
Research Methods in Computing: Writing a Research Proposal

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Writing a Research Proposal

- **Writing a Research Proposal**
- A **research proposal** is similar in a number of ways to a project proposal; however, a research proposal addresses a particular project: academic or scientific research.

Thanks to Joe Touch for "one ping"

Writing a Research Proposal



- The forms and procedures for such research are well defined by the field of study, so guidelines for research proposals are generally more exacting than less formal project proposals.
- Research proposals contain extensive literature reviews and must offer convincing support of need for the research study being proposed.

http://www2.smumn.edu/deptpages/~tcwritingcenter/Forms_of_Writing/ResearchProposal.htm

Research Proposal



- What is the question that this proposal addresses?
- Why is this problem significant?
- How will the question be addressed?
- What will be the social, economic, ethical and psychological impact of your project.
- What is the value of this research to the people of Ireland?

Research Proposal



- You will have to present this proposal in the form of a poster presentation. (50%)
- The presentation will be judged by a group of academics and research administrators. (40%)
- You will have to write a 'press release' of your proposal that should be intelligible to an informed non-scientist. (10%)

Writing a Research Proposal



INSIGHT: Video Analysis and Selective Zooming using Semantic Models of Human Presence and Activity (c. 0.5 Million Sterling, 2004-2007)

INSIGHT is a project funded by one of the UK research councils (EPSRC the nearest equivalent of *Science Foundation Ireland*) and [the UK Ministry of Defence] under the EPSRC Technologies for Crime Prevention and Detection Programme. INSIGHT aims to advance techniques for semantic content analysis of CCTV recordings for automatic semantic video tagging, search and pro-active sampling by:

http://www2.smu.edu/deptpages/~tcwritingcenter/Forms_of_Writing/ResearchProposal.htm

Writing a Research Proposal



INSIGHT: Video Analysis and Selective Zooming using Semantic Models of Human Presence and Activity

- (1) Developing models for fully automated semantic-tagging of CCTV recordings based on holistic human presence detection and abnormal event / activity recognition, e.g. monitoring unmanned sites and buildings and to significantly reduce the false alarms triggered by existing Video Motion Detection systems.
- (2) Developing models for event and activity based visual topic spotting and scene change detection for semantic decomposition and automatic sorting of CCTV recordings over time, e.g. automatically detecting in video aggressive human behaviour on buses, trains or in front of buildings.
- (3) Developing models for automated selective zooming and super-resolution in CCTV recordings with variable levels of details, e.g. to synthesize in arbitrary virtual views good-quality close-up images of a face or vehicle number-plate in order to improve the accuracy of automatic face-recognition and ANPR (Automatic Number Plate Recognition), and to increase the value of imagery evidence captured in low-resolution by CCTV cameras.

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Writing a Research Proposal



INSIGHT: Video Analysis and Selective Zooming using Semantic Models of Human Presence and Activity

- (1) Developed models for automated semantic-tagging of CCTV video based on holistic human presence detection and abnormal event / activity recognition;
- (2) Developed models for event and activity based visual topic spotting and scene change detection for semantic segmentation of CCTV video;
- (3) Developed algorithms for selective zooming / super-resolution in CCTV video, in particular to cope with variations in 3D pose change, expression deformation and lighting changes.**

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Writing a Research Proposal: A research 'grid'



DEVELOP	GENERIC APPLICATION	ELABORATION	SPECIFIC APPLICATION	IMPROVEMENT TO EXISTING PRODUCTS/SERVICES
MODELS				
ALGORITHMS				

http://www2.smu.edu/deptpages/~tcwritingcenter/Forms_of_Writing/ResearchProposal.htm

Writing a Research Proposal



DEVELOP	GENERIC APPLICATION	ELABORATION	SPECIFIC APPLICATION	IMPROVEMENT TO EXISTING PRODUCTS/SERVICES
MODELS	fully automated semantic-tagging of CCTV recordings	based on holistic human presence detection and abnormal event / activity recognition,	e.g. monitoring unmanned sites and buildings	and to significantly reduce the false alarms triggered by existing Video Motion Detection systems.

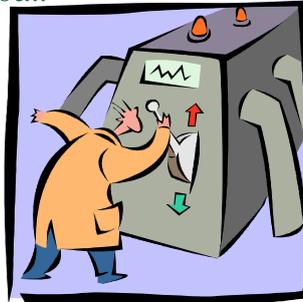
http://www2.smu.edu/deptpages/~tcwritingcenter/Forms_of_Writing/ResearchProposal.htm

Writing a Research Proposal



The purpose of your research proposal is not...

