy, S. Rajagopalan and R.G. Harley, "Hardware Implementation of a Mamdani Based Fuzzy Logic Controller for a Static Compensator in a Multimachine Power System". IEEE Transactions on Industry Applications, Vol. 45, No. 4, pp. 1535-1544, July/August 2009.

23. W. Zhou, B. Lu, T. G. Habetler, and R. G. Harley, "Incipient bearing fault detection via motor stator current noise cancellation using Wiener filter", IEEE Transactions on Industry Applications, Vol. 45, No. 4, pp. 1309-1317, July/August 2009.

24. W. Qiao, R. G. Harley and G. K. Venayagamoorthy, "Coordinated reactive power control of a large wind farm and a STATCOM using heuristic dynamic programming". IEEE Transactions on Energy Conversion, Vol. 24, Issue 2, pp. 493-503, June 2009.

25. S. Mohagheghi, R.G. Harley, T. G. Habetler, and D. Divan, "Condition monitoring of power electronic circuits using artificial neural networks", IEEE Transactions on Power Electronics, Vol. 24, No. 10, pp. 2363-2390, Oct. 2009.

26. Z.L. Szpak and J,R, Tapamo, Automatic and Interactive Retinal Vessel Segmentation, South African Computer Journal, No 40, pp. 23-30, 2008.

27. Olutayo O Oyerinde and Stanley H Mneney, Improved Soft Iterative Channel Estimation for Turbo Equalization of Time Varying Frequency Selective Channels, Journal of Wireless Personal Communications Nov 2008.

28. N. Pillay, H. Xu and F. Takawira, "Repeat-Puncture Superorthogonal Convolutional Turbo Codes", SAIEE Africa Research Journal, vol 99(2),pp;54-59. June 2008.

29. Y.S. Liu, F Takawira and H Xu , Approximate Analysis of the Hybrid Token-CDMA MAC System, IEEE Transactions on Mobile computing, pp:557-568, Vol.7, No. 5, May 2008.

30. O. Sokoya, H. Xu, F. Takawira, "Performance evaluation of high rate space time trellis coded modulation using Chebyshev Quadrature technique", IET proceedings on communications, pp:658-663, Vol 2, No. 5, May 2008.

31. Z. Gao, T. G. Habetler, R. G. Harley, and R. S. Colby, "A Sensorless Rotor Temperature Estimator for Induction Machines Based on Current Harmonic Spectral Estimation Scheme", IEEE Transactions on Industrial Electronics, Vol. 55, No. 1, pp.407-416, Jan. 2008.

32. W. Qiao, R. G. Harley, and G. K. Venayagamoorthy, "Fault-Tolerant Optimal Neurocontrol for a Static Synchronous Series Compensator Connected to a Power Network". IEEE Transactions on Industry Applications, Vol. 44, No. 1, pp. 74-84, Jan./Feb. 2008.

33. J-W. Park,_R. G. Harley, G. K. Venayagamoorthy, G. Jang, "Dual Heuristic Programming Based Nonlinear Optimal Control for a Synchronous Generator", EAAI (*Engineering Applications of Artificial Intelligence), Elsevier, Vol. 21, No. 1, pp. 97-105, February 2008.*

34. W. Qiao, G.K. Venayagamoorthy, and R. G. Harley, "Optimal wide-area monitoring and nonlinear adaptive coordinating neurocontrol of a power system with wind power integration and multiple FACTS devices," Neural Networks, Vol. 21, No. 2-3, March/April 2008, pp.466-475.

35. W. le Roux, R. G. Harley, and T. G. Habetler, "Detecting faults in rotors of PM drives," IEEE Industry Applications Society Magazine, March/April 2008, pp. 23-31.

36. Y. del Valle, G.K. Venayagamoorthy, S. Mohagheghi,, J. C. Hernandez, and R.G. Harley, "Particle Swarm Optimization: Basic Concepts, Variants and Applications in Power System". IEEE Transactions on Evolutionary Computation, Vol. 12, No. 2, pp. 171-195, April 2008.

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38. W. Qiao, W. Zhou, J. M. Aller, and R. G. Harley, "Wind speed estimation based sensorless output maximization control for a wind turbine driving a DFIG," IEEE Trans. Power Electronics, Vol. 23, No.3, pp. 1156-1169, May 2008.

39. W. Qiao, Z. Gao, R. G. Harley, and G. K. Venayagamoorthy, "Robust neuro-identification of nonlinear plants in electric power systems with missing sensor measurements," IFAC Journal: Engineering Applications of Artificial Intelligence (Elsevier), Vol. 12, No. 4, pp. 604-618, June 2008.

