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# Mechanical Engineering 200: 600-1000 Word Technical Paper

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# Roger Graves



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Director, Writing Across the Curriculum  
Professor, EFS

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- wac
- c4w
- writing initiatives
- webmail
- efs

I'm new to the University of Alberta, having come from the University of Western Ontario where I was Director of the Program in Writing, Rhetoric, and Professional Communication in the Faculty of Arts and Humanities. In my new position here I'll be working with faculty and students across the university as part of the Writing Across the Curriculum initiative. I will also be working with students and faculty in the Department of English and Film Studies.

I am the author, co-author, or editor of five books and 29 articles, including Writing Instruction in Canadian Universities. My current research interests include the development of doctoral student writing, writing assignments across disciplinary fields, and rhetorical approaches to text encoding. Currently I serve as co-Vice-President of the Canadian Association for the Study of Discourse and Writing (CASDW) and a member of the Executive Board of the Canadian

### Recent presentations

This page contains links to pdfs of slides displayed at presentations I've given.

### Books

This page displays the covers and descriptions of books I've authored, co-authored, or co-edited



### Blog: Thinking About Writing

A new blog on writing-related issues

<http://www.ualberta.ca/~graves1/index.html>

# Centre for Writers



Writing Initiatives  
University of Alberta



Centre for Writers

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## Welcome to the Centre for Writers

We offer **free** one-on-one writing coaching and support to all students, instructors and staff at the University of Alberta - in any faculty or at any level of study.

Our writing coaches are available to assist clients with higher order concerns in their writing, such as thesis formation, organization and idea development, as well as more specific details, like grammar and documentation style. Clients can bring in any writing project at any stage of development: essays, lab reports, creative pieces, scholarly articles, thesis drafts, application letters - and more. Our coaches will also help students read instructor comments on already-graded papers. ESL and EAL students are welcome!

[Request a class room visit by a tutor.](#)

**Welcome back for the Fall 2009 term! Tutoring hours will begin on Monday, September 14. The online appointment-booking schedule will be available to clients as soon as possible prior to this date. We look forward to working with you!**



9/2/2009 10:34:15 AM

### Express News

#### Twitter Updates

The Centre for Writers will open for the fall term on Monday, September 14! 5 days ago

[follow me on Twitter](#)

#### GramWOW



<http://www.c4w.arts.ualberta.ca/>

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# Communication/Technical Skills

No matter how many technical skills you have, you still need to deal with people at a level they can understand, so communication skills are just as important as technical skills.

Paula Anthony, Industry technical support team leader

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# Earnings and English



A study reported in *Fortune* magazine showed that the top quartile in university studies earned **three times** what the bottom quartile earned in their lifetimes.

The best communicators among you will earn millions more over your lifetimes than the least effective communicators.

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# Genres

As you move through your career at U of A you will need to learn new genres

- Engineering genres:  
presentations, abstracts, reports
  - Genres in course electives:  
essays, reflections, summaries, annotated bibliographies
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# Audiences

You will need to learn to write for distinctly different audiences:

- Co-workers in co-op placements
- Engineering professors
- Professors in elective courses
- Job search documents



