STRATEGIC PLAN

Summer 2016
Department of Computer Science & Engineering

College of Engineering
University of Nevada, Reno

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1 Executive Summary

The Department of Computer Science and Engineering (CSE) at UNR offers state of the art undergraduate and graduate degrees including BS, MS and Ph.D. degrees. The department’s faculty and students engage in cutting edge research that benefits the state, the country and society as a whole. It is a productive, forward looking and energetic unit of the College of Engineering (CoEN). Over the last ten years the Department of Computer Science and Engineering realized qualitative and quantitative enhancements and achievements in its educational programs, as well as its research, service and outreach metrics. The department is well poised to achieve further advances in all these areas during the second decade of the 21st century, if some barriers for such growth are removed and the department is allowed to reach its full potential. To achieve our vision, we will continue to offer outstanding educational programs at the BS, MS and PhD levels, perform basic and applied research of excellent quality that advances the discipline and provides solutions to industry, and engage effectively in multidisciplinary efforts, service and outreach activities. Through these, we aim for our department to be ranked by the News and World Report rankings.

Over the next five years, the CSE department expects to grow significantly, become more visible and more highly respected among its peers as a destination of top choice for students, recruiters, industry and other academics. We plan to grow our tenure track faculty by 8, from 19 in August 2015 to 27. At this time, the areas of highest interest for additional new faculty members are cybersecurity, unmanned autonomous vehicles, advanced manufacturing, big data, high-performance computing, the Internet of Things (IoT), and bioinformatics. These will add to our current existing areas of expertise in the following four areas: (1) Computer and Network Systems, (2) Games and Simulations, (3) Intelligent Systems, and (4) Software Systems. Our undergraduates are expected to increase by approximately 30% to over 700 majors. We plan to have similar or higher percentage growth in our graduate programs, with MS enrollment reaching 40 students. We intend to give priority to PhD enrollments and by 2020 expect to have 48 Ph.D. students, graduating 6 per year. At the same time our BS and MS graduation rates are expected to increase by about 30% from current levels. We intend to achieve similar or higher increases with respect to publications to 50 journal and 60 conference publications per year by 2020, and in our externally funded research productivity, averaging close to 2.5M per year in awards and expenditures. To enable the growth envisioned we recognize that the space allocated to CSE must grow significantly in the near future and reach a level of 41,000 square feet by 2020. In addition to the above, the department will seek to enhance our educational programs (undergraduate and graduate), the quality and quantity of our students, the quality of our research program, our outreach program, and improve our resources. The specific goals and strategies for these enhancements are described in Sections 3 and 4.


2 Vision and Mission Statements

Departmental Vision

We envision that in the next five years, the Department of Computer Science and Engineering at UNR will be recognized in the state and the region as a leader in select focal areas, and for the excellence of its research, education and outreach, and will continue to gain prominence at a rate to ensure it a place within the News and World Report Rankings before the end of the decade.

Departmental Mission

The mission of the department is to advance the frontiers of computer science and engineering, to produce qualified individuals in the discipline, and to reach out both within and beyond the university to apply computer science and engineering solutions to technical and societal problems. To accomplish this mission, the department seeks to:

- Educate and produce outstanding BS, MS, and Ph.D. graduates with a globally competitive education, with cutting edge knowledge about computing and who are able to learn and lead throughout their careers.

- Perform basic and applied research in computing and information technology that advances our knowledge about computing and its applications.

- Apply computer science and engineering solutions to challenges in other disciplines and support multidisciplinary efforts.

- Engage in service and outreach to enrich the community, state, and profession.

- Establish viable corporate and external partnerships to help identify problems and solutions and facilitate transfer of knowledge.

3 Strategic Objectives

To maintain and continue the growth enjoyed by the Department of Computer Science and Engineering in both its undergraduate and graduate programs, as well as its research and outreach activities, the department must accomplish a set of strategic objectives and lead in all the activities needed to enhance the College’s reputation.

3.1 Enhance Educational Programs

3.1.1 Undergraduate Education

**Goal:** Increase the quality of the undergraduate program.
Strategy: We plan to broaden the spectrum of courses offered by the department, both in areas foundational for computer science and in special topics, related to research. This will be achieved through increasing the number of faculty in our department, as proposed in Section 4.

Goal: Increase the participation of undergraduates in research, to have an average of 2 undergraduate students working with each faculty member.
Strategy: The department will foster integration of research and education at the undergraduate level. Though currently being practiced by many faculty members, the department will more systematically engage and reward undergraduates to participate in research through the organization of undergraduate summer school research activities and the mentoring of undergraduate students in research labs. To facilitate these activities we aim to allocate appropriate laboratory space to the faculty members who supervise significant number of undergraduate students for research.

