



CALIFORNIA STATE UNIVERSITY  
**FULLERTON**

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**CENTER FOR CYBERSECURITY**

<b>Center Name</b>	Center for Cybersecurity
<b>College Unit:</b>	College of Engineering and Computer Science
<b>Director:</b>	Dr. Mikhail I. Gofman
<b>Contact Information:</b>	<b>Email:</b> <a href="mailto:mgofman@fullerton.edu">mgofman@fullerton.edu</a> <b>Telephone:</b> (657) 278-7304 <b>Building:</b> Computer Science <b>Office:</b> CS-302
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## 1. Mission and Goals

The Center for Cybersecurity at College of Engineering and Computer Science (ECS) was founded to help bolster the security posture of the nation through cybersecurity education, research, and outreach. It

represents CSUF's response to the increasing cyberattacks that threaten individuals, institutions, and critical infrastructure. The specific goals of the center can be summarized as follows:

1. **Cybersecurity Education:** Establish and maintain a top-notch, interdisciplinary designed cybersecurity curriculum based on high-impact pedagogical practices and geared toward training the next generation of security practitioners.
  - **This goal aligns with Goal 1 of the 2013--2018 Strategic Plan Goal 1:** *"A curricular and co-curricular environment that prepares students for participation in a global society and is responsive to workforce needs"* as there is a surging demand for cybersecurity professionals with the global cybersecurity job market expected to grow to \$170 billion by 2020 (Forbes.com).
2. **Cybersecurity Research:** Pursue novel externally funded security research and engage students in research-based learning experiences.
  - **This goal aligns with the 2013--2018 Strategic Plan Goal 1:** Involvement in hands-on security research prepares students for the technical challenges of the security workplace.
  - **This goal aligns with the 2013--2018 Strategic Plan Goal 2:** *"A curricular and co-curricular environment that prepares students for participation in a global society and is responsive to workforce needs. Improve student persistence, increase graduation rates university-wide, and narrow the achievement gap for underrepresented students"*. Faculty involved with the center make efforts to recruit student researchers from the groups underrepresented in STEM including women and Hispanics, which empowers them to enter the growing cybersecurity market.
  - **This goal aligns with the 2013--2018 Strategic Plan Goal 4:** *"Increase revenue through fundraising, entrepreneurial activities grants, and contracts"*.
3. **Cybersecurity Outreach:** To host public events and workshops aimed at educating industry professionals and the broader community in the fundamentals of cybersecurity, to forge ties with industry in order to attract funding necessary for supporting center activities, and to cooperate with industry on addressing real-world security issues.
  - **This aligns with the 2013--2018 Strategic Plan Goals 1, 2, and 4** as the outreach events provide extracurricular activities and events for students, including those from groups underrepresented in cybersecurity, where they are educated about cybersecurity by industry experts, receive encouragement and advice on succeeding in cybersecurity. These events also establish faculty-industry collaboration on future research, joint grants, and contracts.

The three goals are also directly aligned with the mission of ECS "to educate engineers and computer scientists who will graduate with state-of-the art knowledge in their chosen field and are ready to embark on careers in industry and government, or proceed to acquire advanced degrees in their own or related fields."

## 2. Activities

The table below summarizes the activities that took place 2015--2017 toward achieving Goal 1:

Activity	Description	Dates
<b>Development of the Malware Analysis Undergraduate Course (CPSC-458)</b>	Computer Science course focusing on the hands-on process of reverse engineering viruses and other malicious software in order to develop protection measures. The course was developed jointly with malware analyst at Bechtel Corporation.	To be offered in Fall 2018
<b>Development of the Cyberforensics Graduate Course (CPSC-552)</b>	A hands-on course focusing on the forensic procedures following a security breach in order to assess the damages and fix vulnerabilities that made the breach possible. It was developed jointly with a Certified Information Systems Security Professional and is the first security-focused computer science graduate course.	To be offered in Fall 2018
<b>Establishment of the Multix Titan Security Bootcamp system</b>	A virtual lab allowing students in security courses to engage in the hands-on cybersecurity attack and defense exercises simulating real-world scenarios.	2016--2017
<b>Development of the Biometrics security certification program</b>	A certificate program designed to complement STEM degrees of recent graduates in order to take advantage of the rapidly growing biometrics job market. The efforts are underway to obtain funding necessary for piloting the program.	2016--2018

