Request for NSF Highlight

National Science Foundation
Computer and Information Science and Engineering Directorate (CISE)
Computer and Network Systems Division (CNS)

Each year, NSF program officers are asked to provide descriptions of program accomplishments, or "highlights," about the outcomes of NSF awards. This activity is a requirement of the Government Performance and Results Act (GPRA). As a recipient of a NSF-CISE award, you are asked to provide the information outlined in this form.

Please save a copy of this form (and the completed version of the form) with a file name formed by concatenating your proposal number with your last name as:

Your NSF proposal number your last name.doc
(For example: 0599999Smith.doc)

Please return the completed form as an attachment to an email message you send to:

cnshighlights@nsf.gov

*Please note: This form is a Word Form. Please use the **TAB key** to move through the form. Other keys (such as the ENTER key) are likely to cause spurious behavior.*

Your Last Name:	Richard
First Name:	Hughey
Your Institution:	University of California, Santa Cruz
Your email address:	rph@soe.ucsc.edu
Telephone Number:	831-459-2939

Your Project's Title:

SURF-IT: Exploring Integrative System Design at UCSC

Please enter your **NSF/CISE/CNS Award Number**: [Please note – If you are describing a collaborative award, please enter the proposal numbers for **all** of the affiliated awards]

NSF-CNS0852099	NSF-	NSF-	NSF-	NSF-
NSF-	NSF-	NSF-	NSF-	NSF-

What is the name of the NSF Program Officer who originally made this award or who is currently your cognizant Program Officer? **Peckham, Joan**

Select Primary (and Secondary) Strategic Outcome Goal

Included below are two tables – titled **Primary Strategic Outcome Goal** and **Secondary Strategic Outcome Goal**.

All NSF projects have "Primary" strategic outcome goals and they *may also have* "Secondary" strategic outcome goals. In the PRIMARY strategic outcome goal table please decide on **one category** (i.e., one column: Discovery, Learning or Research Infrastructure) that BEST DESCRIBES your project's highlight. Within that column, please check one or more boxes that apply. If your project also has clear Secondary strategic outcome goals, decide on the appropriate column in the *second table* labeled "Secondary Strategic Outcome Goals and check as many boxes within that column that describe your project. So, for example, if your Primary Strategic Outcome Goal was Discovery, your Secondary Goal may be Learning.

Primary Strategic Outcome Goal

Decide whether your project's *Primary Strategic Outcome* goals address Discovery, Learning ***or*** Research Infrastructure. For whichever of the three that captures your project's focus, please check one or more boxes *within that column* that best describe your project.

Discovery

Fostering research that advances the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering.

Please Note:
If you are reporting an outcome from an **EPSCoR** Research Infrastructure Improvement grant, or a research grant co-funded with the EPSCoR Program, please check the EPSCoR box under DISCOVERY, as well as the box that represents the area of science, engineering, or education for the project.
2) If you are reporting an outcome of research conducted at an NSF-funded large facility and check a category under Discovery for the PRIMARY goal, please also check the **Major Multi-User Facilities** category under Research Infrastructure for the SECONDARY goal.

Research Grants

- ☐ Biological Sciences
- ☐ Computer & Information Science and Engineering
- ☐ Cyberinfrastructure (excluding Shared Cyberinfrastructure Tools; see Research Infrastructure)
- ☐ Engineering Research
- ☐ Small Business Innovation Research/Small Business Technology Transfer
- ☐ Geosciences: Earth, Atmosphere, and Ocean Sciences

Learning

Defined in the NSF Strategic Plan 2006-2011 as "Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens."