To describe
the WizWoz
system



- Your reader does not have a WizWoz
- She is primarily interested in re-usable brain-stuff, not executable artefacts

Writing a Research Proposal



Contributions should be refutable

NO!	YES!
We describe the WizWoz system. It is really cool.	We give the syntax and semantics of a language that supports concurrent processes (Section 3). Its innovative features are...
We study its properties	We prove that the type system is sound, and that type checking is decidable (Section 4)
We have used WizWoz in practice	We have built a GUI toolkit in WizWoz, and used it to implement a text editor (Section 5). The result is half the length of the Java version.

Simon Peyton Jones, Microsoft Research, Cambridge

Writing a Research Proposal



The truth: credit is not like money

Giving credit to others does not diminish the credit you get from your paper

- Warmly acknowledge people who have helped you
- Be generous to the competition. "In his inspiring paper [Foo98] Foogle shows.... We develop his foundation in the following ways..."
- Acknowledge weaknesses in your approach

Simon Peyton Jones, Microsoft Research, Cambridge

Credit is not like money



Failing to give credit to others can kill your paper

If you imply that an idea is yours, and the referee knows it is not, then either

- You don't know that it's an old idea (bad)
- You do know, but are pretending it's yours (very bad)

Simon Peyton Jones, Microsoft Research, Cambridge

Research Proposal



■ REVIEW PROCESS

- The applicant is asked to designate the panel in which he/she wishes the proposal to be reviewed. Descriptions of the RFP review panels are available on the SFI website. All proposals will be reviewed by international panels of reviewers selected by SFI staff. The reviewers will be sent a number of proposals to review and will submit their written reviews to SFI prior to the panel meeting. The reviewers will then convene as a panel to discuss the merits of all the proposals in their research area, taking into account the reviews already submitted by the panel members. A rapporteur for each proposal will be assigned from among the panel members and he/she will provide a written summary of the panel discussion. This summary and the overall recommendation will reflect the consensus of the panel and will be provided to SFI before the end of the panel meeting. SFI will use these recommendations to make funding decisions.

Writing a Research Proposal



BEWARE: Behaviour based Enhancement of Wide-Area Situational Awareness in a Distributed Network of CCTV Cameras

- (1) (a) To develop a model for robust detection and tagging of people over wide areas of different physical sites captured by a distributed network of cameras, e.g. monitoring the activities of a person travelling through a city/cities.

(b) To develop a model for global situational awareness enhancement via correlating behaviours across a network of cameras located at different physical sites, and for real-time detection of abnormal behaviours in public space across camera views; The model must be able to cope with changes in visual context and on definitions of abnormality, e.g. what is abnormal needs be modelled by the time of the day, locations, and scene context.

(c) To develop a model for automatic selection and controlling of Pan-Tilt-Zoom (PTZ)/embedded smart cameras (including wireless ones) in a surveillance network to 'zoom into' people based on behaviour analysis using a global situational awareness model therefore achieving active sampling of higher quality visual evidence on the fly in a global context, e.g. when a car enters a restricted zone which has also been spotted stopping unusually elsewhere, the optimally situated PTZ/embedded smart camera is to be activated to perform adaptive image content selection and capturing of higher resolution imagery of, e.g. the face of the driver.

http://www2.smumn.edu/deptpages/~tcwritingcenter/Forms_of_Writing/ResearchProposal.htm

Writing a Research Proposal



INSIGHT begat *BEWARE* – another project for Prof Gong for the next 3 years (2007-2010)

GENERIC

BEWARE Preamble: There are now large networks of CCTV cameras collecting colossal amounts of video data, of which many deploy not only fixed but also mobile cameras on wireless connections with an increasing number of the cameras being either PTZ controllable or embedded smart cameras. A multi-camera system has the potential for gaining better viewpoints resulting in both improved imaging quality and more relevant details being captured. However, more is not necessarily better. Such a system can also cause overflow of information and confusion if data content is not analysed in real-time to give the correct camera selection and capturing decision. Moreover, current PTZ cameras are mostly controlled manually by operators based on ad hoc criteria. There is an urgent need for the development of automated systems to monitor behaviours of people cooperatively across a distributed network of cameras and making on-the-fly decisions for more effective content selection in data capturing. **Today, there is no system capable of performing such tasks and fundamental problems need to be tackled.** This project will develop novel techniques for video-based people tagging (consistent labelling) and behaviour monitoring across a distributed network of CCTV cameras for the enhancement of global situational awareness in a wide area. More specifically, we will focus on developing three critical underpinning capabilities:

