

Grants Workshop



EARLY CAREER AWARDS

Writing a CAREER Proposal

Arun K. Somani
Jerry R. Junkins Chair Professor
Electrical and Computer Engineering
Iowa State University, Ames, IA 50011
arun@iastate.edu

(Based on a career workshop in ECpE in 2004)

(Thanks to Vijay Vittal, S. Aluru, D. Rover, M. Salapaka)

Funding Record

- Arun Somani has had continuous NSF funding for the past 18 years.
- Currently is the PI/Co-PI on 7 NSF grants.
- Arun has had funding from NASA, Lockheed Martin, Boeing Aerospace, etc.
- As Department Chair, he has mentored 5 faculty members in applying for Career Awards and 3 were successful so far.
- He has served as panel reviewer for Career Awards

Key Ingredients: Research

- This is a CAREER award
 - The proposed research should keep you busy for five+ years
 - It must lead to significant new discovery
 - It must make a difference on the field, open new directions
- That means you must have a solid, original, and novel idea that is clearly conveyed in 10 pages or so

Research – Cont'd

- The proposal is not a text book, tutorial, or paper
 - If it appears that most of it is done, it is not a career proposal
 - Thus do not include too many equations
- The metrics used in the review process, intellectual merit and broader impact must be clearly brought out in the proposal, possibly with clear headings

Key Ingredients: Teaching

- Obtain an appropriate balance between research and teaching
- You need to demonstrate how effectively you will combine both these aspects in a productive academic career
- The teaching component should also be innovative, include novel ideas that you will develop in education
- It cannot simply be course development or enhancement
- You need to show that the educational development fills an important void in the available material in the proposed area

Teaching – Cont'd

- It must include one or more tangible deliverables like module development, web based development, development of CDs, and text book or monograph authoring
- Include a demonstrative examples of what you might have done
- Do not make the teaching component less than 3 pages
- Remember we are in the education business!!!!!!

Research Component - 1

- Present the research ideas in a crisp & clear manner
- Describe the goals and criteria to declare achieved
- Describe how outcomes will be evaluated
- For every problem and sub-problem, include problem statement, its significance, the current state of the art, proposed approach, initial results if any, and why you believe that the proposed approach is superior

Research – Cont'd

- Lay out the time line for your research
- Dissemination plan for research work is important
- In the research part you need to build transitions critical to the education part

Research Component - 2

- Identify and point out potential for interactions with senior investigators at the top ranked schools
- Make contact with these investigators and, if possible, include a letter from them stating their interest and willingness to collaborate -- include in the supplemental material
- Include a letter in the supplemental material if you have potential of interaction/collaboration with industries showing how they will interact with you

Research – Cont'd

- Demonstrate some breadth in terms of developing original ideas and branch out from your PhD research
- Ensure that the work is not a simple continuation
- Carve out a niche for yourself and separate yourself from your PhD advisor (cut the umbilical chord)
- Do not include literature review as a task

Teaching Component

- You have to make a strong case for why you view teaching as a critical component of your career
- Elaborate on how your research work will enhance the education of your students and how you will bring research results into the class room
- Describe the teaching tools you will develop

Teaching – Cont'd

- Make sure you include aspects like Research Experience for Undergraduates (REU), Research Experience for teachers (RET)
- If you have several people working in a similar area, the Combined Curriculum and Research Development may be a good avenue to develop course content for a common curriculum

Important Points – 1

- Write your story yourself
- State all the assumptions you have made
- Do not simply; state, explain facts if needed
- Do not assume that the reviewer will fill in the blanks – since most likely s/he will fill them incorrectly
- Leave no holes

Important Points

- Careful budget preparation is important
- NSF puts high priority on graduate student support
- In a CAREER proposal supporting a post doctoral fellow is NOT a good idea
- Set aside money to travel to the top professional society conference in your area and say so

Important Points - 2

- Leverage institutional support for your program
- You have to show how your start-up package will complement the CAREER award
- If your work is experimental and dependent on equipment show how this will be facilitated
- If you are going to use equipment elsewhere, include a letter in the supplemental material

Important Points

- If you have purchased equipment from start-up or other sources indicate them
- Clearly show the nature and availability of technical support to maintain equipment for research
- If your work is computational show what facilities you have on campus
- Spell out the type of software you have/will develop