40. S. Rajagopalan, José A. Restrepo, José M. Aller, Thomas G. Habetler, and Ronald G. Harley, "Nonstationary motor fault detection using recent quadratic time-frequency representations," IEEE Transactions on Industry Applications, Vol. 44, No. 3, pp. 735-744, May/June 2008.

41. W. Qiao, R. G. Harley, and G. K. Venayagamoorthy, "Fault-tolerant indirect adaptive neurocontrol for a static synchronous series compensator in a power network with missing sensor measurements", IEEE Transactions on Neural Networks, Vol. 19, No. 7, pp. 1179-1195, July 2008.

42. Joy Mazumdar, and R.G. Harley, "Recurrent Neural Networks Trained with Backpropagation Through Time Algorithm to Estimate Nonlinear Load Harmonic Currents" IEEE Transactions on Industrial Electronics, Vol. 55, No. 9, pp. 3484-3491, September 2008.

43. Z. Gao, T. G. Habetler, R. G. Harley, and R. S. Colby, ""A Sensorless Adaptive Stator Winding Temperature Estimator for Mains-Fed Induction Machines with Continuous-operation Periodic Duty Cycles", IEEE Transactions on Industry Applications, Vol. 44, No. 5, pp. 1533-1542, Sept./Oct. 2008.

44. Joy Mazumdar, R.G. Harley, F. C. Lambert G.K. Venayagamoorthy, and M. L. Page, "Intelligent tool for determining the true harmonic current contribution of a customer in a power distribution network", IEEE Transactions on Industry Applications, Vol. 44, No. 5, pp. 1477-1485, Sept/Oct 2008.

45. Z. Gao, R. S. Colby, T. G. Habetler, and R. G. Harley, "A Model Reduction Perspective on Thermal Models for Induction Machine Overload Relays", IEEE Transactions on Industrial Electronics, Vol. 55, No. 10, pp. 3525-3534, Oct. 2008.

46. Joy Mazumdar, and R.G. Harley, "Utilization of Echo State networks for Differentiating Source and Nonlinear Load harmonics in the Utility Network" IEEE Transactions on Power Electronics, Vol. 23, No. 6, pp. 2768-2745, Nov. 2008.

47. B. Lu, T. G. Habetler and R. G. Harley, "A non-intrusive and in-service motor efficiency-estimation method using air-gap torque with considerations of condition monitoring", IEEE Transactions on Industry Applications, Vol. 44, No. 6, pp. 1666-1674, Nov./Dec. 2008. Second prize Transactions award for 2008.

48. J. C. Hernandes-Meija, J. Perkel, R. Harley, M. Begovic, R. N. Hampton, and R. Hartlein, "Determining routes for the analysis of partial discharge signals derived from the field", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 15, No. 6, pp. 1517-1525, December 2008.

49. W. Zhou, T. G. Habetler, and R. G. Harley, "Bearing fault detection via stator current noise cancellation and statistical control", IEEE Transactions on Industrial Electronics, Vol. 55, No, 12, pp. 4260-4270, December 2008.

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51. W Jin, H.Xu and F. Takawira "An adaptive hybrid list decoding and chase-like algorithm for Reed-Solomon codes", SAIEE Africa Research Journal, Vol. 98, No.1 pp:13-15, March 2007.

52. E Eitelberg, C.H. Houpis "Isaac M. Horowitz: An essential singularity in the complex domain of control theory (1920–2005)", Int. J. Robust and Nonlinear Control. Volume 17, Issue 2-3, pp. 95–105, 2007.

53. E. Eitelberg "Macro dynamic feedback interaction between trade and production", Int. J. Robust and Nonlinear Control. Volume 17, Issue 2-3, pp. 203–224, 2007.

54. E Eitelberg, E Boje "Implicit Quasi Steady State Approximation and Application to a Power Plant Evaporator", ASME Journal of Dynamic Systems, Measurement and Control. Jan. 2007, Vol. 129/1, pp. 66–71.

55. W. le Roux, R. G. Harley, and T. G. Habetler, "Detecting rotor faults in low power permanent magnet synchronous machines", IEEE Transactions on Power Electronics, Vol. 22, No. 1, pp. 322-328, January 2007.

56. S. Mohagheghi, Y. del Valle, G.K. Venayagamoorthy and R.G. Harley, "A Proportional-Integrator Type Adaptive Critic Design Based Neurocontroller for a Static Compensator in a Multimachine Power System", IEEE Transactions on Industrial Electronics, Vol. 54, No. 1, pp. 86-96, Jan 2007.

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60. J. Mazumdar, R. Harley, F. Lambert and G.K. Venayagamoorthy, **"**Neural Network Based Method for Predicting Nonlinear Load Harmonics**,"** IEEE Transactions on Power Electronics. Vol. 22, No. 3, pp. 1036-1045, May 2007.