Specific application

ELABORATION

Improvements to existing services

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Writing a Research Proposal



EPSRC Reference:	EP/E028594/1		
Title:	BEWARE: Behaviour based Enhancement of Wide-Area Situational Awareness in a Distributed Network of CCTV Cameras		
Principal Investigator:	Professor S Gong		
Other Investigators:	Dr T Xiang		
Researcher Co-Investigator:			
Project Partner:	Liverpool City Council - City Watch CCTV	Ministry of Defence SA-SD	Police Scientific Development Branch
	Smart CCTV Ltd	Tyco Fire & Integrated Solutions Ltd.	Ultra Electronics Limited
Department:	Computer Science		
Organisation:	Queen Mary, University of London		
Scheme:	Standard Research		
Starts:	02 July 2007	Ends:	01 September 2010
		Value (£):	623,617
EPSRC Research Topic Classifications:	Image and Vision Computing		
EPSRC Industrial Sector Classifications:	Aerospace and Defence		
Related Grants:			
Panel History:	Panel Date	Panel Name	Outcome
	01 Nov 2006	Fighting Crime, Increasing Security	Announced
	Summary		

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Computing: a Professional Discipline



- **The moral of the story:**
 - **Computing is an expanding discipline; all pervasive and hence with diffuse boundaries;**
 - **Computing can be viewed as a science or a branch of engineering, but this would be saying that medicine is medical science or the law is a social science;**
 - **Computing is a professional subject where there challenges theoretical and practical alike**

Plagiarism: THE SCHÖN SAGA



October 2001:
Hendrik Schön and Zhenan Bao: A single molecule transistor made out of organic material;

The end of silicon-based, highly toxic process of making transistor involving rare metals;

The new world of freely available organic molecules to build transistor.

Plagiarism: THE SCHÖN SAGA



Sound bites
Study tracks sophisticated views on transgenics
p368

Name game
Chemists seek a route from structure to a proper name
p369

DNA clampdown
UK commission calls for line on illicit use of DNA samples
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Killer question
US and Canada clash over a planned area
p372

Bell Labs launches inquiry into allegations of data duplication

Geoff Brumfiel, Washington
One of nanotechnology's rising stars is under investigation following claims that data in some of his papers have been falsified.

Jan Hendrik Schön, a researcher at Bell Labs in Murray Hill, New Jersey, faces an independent inquiry after scientists noticed striking similarities between different graphs in a number of his published papers.

To peer or not to peer : The Einstein Saga



Einstein Versus the Physical Review

A great scientist can benefit from peer review, even while refusing to have anything to do with it.



Doubting gravitational waves

Einstein submitted this research to the *Physical Review* under the title "Do Gravitational Waves Exist?" with Rosen as coauthor. Although the original version of the paper no longer exists, Einstein's answer to the title question, to judge from his letter to Born, was "No."

[...]

But not everyone was so easily convinced. The *Physical Review* received Einstein's submission on 1 June 1936, according to the journal's logbook. Tate returned the manuscript to Einstein on 23 July with a critical review and the mild request that he "would be glad to have [Einstein's] reaction to the various comments and criticisms the referee has made." Einstein wrote back on 27 July in high dudgeon, withdrawing the paper and dismissing out of hand the referee's comments:

Dear Sir,

We (Mr. Rosen and I) had sent you our manuscript for publication and had not authorized you to show it to specialists before it is printed. I see no reason to address the—in any case erroneous—comments of your anonymous expert. On the basis of this incident I prefer to publish the paper elsewhere.