Gamesmanship - 1

- A proposal decision is not solely based on the technical aspect
- Make sure that you refer to all the important work
 - The first thing many reviewers look at is the section on references to see if their work is referenced
- If you have a research group with some critical mass make sure that you mention how this will enhance your own activity

Gamesmanship

- Facilitate the letter of support that your Department Chair will write to bring out the best
 - Ghost write this letter to highlight the salient features
- Also ghost write the industry letters for the supplemental material
 - These letters should clearly lay out where the work fits in the company's plan, how they intend to work with you, and how they intend to use the research results

Gamesmanship - 2

- If you know of some one with a successful proposal, request them to share their proposal with you
- A successful proposal can provide several useful hints
- If the PI is willing to share the reviews you can also judge what the reviewers see in a successful proposal

Gamesmanship

- Department chairs may also facilitate this
- Contact program director and visit them if possible
- Putting a face to a name is important
- A visit to NSF and a face to face meeting with the program director is invaluable
- Going to NSF with your Dean or Department Chair will also help open doors for you

Mechanics

- Have your proposal ready at least ten days before the deadline
- Upload it at least two days before the deadline
- You can always revise material before submitting
- Prepare your biographical sketch carefully
- Do suggest names of reviewers who have no conflict of interest with you
- Do not use a font size less than 11 (it is the quality and not the quantity that really matters)

Mock Review

- Have at least two senior colleagues, one in your area, and one outside do a mock review
- Be open to suggestion and criticism
- Request your colleagues to be brutal, not mince words
- Use the feedback to improve your proposal
- In the case of a likely event, if you have a previously unsuccessful proposal that you are revising, then during the mock review give your colleagues the previous proposal, the verbatim reviews, and a brief description of what you have now done differently
- This will help during the mock review

Sarah Ryan

Industrial & Manufacturing
Systems Engineering

smryan@iastate.edu

294-4347

Funding Record

- Sarah Ryan received a Career Award from 1997-2002
- She has served on several review panels for Career Awards and regular grants
- Sarah has been the PI on a multidisciplinary research grant and coPI on an educational grant
- She is currently a co-PI on 2 large multi-disciplinary grants

Do (content)

- Believe in your idea.
- Write for a broad audience containing at least one expert in your field.
- Define scope and (briefly) acknowledge limitations.
- Demonstrate familiarity with current scholarship of teaching and learning.

Do (style)

- Use *italics*, **bold**,
 - Bulleted or numbered items
 - And/or whatever will emphasize what you want the reviewers to focus on.
- Explain what you will do with \$400-500k over 4-5 years.
 - What you will set your research assistant(s) to work on?
- Put words in the reviewers' mouths.

Don't

- Propose just a straightforward or minor extension of your dissertation.
- Propose only to develop a new graduate course in your specialty.
- Make the reviewers hunt for reasons why your proposal should be funded.
- Submit a paper for review as a proposal.
- Rely on educational buzzwords.
- Expect to be funded on the first try.

Dean Adams

Assistant Professor
Department of Ecology, Evolution, and
Organismal Biology
Department of Statistics

dcadams@iastate.edu

294-3834

CAREER grant recipient 2005-2010

Funding Record

- Dean Adams has been funded by the NSF at all academic levels:
- Dissertation Improvement Grant
- Postdoctoral Fellowship
- NSF Starter Grant
- Career Grant with REU and ROA supplements

Three main messages

- Be integrative and creative
- Seek guidance
- Be persistent

Be integrative and creative

CAREER: The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of the early career-development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission

- Successful CAREER grants integrate research & teaching
- 'Standard' education activities insufficient
- Must propose creative and innovative education components
- **Emphasize this integration throughout proposal**

Example

■ My educational activities

- Education through formal instruction: integrate research in the classroom
- **Mentoring:** undergraduate, graduate, post-doctoral researchers, **national & international instruction in my lab**
- Educational outreach: **Host workshop**
- Education exchange with small college

Seek guidance

■ Talk to peers

- Who in your Department, College, etc. has received a CAREER award?
- Discuss your ideas
- Find mentors to pre-review your grant

■ Before submission talk to NSF

- Advocate ideas to program manager
- Discuss appropriateness for CAREER program
- Incorporate feedback into proposal

Be persistent

- Most CAREER grants are not awarded on the first try
- Speak to program manager at NSF
- Respond to all reviewers' comments in revisions
- Re-submit

Anne Cleary

Assistant Professor
Department of Psychology
Area: Cognitive Psychology

acleary@iastate.edu
294-7453

CAREER Grant Recipient (2004 - 2009)

Funding Record

- Anne Cleary received her Ph.D. in 2001 and won her Career Award in 2004.