61. S. Mohagheghi, G. K. Venayagamoorthy, and R. G Harley, "Optimal Wide Area Controller and State Predictor for a Power System". IEEE Transactions on Power Systems, Volume 22, No.2, pp.693-705, May 2007

62. S. Rajagopalan, José M. Aller, José A. Restrepo, T. G. Habetler, and R. G. Harley, "Analytic-Wavelet-Ridge-Based Detection of Dynamic Eccentricity in Brushless Direct Current (BLDC) Motors Functioning Under Dynamic Operating Conditions," IEEE Transactions on Industrial Electronics, Vol. 54, No. 3, pp. 1410-1419, June 2007.

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64. L. Wu, X. Huang, T. G. Habetler, and R. G. Harley, "Eliminating Load Oscillation Effects for Rotor Eccentricity Detection In Closed-Loop Drive-Connected Induction Motors", IEEE Transactions on Power Electronics, Vol. 22, No. 4, pp. 1543-1551, July 2007.

65. X. Huang, T. G. Habetler, and R. G. Harley, "Detection of Rotor Eccentricity Faults in a Closed-Loop Drive-Connected Induction Motor Using an Artificial Neural Network", IEEE Transactions on Power Electronics, Vol. 22, No. 4, pp. 1552-1559, July 2007.

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67. S. Mohagheghi, G. K. Venayagamoorthy, and R. G Harley, "Optimal Neuro-Fuzzy External Controller for a STATCOM in the 12-Bus Benchmark Power System", IEEE Transactions on Power Delivery, Vol.22, No. 4, pp. 2548-2558, Oct 2007.

68. X. Huang, T. G. Habetler, R. G. Harley, and E. Wiedenburg, "Using a Surge Tester to Detect Rotor Eccentricity Faults in Induction Motors", IEEE Transactions on Industry Applications, Vol.43, No. 5, pp. 1183-1190, Sept/Oct 2007.

69. M-.W Lin , J.R. Tapamo and B. Ndovie A Texture-Based Method for Document Segmentation and Classification, South African Computer Journal, No 36, pp. 49-56, June 2006.

70. T. M. N. Ngatched and F. Takawira, "An ensemble of iteratively decodable codes constructed based on a superposition method," IEEE Trans. Commun., vol. 54, no. 11, pp. 1937 – 1947, Nov. 2006.

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Peer reviewed published conference articles

1. N. Pillay, H. Xu and F. Takawira, " Dual-Repeat-Puncture Turbo Codes in AWGN Channels" IEEE Africon 2009, Nairobi.

2. J.M. Mouatcho Moualeu, H. Xu and F. Takawira, "'Turbo Coded in coded cooperation using the forced symbol method," IEEE Wireless Communications and Networking Conference (WCNC), Hungry, April 2009.

3. S.R. Beharie, H. Xu and F. Takawira, "Cross Layer Hybrid ARQ 2 Cooperation with Throughput Improvement" IEEE Wireless Communications and Networking Conference (WCNC), Hungry, April 2009.

4. J.M. Mouatcho Moualeu, H. Xu and F. Takawira, "'Double Repeat-Punctured Turbo Coded Cooperative Diversity Scheme," IEEE WCNC, Las Vegas, March 31-April 03, 2008.

5. T. M. N. Ngatched and F. Takawira, "A list decoding algorithm for short low-density parity-check codes," 4th International Symposium on Turbo codes and Related Topics in Munich, Germany, Apr. 3-7 2006.

6. F Ghafour, F Takawira, "High Rate Non Binery Generalized Low Density Parity Check Codes" SATNAC 2008, 7-10 September, Eastern Cape Coast, South Africa.

7. J M Moualeu, H Xu , F Takawira. "Turbo Coded Cooperation using the forced Symbol Method. SATNAC 2008, 7-10 September, Eastern Cape Coast, South Africa.

8. L Padayachee, H Xu, F Takawira. "A Chanel and Delay Estimation Algorithm For Asynchronous Cooperative Diversity Networks With Pilot Symbol" SATNAC 2008, 7-10 September, Eastern Cape Coast, South Africa.

9. S R Beharie, H Xu, F Takawira "Cross Layer ARQ 2 Cooperative Diversity in Next Generation Wireless Networks" SATNAC 2008, 7-10 September, Eastern Cape Coast, South Africa.

10. N. Pillay, H. Xu and F. Takawira, "Repeat-Puncture Superorthogonal Convolutional Turbo Codes in AWGN Channels" SATNAC 2007, 9-13 September, Mauritius.

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