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- ☐ K-12 Education
- ☐ Teacher Education and In-service Professional Development
- XX Undergraduate Education and Undergraduate Student Research
- ☐ Graduate Education and Graduate Student Research
- ☐ International Research Experiences for Undergraduate & Graduate Students
- ☐ Postdoctoral Education, including International Postdoctoral Fellowships
- ☐ Public Understanding of Science and Lifelong Learning
- XX Broadening Participation to Improve Workforce Development
- ☐ Promoting CyberLearning Strategies to Enhance STEM Education
- ☐ Professional and Career Development (i.e., ADVANCE, Course, Curriculum, and Laboratory Improvement (CCLI)

Research Infrastructure

Defined in the NSF Strategic Plan 2006-2011 as "Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyber-infrastructure and experimental tools."

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2) If you are reporting an outcome of research conducted at an NSF-funded large facility and check the **Major Multi-User Facilities** category under Research Infrastructure for the PRIMARY goal, please also check the appropriate category under Discovery for the SECONDARY goal.

Major Multi-User Facilities

- ☐ Academic Research Fleet
- ☐ ATLAS - A Toroidal Large Angle Spectrometer
- ☐ CMS - Compact Muon Solenoid
- ☐ Cornell Electron Storage Ring
- ☐ Gemini Observatory

☐ Mathematical & Physical Sciences ☐ Social, Behavioral, & Economic Sciences ☐ Polar Sciences: Arctic and Antarctic Research ☐ CAREER: Faculty Early Career Program ☐ EPSCoR: Experimental Program to Stimulate Competitive Research ☐ International Collaborative Research ☐ Education Research and Evaluation to Improve STEM Learning and Teaching **NSF Centers** ☐ Centers for Analysis & Synthesis ☐ Centers for Chemical Innovation ☐ Engineering Research Centers ☐ Materials Research Science & Engineering Centers ☐ Nanoscale Science & Engineering Centers/Networks ☐ cience & Technology Centers ☐ Science of Learning Centers	Program, & Advanced Technological Education (ATE) Program)	☐ IRIS - Incorporated Research Institutes for Seismology ☐ Integrated Ocean Drilling Program ☐ Large Hadron Collider ☐ Laser Interferometer Gravitational Wave Observatory (LIGO) ☐ MREFC Projects: ALMA, Earthscope, IceCube Nutrino Observatory, SODV (Scientific Ocean Drilling Vessel), South Pole Station Modernization, NEON, OOI, ARRV, ATST ☐ National Astronomy and Ionosphere Center (NAIC) ☐ National Center for Atmospheric Research (NCAR) ☐ National High Magnetic Field Laboratory ☐ National Nanofabrication Infrastructure Network ☐ National Optical Astronomy Observatory (NOAO) ☐ National Radio Astronomy Observatory (NRAO) ☐ National Solar Observatory ☐ National Superconducting Cyclotron Laboratory ☐ Network for Earthquake Engineering Simulation (NEES) ☐ Polar Facilities & Logistics ☐ Major Research Instrumentation (MRI) Program ☐ Shared Cyberinfrastructure Tools ☐ Other Infrastructure and Research Resources

Secondary Strategic Outcome Goal

Complete this table **only** if your project has clear *Secondary Outcome goals*. So, for example, if your Primary Strategic Outcome Goal was Discovery, then your Secondary Strategic Outcome Goal can be either Learning or Research Infrastructure. Please check one or more boxes within that column that describe your project's Secondary Strategic Outcome goals:

Discovery

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Research Grants

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- ☐ Mathematical & Physical Sciences
- ☐ Social, Behavioral, & Economic Sciences
- ☐ Polar Sciences: Arctic and Antarctic Research
- ☐ CAREER: Faculty Early Career Program
- ☐ EPSCoR: Experimental Program to Stimulate Competitive Research
- ☐ International Collaborative Research
- ☐ Education Research and Evaluation to Improve STEM Learning and Teaching

Learning

Defined in the NSF Strategic Plan 2006-2011 as "Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens."