My Research Laboratory



- The Lab
- >People
 - Lead Investigator
 - Graduate Investigators
 - Undergrad Experimenters
 - Project Collaborators
- >Research
 - What we Study
 - Past Projects
 - Current Projects
- >Join the Research Team
 - Prospective Graduate Students
 - Opportunities for Undergraduate Students
- Links
 - >Iowa State University
 - ISU Home Page
 - ISU Dept of Psychology
- <Home>

The Anne M Cleary
Human Memory Laboratory



Cleary Lab Members, Fall 2005 (not all are pictured)

Graduate students Bogdan Kostic, Moses Langley (Far left and far right, respectively)

Undergraduate students Monish Winfield, David Winfield, Andrea Eslick, Jacob Juhl, Joshua Woods, John Bienenus, Steve Siefert, Megan Keppler, Morgan Stone, Aaron Pettyjohn, Kaeli Sampson, Sabrina Blackledge, Julie Freese, Elyse Elbert, Melissa Buechler, James Studley, Kristen Langer, Gretchen Mapel, Jeremy Oehlert, Joe Williams

Preparation

- Attend NSF Workshops
- Read recent CAREER grant abstracts and/or proposals
- Develop a plan that creatively integrates teaching & research

The Proposal

- Two statements up front:
 - The intellectual merit of this work is...
 - The broader impact(s) of this work is/are...
- Creative integration of teaching & research
 - Are the two interdependent in the plan?
- The “wow” factor
 - Will the reviewers be wowed by it?

The Proposal Continued

■ The Research Plan:

- Have innovative ideas
- Have preliminary data
- Have intellectual merit
- Can people outside of your domain understand your proposal?
 - Minimize jargon
 - Ask someone outside of your field to read it

The Proposal Continued

■ The Education Plan:

- Creatively integrate educational activities with your research plan
 - Involve undergraduates in your research
 - Become involved in programs aimed at involving students from underrepresented groups in research
 - The McNair Scholar Program at ISU
 - The PWSE Program at ISU
- Propose creative educational activities
 - New Classroom Techniques
 - New Course Materials

The Proposal Continued

- Before Submitting:
 - Get feedback on your proposal
 - Senior faculty in your department
 - Peers

The Process

- Be prepared for a fairly long wait
- Be prepared for a rejection
 - Career grants are rarely funded on the first submission (though it is not impossible).
- Be persistent -- resubmit

Victor S.-Y. Lin

Associate Professor
Department of Chemistry

vsylin@iastate.edu
294-3135

Funding Record

- Victor Lin has had several awards from the NSF, DOE and the USDA.
- He received a 5-year Career Award in 2003.
- He has served as a panel reviewer for Career Awards for the past 3 years.

Just another NSF grant?

- One needs to recognize the differences between a CAREER award and an ordinary NSF grant

Different Criteria

- “Long-term” research plan
- “Well thought-through” and “General” teaching plan
- Broad impact to the scientific community

Long Term Innovative Ideas

- Significant question
- Cutting edge and interdisciplinary research
- Novel methods and technologies
- Preliminary results/data (more the better)

Well Thought-Through Teaching Plan

- Develop unique/novel ideas
- Provide solutions for specific issues that are relevant to your geographic location
- Integrate research activities into the teaching plan

Seek Advice from Mentors

- Find Career Awardees
- Obtain copies of successful and unsuccessful proposals with reviews
- Ask your mentors to read your proposal

Respond to Reviews

- Speak to program manager at NSF
- Address reviewers' comments in revisions
- Publish key preliminary results if possible

Frederick Haan

- Department of Aerospace Engineering
- haan@iastate.edu
- 294-2884

Funding Record

- Frederick Haan has received 4 NSF awards in the past 4 years.
- Received a Career Award and a MRI Award

Career Proposal Tips

- Keep in mind what the review process is like:
 - Reviewers have to read 10 or 12 proposals and then they go sit in a room in Arlington, Virginia with 20 other people and talk about 25 different proposals.
 - DO NOT make your proposal annoying with tiny type.
 - DO NOT speak only to specialists in your particular sub-discipline. Some people in the panel will have backgrounds close to yours but not everyone. You must be able to explain your work and its significance to a broader audience as well.

