

Project Summary

The Title Goes Here

IIS: Robust Intelligence: Medium

David Cox (Harvard University)

A summary of the proposal goes here, takes two-third of page.

Intellectual Merit: xxxTODO The proposed work will [do something really intellectually meritorious]. A paragraph or two.

Broader Impacts: xxxTODO Discussion of broader impact; educational outreach, impact on other outside fields, social/commercial/etc. impacts. A paragraph or two.

1 Overview of Project Objectives

While large strides have been made towards ...

The elements of our interdisciplinary project are summarized in Fig. 1, with three main areas of contribution ...

Objective 1. Do something transformative: a brief description of the transformative thing in a few sentences.

This task represents the core of our project: lorem ipsum and so on...

Objective 2. Demonstrate Something else: develop new algorithms that are super awesome

Some more explanatory text

Objective 3. And so on so forth: Develop new algorithms that do something.

More explanatory paragraphs

Objective 4. Interdisciplinary Impact: Through educational and research-oriented outreach, bring together xxxx....

Our team's interdisciplinary nature provides strength in both core vision science and computer vision...

2 Background

Good grant proposals have some background...

3 Education and Outreach

The educational and outreach activities associated with this project will be two-fold. First, to engage with the broader academic community, we propose to ...

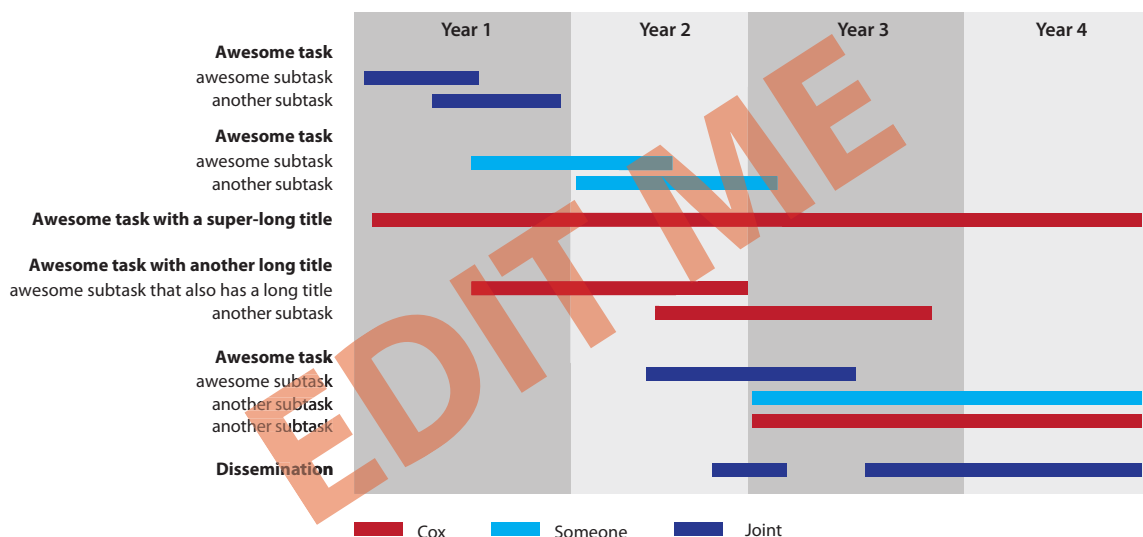
A paragraph or two about this.

Second, to engage with the public, we will ...

A paragraph or two about that



Figure 1: Overview of the Project: xxxx



4 Project Timeline

The proposed effort will be staged according to the timeline shown below, with tightly integrated periods of joint effort between both groups throughout the project timeline. Dissemination of sharable materials will occur as they become available, with a focused period of preparation of materials for dissemination in the third and fourth years.