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- ☐ Graduate Education and Graduate Student Research
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- ☐ Broadening Participation to Improve Workforce Development
- ☐ Promoting CyberLearning Strategies to Enhance STEM Education
- ☐ Professional and Career Development (i.e., ADVANCE, Course, Curriculum, and Laboratory Improvement (CCLI) Program, & Advanced Technological Education (ATE) Program)

Research Infrastructure

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Please Note:
1) If you are reporting an outcome from an **EPSCoR** Research Infrastructure Improvement grant, or a research grant co-funded with the EPSCoR Program, please check the EPSCoR box under DISCOVERY, as well as the box that represents the area of science, engineering, or education for the project.
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NSF Centers ☐ Centers for Analysis & Synthesis ☐ Centers for Chemical Innovation ☐ Engineering Research Centers ☐ Materials Research Science & Engineering Centers ☐ Nanoscale Science & Engineering Centers/Networks ☐ cience & Technology Centers ☐ Science of Learning Centers		☐ National Astronomy and Ionosphere Center (NAIC) ☐ National Center for Atmospheric Research (NCAR) ☐ National High Magnetic Field Laboratory ☐ National Nanofabrication Infrastructure Network ☐ National Optical Astronomy Observatory (NOAO) ☐ National Radio Astronomy Observatory (NRAO) ☐ National Solar Observatory ☐ National Superconducting Cyclotron Laboratory ☐ Network for Earthquake Engineering Simulation (NEES) ☐ Polar Facilities & Logistics ☐ Major Research Instrumentation (MRI) Program ☐ Shared Cyberinfrastructure Tools ☐ Other Infrastructure and Research Resources

Enter Highlight

NOTE: Insert only text in the box. ***Do not try to paste in images.*** An option for inserting images will appear later in the form.

Please write the highlight with sufficient information to describe the research, its significance, and its results in terms that the general public can understand. Technical information is useful, but please avoid jargon and explain any acronyms that you use.

Your lead-in sentence should "engage" the reader and relate the major impacts of your project. You may identify the project's PI and institution in the narrative. However, please avoid lengthy lists of other project participants and institutions if your award is part of a large collaborative group.

Be clear and concise. Describe the problem that motivated your research. What were the key knowledge gaps? Describe the scope of your project.

REQUIRED. Please enter your Highlight text here [*Note: This form limits you to about **400 words***]:

Yes We Can: Combating Obesity Trends in Teenagers Through Persuasive Mobile Technology

Adrienne Woodworth joined the Summer 2009 SURF-IT program to experience life at a research university. Adrienne, a senior Computer Science major at St. Lawrence University in Canton, New York, helped create an iPhone application called Teenvity, designed to motivate teenagers to exercise by playing GPS and accelerometer-based iPhone games. This required her to quickly familiarize herself with the Objective C language and Cocoa programming.

Teenvity is different from other fitness applications in that it is customized to the user's personality. The user creates a profile by taking a short test, and their results determine an agent selection and a list of games for the user to play. Adrienne's work focused on implementing the personality test and scoring, as well as creating embodied virtual agents that say motivational phrases to cater to different personalities. In addition to software design, Adrienne took part in data collection from 25 teenagers prior to design, data analysis, and focus-group testing among 10 teenagers.

Adrienne worked closely with her faculty mentor, Professor Sri Kurniawan, throughout the summer, and joined 16 other students in research, graduate school preparation, a field trip to IBM Almaden Research Center, and social activities including a Shakespeare Santa Cruz production set in a redwood glen.

The University of California, Santa Cruz, Baskin School of Engineering's Summer Undergraduate Research Fellowship in Information Technology (SURF-IT) is an intensive 9-week summer research program particularly focused on increasing diversity in computer science and engineering. 75% of participants have come from groups underrepresented in computing, including first-generation college students, women, and members of underrepresented ethnic or racial minorities.

Surf-it.soe.ucsc.edu

In terms of *intellectual merit*, why is this research outcome notable and/or important? What was achieved that expanded the frontiers of knowledge or contributed to learning or workforce development?