Career Proposal Tips

- If at all possible, get yourself on a review panel
 - Either a career review panel or a regular review panel
 - Call program manager and say you are interested and available to serve on panels

Career Proposal Tips

- Make your goals very clear in the project summary and in the first few pages
 - A few key sentences in the project summary can set the tone for the discussion in the panel
- Organize the proposal very clearly
 - Have good section headings that guide people through the proposal. There is a lot of back and forth through proposals during review and during the panel sessions. It is good to aid navigation as much as possible.
 - A diagram or two describing things often helps to make your objectives or your ideas clearer

Career Proposal Tips

- Have the education plan *clearly integrated* into the overall plan
 - Simply “developing a course” is not enough. Reviewers assume that is your job anyway.
- Integrate outreach to underrepresented groups very clearly into the overall plan.
 - A lot of proposals have a sentence or two at the end of the project description saying that “underrepresented groups will be recruited to work as research assistants.” That doesn't go very far with the reviewers

Career Proposal Tips

- Familiarize yourself with some engineering education literature.
 - This one is good: Journal of Engineering Education, v. 90, n. 2, April 2001, "Integration of Engineering Education and Research: Perspectives from the NSF Civil and Mechanical Systems 1998 CAREER Workshop" by Niemeier et al.]
- If you are getting equipment or data or help from a company or organization, it is good to include a letter from them saying so

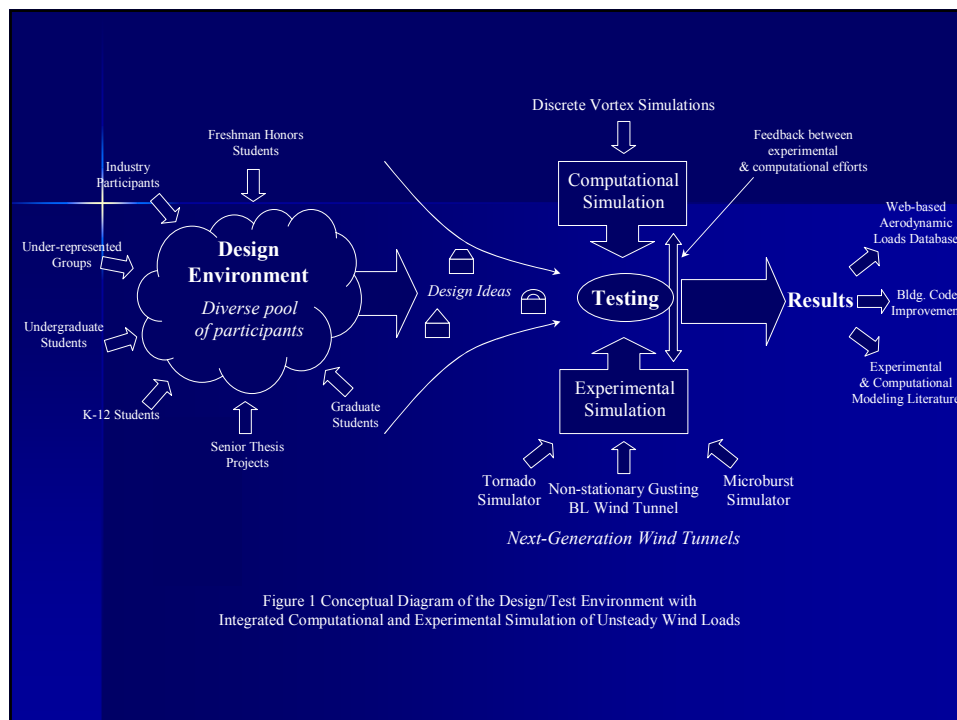


Figure 1 Conceptual Diagram of the Design/Test Environment with Integrated Computational and Experimental Simulation of Unsteady Wind Loads