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# Factors affecting success

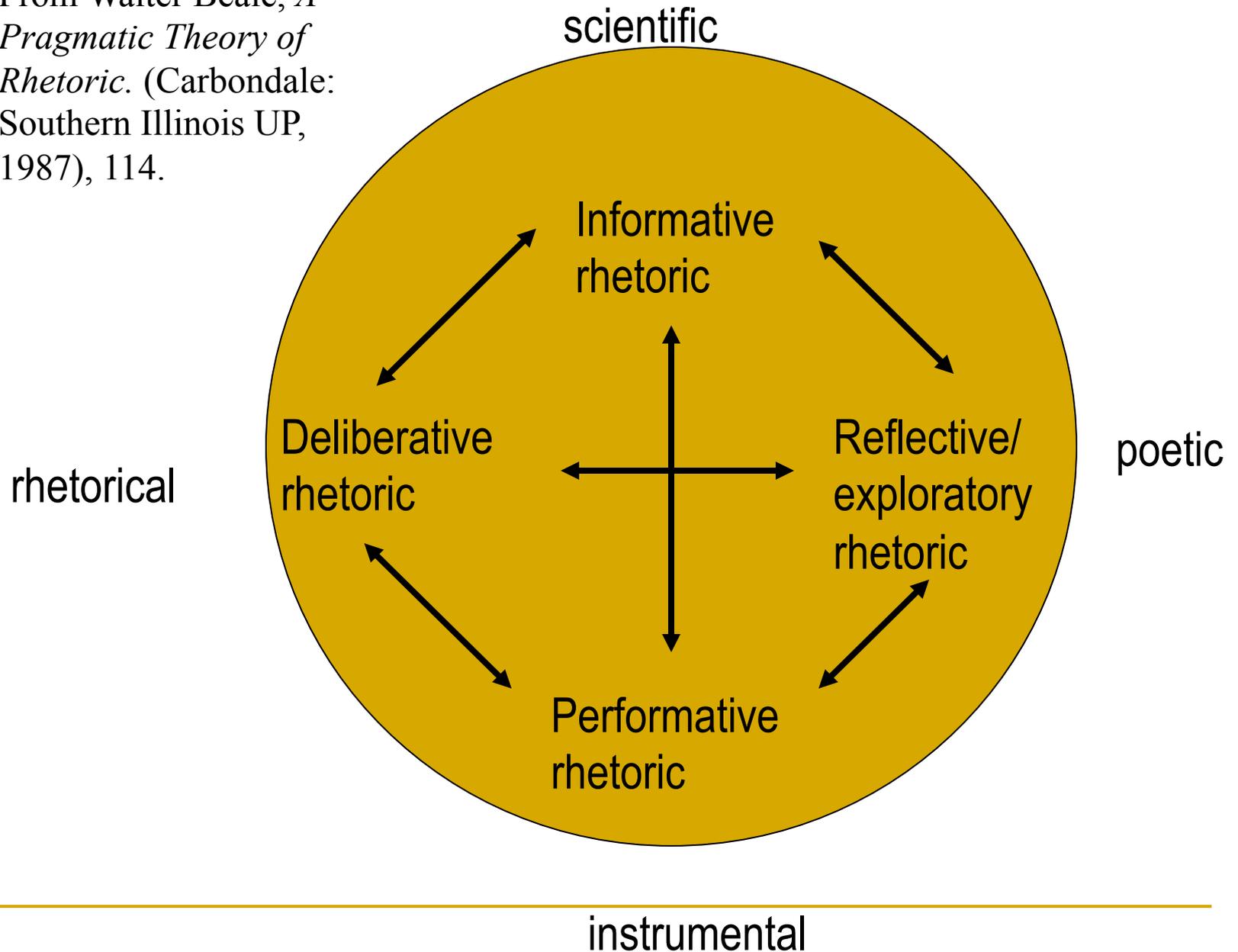
- Flexibility of your writing processes
  - Ability to get feedback on drafts
  - Familiarity with the genre, complexity of the genre
  - Complexity of the task: description is less complex than analysis/synthesis
  - Number of audiences/readers, diversity within these groups
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# Academic writing for engineering students

- Technical engineering documents
  - Email to peers, professors, staff
  - Job application materials
  - Essays for non-engineering courses
  - Lab reports for science courses
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From Walter Beale, *A Pragmatic Theory of Rhetoric*. (Carbondale: Southern Illinois UP, 1987), 114.



# The circular model

- Highlights the dual aims of discourse
- A piece of writing can both persuade and inform (e.g. newspaper report on school lunches)
- Any piece of writing has at least two aims
- E.g Your resume
  - Informative and persuasive

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EVENTS

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\(JET\) Info Sessions](#)

[The heterodonty of  
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Biomechanical implications  
inferred through 3D  
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## Students stand up to make a difference

By **Ileiren Poon**

October 16, 2009 - (Edmonton) The University of Alberta quad was jumping this afternoon as students, staff, faculty and members of the Edmonton community came out to take part in Stand Up Against Poverty.



The annual event is designed to raise awareness of global poverty issues and to connect student groups with each other, as well as with researchers and community groups who are taking action against economic disparity.

Students' Union president Kory Mathewson told the crowd that it's up to them to make a difference in

[Print story](#) | [Email story](#)

[Video coverage of  
Stand Up Against Poverty](#)

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# Audience and Purpose

- Understand your audience for a piece of writing
  - Understand your purpose for a piece of writing
  - The better you understand your audience and purpose, the better your document will accomplish your goals
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# Goals/purpose

- The goal of this writing assignment is to produce a high-quality technical paper.
  - The subject can be chosen freely, however it must be based on an article from the ASME Mechanical Engineering Magazine.
  - Additional sources, such as from U of A library documents or the internet, may be used to supplement the information from the magazine article.
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# Rubric

- Evaluation of the submitted work will be based on (1) structure and format, (2) relevance to mechanical engineering, (3) grammar, (4) spelling, (5) correctness of references, and (6) overall appearance. The maximum score for a perfect paper is 15 marks. Cumulative marks for this writing assignment will contribute 15% to the final course grade.
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# Topics: Scope

Let's brainstorm a list of possible topics:

- Artificial intelligence (too broad)
  - Digital signal processing *applications* (better)
  - Automated manufacturing systems
  - Fighter jets/engines/turbines/stealth
  - Hvac/geothermal energy feasibility
  - Swimsuit fluid dynamics
  - Self-repairing concrete/self-healing
  - Renewable energy sources/technologies/solar
  - Snowboards/composite materials/layers/core materials and performance
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# Sample outline notes

## Segway Personal Transporter

Abstract

Index terms

- I. Introduction
- II. Sensor System
  - A. Analogy with the Human Body
  - B. Simple Mechanical Gyroscope
  - C. Segway Adaption
- III. Mechanical Movement
  - A. Wheels
  - B. Transmission
- IV. Practicality
- V. Conclusion