REQUIRED. Please describe what is notable/important about your project here [*Note: The form limits your description to about **100 words**]:*

SURF-IT exposes 12 or more undergraduates to cutting-edge research every summer. Students work on a variety of research projects to analyze new technologies and create new inventions throughout the broad areas of computer science and engineering. Each participant receives individualized training in a faculty laboratory and extensive workshops related to graduate school, research ethics, presentation, and other topics.

In terms of *broader impacts*, why is this outcome notable and/or important? How well does the activity advance discovery and understanding while promoting teaching, training and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

REQUIRED. In the context of Broader Impacts as described above, Please describe what is notable/important about your project here. [*Note: The form limits your description to about **100 words**]:*

It is only by creating a continuous stream of students, from K12 to College to Graduate School can we fully diversify the excitement of computer science and engineering. UCSC SURF-IT is an intensive 9-week summer program designed to give students an introduction to graduate school and enhance there future success in advanced studies. The work taking place in SURF-IT and throughout the CISE REU Sites will help correct one of the gravest imbalances within the areas supported by the National Science Foundation.

Does this highlight represent transformative or potentially transformative research? If so, please explain why. **Please check one.**

XX Yes No

The National Science Board has defined transformative research as "Research that has the capacity to revolutionize existing fields, create new subfields, cause paradigm shifts, support discovery, and lead to radically new technologies."

OPTIONAL. Please describe the "Transformative" aspects of your project here [Note: The form limits your description to about **100 words**]:

Increasing the physical activity of teenagers through ubiquitous computing will transform our society through its increase in health.

The REU Sites program is also transformative in its ambitous mandate to change the face of advanced research by bringing undergraduate from diverse backgrouns into cutting-edge research and graduate school.

Does this highlight represent Broadening Participation? If so, please explain why. **Please check one.**

Xxx Yes No

If this highlight represents Broadening Participation, please explain why.
The concept of broadening participation includes: *individuals* from underrepresented groups, certain types of *institutions* of higher education, *geographic areas* (e.g. EPSCoR states), and *organizations* whose

memberships are composed of institutions or individuals underrepresented in STEM or whose primary focus is on broadening participation in science and engineering. It is important to note that underrepresented groups vary within scientific fields.

OPTIONAL. Please describe your project's Broadening Participation aspects (if any) here [*Note: The form limits your description to about **100 words***]:

The UCSC Baskin School of Engineering's Summer Undergraduate Research Fellowship in Information Technology (SURF-IT) prepares students for graduate studies with a particularly focus on students from underrepresented groups. 45% of students have been female, 28% have been from underrepresented racial and ethnic groups, and 27% were the first generation in their family to attend college. 70% of our recent alumni plan to attend graduate school.

Are there existing or potential societal benefits of this research? It is important for NSF to be able to provide examples of NSF-supported research that have societal benefits, including benefits to the U.S. economy. Please check one.

Xx Yes No

If there are any existing or potential societal benefits, including benefits to the U.S. economy, of this research of which you are aware, please describe in the space below.

OPTIONAL. Please enter your project's societal benefits (if any) here [Note: The form limits your description to about **100 words**]:

Many of the UCSC SURF-IT projects directly work to improve society. Adrienne, for example, worked within our Assistive Technology Laboratory, developing new systems to encourage exercise in teenagers. Other projects in 2009 included making comic strips accessible for the visually-impaired, and developing algorithms and software for robotic arms designed for upper-extremity physical therapy.

NSF Investments (Existing and Proposed) -- select as many as apply: The purpose of identifying one or more NSF investments is to provide guidance for NSF staff selecting highlights for publication in the annual budget, the annual performance report, and other public documents. These investments represent major cross-foundation initiatives.