5 Evaluation Plan

Continual evaluation of the effectiveness of our efforts will be essential to project success. First, where standard benchmark datasets exist, we will test the algorithms resulting from the present project using these sets. ... xxxx

6 Results from Recent Prior NSF Support

In his role as PI on NSF EAGER Award IOS 0947777: “A Novel Rodent Model for the Neurophysiology of Visual Object Recognition” (09/09-09/11), **Prof. Cox** developed infrastructure and performed experiments establishing the laboratory rat as a powerful new model system for studying the neurophysiological underpinnings of high-level visual recognition. This work resulted in one journal publication [16], with two more publications currently in preparation, and resulted in open source software and hardware being made available for novel experimental apparatus. This project also engaged two REU students, both of whom have gone on to pursue STEM careers.

As Co-PI on NSF Award IIS 0963668: “Collaborative Research: Unlocking Biologically-Inspired Computer Vision: A High-Throughput Approach” (09/10-09/13), **Prof. Cox** has made significant contributions to advancing understanding of biologically-inspired machine vision algorithms, as well as making contributions to general high-performance computing techniques required for running them efficiently at scale. While this project is still in ongoing, it has already resulted in eight peer-reviewed publications [15, 1, 14, 4, 3, 5, 7, 6, 2]. To date, this project has engaged one REU student, and has supported the organization of a workshop at the IEEE CVPR 2011 conference designed to bring together the neuroscience and computer vision community.

In his role as PI on NSF STTR #0750485 (3/1/2007-2/28/2011) on Improving Privacy and Security of Biometrics Systems, **Dr. Scheirer** made significant advancements in biometric-based technology for security and privacy, leading to the only PayPal approved application using fingerprint technology for financial transactions. This project has engaged more than a dozen undergraduates at the University of Colorado, Colorado Springs (several as REU students), five UCCS

graduate students, and two high school interns (both RAHSS students). It has led to several publications [13, 10, 11, 12, 9, 8].

Under NSF Award IIS-1136370 (4/15/2011 - 3/31/2012) “Group Travel Grant for the Doctoral Consortium at the IEEE Conference on Computer Vision and Pattern Recognition” **Dr. Scheirer** as PI organized the doctoral consortium event at CVPR 2011, the premier conference in the area of computer vision.

7 Collaboration Plan

7.1 Advantage of the collaboration

We have proposed here a program of work that brings together two laboratories from different departments and disciplines, with highly complementary expertise, to tackle a novel point of intersection and interaction between the fields of xxxx. The proposed work requires a team with skills in computer science, engineering, neuroscience, and psychology — a diverse skillset that the current team is uniquely well-positioned to provide.

Specifically, the skills of the key personnel currently on the team are:

David D. Cox, Ph.D., (co-Principal Investigator) is an Assistant Professor of Molecular and Cellular Biology at Harvard University, and a member of the Harvard Center for Brain Science. He has an extensive background in both computer science and neuroscience. His laboratory's efforts are organized along two concerted fronts: reverse engineering simple biological visual systems (using rodents as a model system), and using resulting knowledge to forward engineer biologically-inspired artificial systems using high performance computing tools.

....

Walter J. Scheirer, Ph.D. (Senior Personnel) is a senior postdoctoral fellow in Prof. Cox's Laboratory. He is also an Assistant Professor Adjoint at the University of Colorado, Colorado Springs. Previously, he was the director of research & development at Securics, Inc., an early stage company producing innovative computer vision-based solutions. Dr. Scheirer has extensive experience in the areas of computer vision and human biometrics, with an emphasis on advanced learning techniques. His overarching research interest is the fundamental problem of recognition, including the representations and algorithms supporting solutions to it.

7.2 Roles of the team members

The proposed work will be carried out by a highly interdisciplinary team of researchers. Specific responsibilities within the group are described below.

The Cox Lab team will:

- do something
- do something else

The xxxx team will:

- spearhead efforts to do something
- do something else

7.3 Managerial arrangements

The co-PIs have extensively discussed and agreed upon the proposed research directions, and [xxxx will do awesome collab stuff together] The two labs will perform the proposed work in a highly interactive manner, with team members interacting on a day-to-day basis, but with a minimum of bi-weekly meetings attended by both groups. Both PIs anticipate being coauthors on all papers resulting from the proposed work. The specific budget provided by each lab for this proposal indicates how project funds will be divided and spent in each group. Prof. Cox [xxx TODO] will take the lead in administrative interaction with the NSF. Progress reports will be prepared jointly.

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