The table below summarizes the activities that took place 2015--2017 toward achieving Goal 2:

Activity	Description	Dates
<b>Collaborative contract with Unisys Corporation</b>	Research project focused on developing programming tools that aid Unisys developers in writing more efficient, bug-free, and secure Algol codes. The project involved 5 students in Spring 2016 and 2017 and 6 students in Spring 2018 (including 3 female students). Overall the project resulted in \$30,000 of revenue.	Spring 2016, 2017, 2018
<b>Collaborative contract with Boeing Corporation</b>	Research project focused on developing an enterprise-wide process for auditing the security controls of Boeing Corporation. The project involved 4 graduate and 1 undergraduate student (including two female students).	Spring 2017
<b>Collaborative contract with KindHealth Company</b>	Research project focused on performing a security penetration test on the systems of KindHealth health insurance company and developing a process that can be followed by any health insurance company in order to perform a similar type of audit. The project involves 4 undergraduate and 1 graduate student and has brought a revenue of \$5,000.	Spring 2018
<b>Submission of grant proposals</b>	In the past three years the center faculty have submitted grant proposals to Motorola (under review), Small Business Innovation Research (unfunded), Sloan Foundation (unfunded), and NSF Secure and Trustworthy Cyberspace program (under review).	2015--2018
<b>Research Publications</b>	Center faculty have published <b>9</b> papers related to biometrics research to top-tier conferences and a book titled <i>Biometrics in the Data Driven World</i> (CRC press) as well as <b>6</b> publications related to the security of cloud computing and the Internet of Things.	2015--2018

The table below summarizes the activities that took place 2015--2017 toward achieving Goal 2:

<b>Activity</b>	<b>Description</b>	<b>Dates</b>
<b>Security Day</b>	An all-day event inviting cybersecurity expert speakers from industry to lecture about cutting-edge topics in cybersecurity. The event is free, open to the public, and is attended by 150--200 people each year.	Fall 2015--2017
<b>Firewallside Chats</b>	A series of one hour events featuring cybersecurity expert speakers from industry. The events are free and open to the public. 15 such events have been held as at the time of writing featuring talks about high-profile cyberthreats, the future of cybersecurity, and biometrics.	2016--2018
<b>TitanHacks</b>	An all-day hackathon held in conjunction with the Offensive Security Society student club at ECS featuring hands-on tutorials on topics such as cybersecurity, machine learning, Internet of Things, and a competition for building the most innovative applications. The event was opened to the public, attracted 120 attendees and competition contestants included CSUF students and students from local middle and high schools.	Fall 2017

### 3. Organizational Structure and Governance

The center's governing body comprises the center director and three assistant directors responsible for coordinating the curriculum development, research, and outreach aspects of the center's mission, respectively. The director consults assistant directors on the as-needed basis, which is roughly three or four times per semester. The center also has an industry advisory board that comprises cybersecurity experts from industry. The members must be approved by the ECS Dean and are consulted at least once per semester to provide input into specific activities of the center. In 2015--2018 period board members had significant impact in co-developing the malware analysis and cyberforensics courses; their input was used to shape the syllabi, select the topics that are aligned with the industry needs, and to select appropriate textbooks. In addition, a member of the advisory board from E2VE enterprises was involved in the joint submission of the Small Business Innovation Research grant. Finally, the input from the board played important roles in shaping the Security Day and Firewallside Chat events discussed in Section 1.

### 4. Resources and Sustainability

**Revenue:** The operating budget and revenues during the 2015--2018 period is as follows:

<b>Fiscal Year</b>	<b>Item</b>	<b>Amount</b>
<b>2015--2016</b>	Philanthropic support from Raytheon Corporation	\$20,000
<b>2015--2016</b>	Community Donations	\$120
<b>2016--2017</b>	Unisys project contract	\$15,000

<b>2016--2017</b>	Philanthropic support from Raytheon Corporation	\$13,000
<b>2016--2017</b>	Security Day sponsorship from Dell/SecurityFirst companies	\$2,000
<b>2017--2018</b>	KindHealth project contract	\$5,000
<b>2017--2018</b>	Unisys project contract	\$30,000
<b>2017--2018</b>	Security Day sponsorship from Booz Allen/MITRE/Dell companies and private donations	\$2,284
<b>Total</b>		<b>\$87,404</b>

**Faculty and Staff Times:** The faculty acting as the center director receives three units of time release each semester. The center director spends 15--20 hours each week performing the center duties such as maintaining the website, leading the research projects and performing other center tasks. The assistant directors are expected to perform roughly 1-3 hours of service per week assisting the director. In addition, the center has community volunteer (ECS alumni) that spends roughly 1-2 hours a week assisting the director in maintaining the center website and Facebook, Twitter, and Tumblr social network accounts. The advisory board have spent roughly 40 hours in the 2015--2018 period on the advising activities.