REQUIRED:

Xx Adaptive Systems Technology

☐ American Competitiveness Initiative (ACI)

☐ Climate Change

☐ Cyber-enabled Discovery and Innovation (CDI)

xxx Cyberinfrastructure

☐ Environment (including the importance of fresh water and dynamics of water processes)

☐ Homeland Security

☐ Human and Social Dynamics

☐ International Polar Year (IPY)

☐ National Nanotechnology Initiative (NNI)

☐ Networking and Information Technology Research Development (NITRD)

☐ Science and Engineering Beyond Moore's Law

☐ Science of Science and Innovation Policy (SciSIP)

xxx Sensor Research

☐ Understanding Complex Biological Systems (including the interfaces of life, physical, and computational sciences)

☐ None Applicable

Add Image(s)

Why are images important?
NSF highlights and images are for illustration in the Foundation's annual Budget Requests, performance reports, and other documents.

Clear, colorful images (photos, pictures, graphs, charts, etc.) greatly enhance the value of highlights and often tell a story by themselves.

- Resolution should be **72 dpi or higher**.
- Files must be **GIFs or JPEGs**.
- Images must be the size you want them to appear. Recommended maximum width and height are **240 pixels**.
- A **descriptive caption** must be provided.

Insert you image(s) here. For each image, **please provide a caption.** If you have difficulty including your image, formatted as described above, you may attach it to the email that you send back with this form.

Image #1:

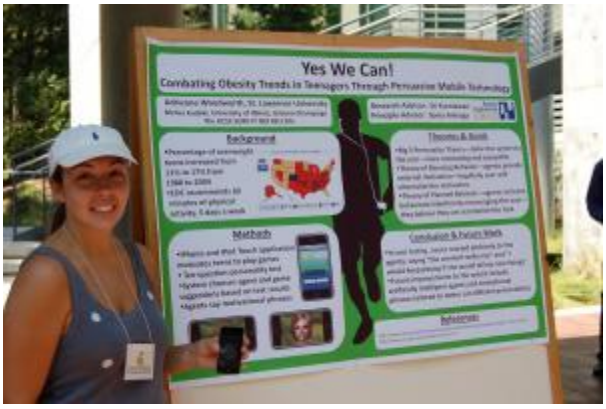

Image #1 Caption:

Adrienne Woodworth, UCSC SURF-IT participant, presents the results of her summer research project in using a cell phone to encourage teenagers to exercise. Surf-it.soe.ucsc.edu.

[Optional: If you have multiple images, insert them below – please don't forget to provide captions for each image.]

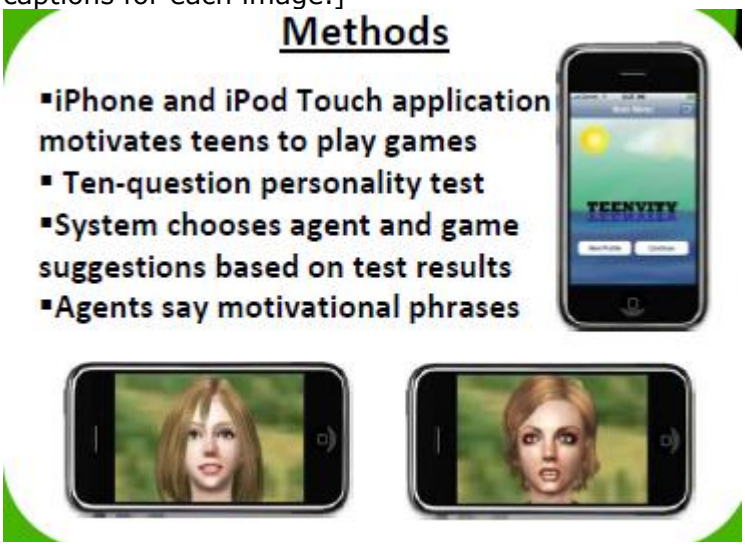

Image 2

Image 2 Caption:
Adrienne Woodworth's project including designing the Teenvity application that selects the appearance and verbal style of the motivational agent based on personality analysis. This diagram is extracted from Adrienne's UCSC SURF-IT poster. Surf-it.soe.ucsc.edu.