Respectfully,

Kennefick, Daniel. (2005). 'Einstein Versus the *Physical Review*'. *Physics Today*, Vol. 58 (September 2005). pp 43-48. http://www.physicstoday.org/vol-58/iss-9/pdf/vol58no9p43_48.pdf

Scientific misconduct



Scientific misconduct consists of fabrication:

making up of data

manipulation of research data and processes

plagiarism

self-plagiarism

violation of ethical standards

ghost-writing

Scientific misconduct: One in Three Scientists Confesses to Having Sinned



Action	%age
plagiarism or falsification	(<)1.5%
"changed the design, methodology or results of a study in response to pressure from a funding source;	15.5%
admitted overlooking others' use of flawed data;	12.5%
had circumvented minor aspects of requirements regarding the use of human subjects."	7.6%



Meredith Wadman, One in Three Scientists Confesses to Having Sinned, 435 Nature 718 (2005);

Scientific misconduct



Reasons for scientific misconduct include:

1. career pressure
2. believing that one knows the right answer
3. ability to get away with it

Reasons for retraction of papers mainly consist of:

- a. errors (i.e. irreproducible results)
- b. fraud or misconduct (e.g. in Schön's case)
- c. political reasons (e.g. in Galileo's case)

(Goodstein 2002)

Plagiarism: THE SCHÖN SAGA



Hendrick J. Schön obtained his PhD from the University of Konstanz (Germany) in 1997 and worked at the Bell Labs (USA) until 2002.

During 2001 and 2002, his works were hailed as remarkable breakthroughs in condensed matter physics, and solid state devices particularly for his work on single molecule transistors and on high temperature superconductors:

organic single molecule transistors – that would have taken us beyond the Moore's law and increased the number of transistors on a chip way beyond today's technology- and

controllable high-temperature superconductors (superconductors work well at -2700 C and high temperature here means -1700C) will increase memory speeds and processor power by orders of magnitude.

Schön was being nominated for the Nobel Prize

Plagiarism: THE SCHÖN SAGA



Hendrick J. Schön has reported to have published over 80 research papers all in leading journals of science and of physics including *Nature*, *Science*, and the American Physical Society's *Physical Review* amongst others. All these journals have a 'high impact factor'. Here is a sample of 15 papers out of 45 examined in detail after its publication. He took a break for X-mas.

Month	2000	2001
January		
February	<i>Science</i>	
March		<i>Nature</i>
April	<i>Science</i>	<i>Science</i>
May		
June	<i>Science</i>	
July	<i>Science</i>	
August		
September		<i>Science</i>
October		<i>Nature & Appl Phys Letters</i>
November	<i>Science & Nature</i>	<i>Nature</i>
December	<i>Appl. Phys. Letters</i>	<i>Appl. Phys. Lett & Science</i>

All these papers have now been retracted publicly – 45 of all his 80 or so publications.



CASE STUDY: THE SCHÖN SAGA:

Not all misconduct is linguistic!

Two experiments carried out, by Schon and colleagues, very different temperatures were reported to have identical noise → Schon suggested that he had submitted the same graph twice by accident;

But then another reader found the same noise in a paper describing a third experiment.

More instances of duplicate data were found in Schön's work.



CASE STUDY: THE SCHÖN SAGA:

Not all misconduct is linguistic!

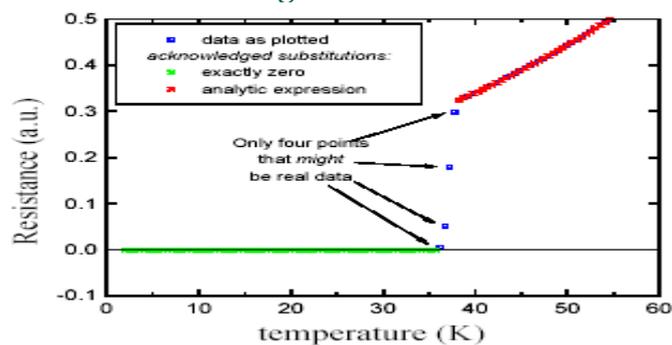


Figure 61. Data from the "Super C60" Paper (XIX) for one gate voltage, showing that only four points of the original 117 remain after acknowledged spliced points are removed. Any rounding of the transition would be obscured by this procedure.

<http://publish.aps.org/reports/lucentrep.pdf>





CASE STUDY: THE SCHÖN SAGA

- Prof. Leonardo Cassuto, described perhaps the greatest fraud in scientific publishing in recent times. It described work that was supposed to have taken place in Lucent Laboratories (formerly **Bell Labs**). Dr. **Hendrick Schon** published about 90 papers in 3 or 4 years, an almost unheard of rate of production. All papers had been submitted to reputable journals, including the prestigious "Nature" and "Science" and had been peer reviewed and published.
- They described experiments which claimed to show organic crystals which had been made to behave as semiconductors, including pentacene as photovoltaic, and C60 (buckyballs) superconducting at low temperatures. Dr. **Schon** seemed to be heading for a Nobel Prize. After publication, other scientists attempted to repeat the results without success: this was the first warning of something amiss. Someone pointed out that the same graph appeared in two separate papers, with different axes, purporting to be the result of separate experiments: this was the second warning.