**Space:** The center occupies room CS-302 in the Computer Science building that serves as cybersecurity research lab. There are no costs associated with the space other than the miscellaneous maintenance costs (roughly \$500 per year).

**Sustainability:** The center expects to increase involvement in the industry projects in order to increase the revenue necessary for procurement of research equipment, hiring student researchers, and other activities necessary for sustaining the center's activities and mission. The targeted amount is \$30,000 per semester.

Furthermore, the annual Security Day event costs roughly \$11,000 per event. The event has been instrumental in attracting company contracts and donor support from companies during 2015--2018 years. However, despite the support from corporate donors the center would be left paying ~\$2,000. Therefore, the center plans to reorganize the Security Day as described in Section 6.

## 5. Highlights and Accomplishments

During 2015--2018 period the center faculty have published 15 papers related to cloud security, network security, mobile security, and biometrics to high-ranking conferences and journals including various IEEE conferences and journals, Communications of the ACM article (the most widely read magazine/journal in Computer Science), and a book titled *Biometrics in the Data Driven World* by Mikhail Gofman and Sinjini Mitra (CRC press). The majority of these works involved graduate and undergraduate students and in fall 2016 a group of biometrics student researchers have presented their work in *IEEE Conference on Technologies for Sustainability* and were awarded third place. These activities/products have increased the center's visibility have received significant media coverage at the regional, national, and international levels, which in turn resulted in the above-described KindHealth joint project, future potential project with SecurityFirst Corporation, and other opportunities.

These above activities and products are directly inline with the security education, research, and outreach goals and had significant impact on the university community in terms of giving CSUF recognition

for cybersecurity. This is evidenced by the media coverage the center has received and the award issued by congresswoman Sharon Quirk DeSilva for the center's efforts.

## 6. Planning and Strategic Outlook

The center director and assistant directors work together to develop 3-year plans that are approved by the ECS Dean. The key plans for the 2018--2020 are outlined below.

### 6.1 Education

**Focus efforts on NSA/DHS National Center of Academic Excellence in Cyber Defense Education.** In the next three years the center will focus its efforts on making CSUF a NSA/DHS National Center of Academic Excellence in Cyber Defense Education. The title carries significant prestige and is awarded to institutions known for high-quality security education. These efforts will involve strategic reorganization of the current security curricula, introduction of new courses (e.g., Web Security) and coordination with other departments (e.g., engineering and Information Technology) in order to meet the criteria requirements outlined in [https://www.iad.gov/NIETP/documents/Requirements/CAE\\_CD-R\\_Criteria\\_NewApplicants.pdf](https://www.iad.gov/NIETP/documents/Requirements/CAE_CD-R_Criteria_NewApplicants.pdf). These efforts will be spearheaded by the center director and assistant directors.

### 6.2 Research

**Continued engagement in industry security projects and sustain research efforts in biometrics, system, and cloud security.** The center will continue its engagement with industry partners to fund research and development projects such as the contract projects with Unisys and KindHealth engaged by the center during the past three years. Such projects will involve graduate and undergraduate students and will bring additional revenue to the center. The goal for these projects is to bring an estimated \$30K worth of revenue to the center per year. The projects will be led by the center director and faculty. The center will also continue its efforts from to produce conference and journal publications and grants.

### 6.3 Outreach

**Continue Firewallside chat events.** These events will be continued with roughly five events per semester and will be used in order to garner student interest in security and forging strategic ties with companies.

**Strategic reorganization of the Security Day event:** The Security Day was conceived to give the center visibility in the community. With the significant media coverage and industry acknowledgements these goals have been achieved. The next step is to reorganize the Security Day to be a paid event targeted at educating information technology professionals about specific topics related to enterprise security. The new event will feature industry expert instructors with whom the center is in the process of forging ties. The goal is to draw 50--100 attendees at a price of \$100--\$250 per attendee resulting in roughly ~\$10,000 of total revenue. The revisions will be undertaken by the center director and assistant directors.