References

## Flying cars

Abstract

Index terms

1. Introduction
2. Alternate Mode for Everyday Travel
3. Technology in the Moller Skycar and Terrafugia Transition
  - A. Moller Skycar Technology
  - B. Terrafugia Transition Technology
4. Conclusion

References

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# Sample outline

- I. Introduction
  - II. Sensor System
    - A. Analogy with the Human Body
    - B. Simple Mechanical Gyroscope
    - C. Segway Adaption
  - III. Mechanical Movement
    - A. Wheels
    - B. Transmission
  - IV. Practicality
  - V. Conclusion
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# Abstracts

- **Abstract**— The Segway-PT is a personal transportation device that is largely dependent on the concepts of gyroscopic motion. A mechanism consisting of semiconductor sensors and microprocessors are responsible for dynamic correction of tilt. The angle of rotation is controlled by a user to guide the device to go in a desired direction. The Segway-PT is supported by only two wheels and has minimal moving parts. It is designed for versatility in short commutes, operating on electric power. Redundancy is used abundantly to prevent failure.
  - 6 sentences
  - Structure of abstract mirrors structure of the paper itself
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# Abstract example

**Ever since automobiles and aircrafts became staples in transportation, there has been interest in combining the two into one vehicle. Two main types of flying cars are currently being developed; the roadable aircraft and the vertical takeoff and landing (VTOL) vehicle. The technology focus of the roadable aircraft is to have a transformable airplane whose wings compactly fold to become a suitable width, enabling it to drive on the highway . The VTOL vehicle is designed to fly using an autopilot program to transport passengers, with minimal travel distance spent on roadways. The main developer of the VTOL vehicle is Moller International. The company has developed a flying prototype called the Moller Skycar which utilizes Freedom Motors' Rotapower engines. The engine is compact and practically vibration free. The company developing the roadable aircraft is Terrafugia. Their design employs technology used in most aircrafts as well as new mechanisms to allow folding wings. The company's fully functional prototype is the Terrafugia Transition, which is planned to begin production during the fourth quarter of 2011. The goal of these vehicles is to improve convenience of travelling, provide quicker responses to emergency situations and cut costs of aircraft ownership for consumers.**

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# Introductions

Technological advancement in **transportation** is a process that is constantly ongoing. Society has evolved from using **natural modes of transportation** such as canals, to optimizing the automobile. The next step is already under development, which is to switch over to a **flying vehicle**, making traffic flow more efficient.

Technology has been developed to slowly ease into this new transportation phase. For example: **new types of efficient rotary engines, systems to implement folding wings, and the development of vehicles without traditional features, such as mirrors**. We will examine the need for this new transportation system and how to get there in Section II. Section III will take a close look at the technology behind personal aircraft vehicles followed by a conclusion of the information presented.

General statement

Narrows the topic

Identifies the topic

Introduces topics that show up later in paper

Gives overview

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# Introduction

The modern world is increasingly encouraging many alternatives to fossil-fuel based transportation; one example is the Segway Personal Transporter (-PT). The Segway-PT is a one-person unit, designed to achieve an environmentally friendly and mobile method of personal transportation [see Fig. 1]. First unveiled in 2001 by Dean Kamen in New Hampshire, the Segway-PT features a self-balancing mechanism, designed to sense the user's movements and vary the pitch of the device and speed of wheels. This action occurs instantaneously, due to a sophisticated operating system.

General statement

Focus of paper

Detail of topic

Engineering  
interest

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# Second section

## II. SENSOR SYSTEM

The main feature of the Segway-PT is its ability to provide movement using a self-balancing mechanism, activated by the user. It is useful to review some basic concepts first.

First main  
feature

Transition to  
subsections

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# Second section

The first main difference between the foot of a sprinter and the average foot is the length of the Achilles tendon moment arm. As seen in Fig. 1, this moment arm,  $r$ , acts parallel to the length of the foot, and creates a moment about the center of joint rotation,  $O$ . A 2009 study at the Pennsylvania State University measured the lengths of ten male college sprinter's Achilles tendon moment arms. It was found that the average length of the moment arm was only 31.0 mm, whereas the average length of a non-sprinter's moment arm was 41.6 mm [1]. This is a surprising result as a smaller moment arm, creates a smaller moment about  $O$ , when the same force  $F$  is applied. A smaller moment, means the ankle is less flexible, a seemingly disadvantageous quality for a sprinter. When this disadvantage works together with another specific structural difference however, it gives the sprinter an extreme advantage.

transition

Technical details,  
measurements

New, novel idea

Transition to next  
section

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# Format

- 600-1000 words
- Documents you have give extensive information about format; read them and do what they say



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# Looking ahead: Drafts of reports

- Use the C4W as a resource to get feedback before handing in final drafts
  - Peer review: A complete draft must be brought to class for review. This draft must follow the above described IEEE format. It will be reviewed by two of your peers and returned to you.
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# Final thoughts

- Work hard at developing broad writing skills to handle the challenges of writing at work and in academic settings