CASE STUDY: THE SCHÖN SAGA

- The Committee looked at 24 allegations from 20 different sources with over 100 different complaints; 16 cases of *scientific misconduct* were proven, 2 had no direct link to his work, and 6 were not used in publication. He was asked to, and did, retract 25 of his largely co-authored publications in the high impact journals.
- Only Hendrick Schon was reprimanded, he was dismissed by Bell Labs in September 2002 and in June 2004 the University of Konstanz withdrew his PhD because he brought the discipline in disrepute. His thesis has not been criticised for plagiarism and it is understood that his lawyers are in touch with the University authorities.

Beasley Report



The allegations investigated in the Beasley Report were:

1. data substitution
 2. unrealistic precision (of data = precisions beyond that expected in real experiment)
 3. contradictory physics (= results that were inconsistent with stated device parameters and prevailing physical understanding)
-

Conclusions of the Beasley Report



- The Committee found falsification or fabrication of data in 16 out of the 24 cases they examined.
 - Substitution of curves or parts of them to represent materials or devices in order to produce a more convincing representation of behaviour observed was found to be scientific misconduct.
 - Schön did not follow generally accepted practice concerning the maintenance of traceable records nor did he retain original data in a form with which critical physical claims could be verified or examined.
 - The Committee found all coauthors of Hendrik Schön in the work in question completely cleared of any scientific misconduct
-

Report of the Committee “Liability in Science” at the University of Konstanz



- It was limited to the papers that originated in Konstanz (papers on photovoltaics)
 - The main results are not questionable
 - Inconsistencies in the publications were found but the documentation provided was not enough to prove fabrication of data
 - Inconsistencies did not affect conclusions
 - The committee concluded that on this basis no deliberate manipulation could be inferred
-

Report of the Committee “Liability in Science” at the University of Konstanz



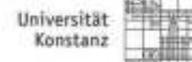
- The remark in the Beasley Report that most papers had originated in Konstanz only explains the circumstances.
 - The committee also found that there are no grounds to accuse Schön of gross negligence.
 - Schön’s behaviour lies in a ‘grey area’ hence his scientific misconduct cannot be proved.
 - The final conclusion of the Committee is that Schön’s mistakes can be corrected by Errata in the journals concerned.
-

University of Konstanz 'rejects' Schon's thesis



- Schon's thesis was rejected by the University of Konstanz in 2004 on grounds of unbecoming scientific conduct.
- Schon appealed against the decision and the University took 5 more years to decide!

Report of the Doctoral Committee, University of Konstanz



Presseinformation Nr. 163 vom 28. Oktober 2009

Erhebliches wissenschaftliches Fehlverhalten

Widerspruch gegen Entzug des Doktorgrades zurückgewiesen

Jan Hendrik Schön hat gegen den Entzug des Doktorgrades durch den Promotionsausschuss des Fachbereichs Physik an der Universität Konstanz Widerspruch eingelegt. Der Promotionsausschuss hat daraufhin nochmals verschiedene Publikationen Schöns untersucht. Er kam dabei zum Ergebnis, dass bei diesen Publikationen ein erhebliches wissenschaftliches Fehlverhalten vorliegt. Aufgrund der Feststellungen hat der Promotionsausschuss seine Auffassung bestätigt, dass sich Hendrik Schön durch sein Verhalten als unwürdig zur Führung des Doktorgrades erwiesen hat. Vor diesem Hintergrund hat der Prorektor für Lehre nach einer Interessenabwägung den Widerspruch zurück gewiesen.

Die Universität Konstanz hat im Juni 2004 Jan Hendrik Schön den Dokortitel entzogen. Das wissenschaftliche Fehlverhalten, das der Physiker zwar nicht im direkten Zusammenhang mit seiner Promotion, jedoch bei seinen späteren Arbeiten an den Tag gelegt hat, war der Grund für die Entscheidung des Promotionsausschusses des Fachbereichs Physik.