Goal: Explore alternative course delivery systems.
Strategy: The department will explore online education through virtual collaborative classrooms offered by new on-line technologies, and will actively participate in initiatives undertaken by the CoEN in this regard. Alternative course delivery is currently taking place in the University and a number of CSE courses may be taught that way in the next few years.

3.1.2 Graduate Education

Goal: Enhance the quality of the graduate program.
Strategy: We plan to broaden the spectrum of graduate courses offered by the department in a wider spectrum of research related topics. This will be achieved through increasing the number of faculty in our department, as proposed in Section 4. In addition, we plan to continue improving our computing infrastructure, either through instructional grants from the University or through equipment grants from federal funding agencies.

Goal: Attract students from industry.
Strategy: The department has established a courses only master’s degree. The courses only MS degree has the potential to attract students from industry. We already have several graduate students from Bally Technologies (Scientific Games), IGT-GTECH and GE in our program. Such students have years of industrial experience, generally perform very well in our MS program and have the potential to continue in our Ph.D. program. Over the next several years we will seek to further strengthen ties with local industry and envision that in collaboration with industry we will develop courses that cater to the specific needs of student with full time jobs. Local industry has already expressed an interest in such courses.
Goal: Establish and increase the number of on-line courses and degree programs offered by the department.
Strategy: We plan to explore the course topics that could be offered through on-line instruction, and create new course materials and degree programs that our department could offer on-line. The CoEN has already established such a program for renewable energy. Cybersecurity, an area in which we are strengthening expertise, is a possible new topic for such an on-line program.

Goal: Increase the quality and the quantity of graduate student publications, from approximately 42 journals and 41 conference publications now, to reach 50 journal and 60 conference publications per year by 2020.
Strategy: Publications are essential to the development of our Ph.D. students and their ability to pursue a career in academia. Through increased PhD enrollments, increased faculty funding resources, and mentoring from faculty to encourage student publications, we plan to increase the number of articles that are submitted and accepted to high-quality conference meetings and journals.

3.2 Enhance the Quality and Quantity of our Students

The Department seeks to increase the quality and quantity of students in our programs over the next five years. With enrollments in our field beginning to grow, we believe that the next few years will provide us with significant opportunities to achieve this. Broadly speaking, our relatively young department is finally in a position to devote some of its scarce resources to recruiting, mentoring, and retaining high quality students. The faculty recognizes the importance and impact that even a few high quality students can have on a department – at the same time, we recognize that as a state university and as a department that is starting to receive national exposure, we must make the most of the students we have and increase the quality of our students through the objectives and strategies described below.

3.2.1 Undergraduate Studies

Our undergraduate programs have been streamlined and aligned with our research objectives and are now on par with national trends. Below are our proposed goals and strategies for enhancing our undergraduate studies.

3.2.1.1 Attract High Quality Students

Goal: Recruit larger numbers of higher quality students.
Strategy: Work with the CoEN and the University admissions office attract National Merit, Presidential Scholars and high achievement students to join the Computer Science and Engineering
Department. This goal is consistent with UNR’s strategic plan, Theme 1 – Learning, to increase the number of National Merit and High Achievement Scholars.

3.2.1.2 Undergraduate Enrollments

**Goal:** Handle the steady increase in undergraduate student enrollments.

**Strategy:** Hire additional faculty and lecturers to assist with the enrollment increase.

3.2.1.3 Undergraduate Recruitment

**Goal:** Work with college of engineering recruiters to prepare and disseminate program recruitment materials and enhance their ability to recruit CSE students.

**Strategy:** Update CSE brochures and make new brochures highlighting the CSE strength areas along with the expertise of newly added faculty hires. Visit counselors at all local high schools, have an annual luncheon with the counselors hosted by CSE, and encourage them to identify promising high school students for targeted recruitment. We also plan to pursue NSF RET funding opportunities, which would give us the opportunity to engage with school teachers and high-quality students at local schools.

3.2.1.4 Retention and Graduation Rates

**Goal:** Reduce the number of majors dropping out of mid-level CSE classes and reduce the time to graduation.

This goal is consistent with UNR’s strategic plan, Theme 1 – Learning, to increase Fall-to-Fall freshmen retention. We plan to use the following strategies to achieve our goals:

- Create a departmental recruitment and retention committee.
- Devise and implement a program to have upper-class students (seniors and juniors) mentor lower-class undergraduates (sophomores and freshmen). We can also recruit such high quality students for undergraduate research.

Several obstacles remain in achieving these objectives:

- In the past, we have had no time or budget for producing recruiting materials or for recruiting visits by faculty to high schools. However, the CoEN has become more resourceful regarding the budget and opportunity to produce recruiting materials. Faculty will be assigned to recruiting events and visits.
• We have no dedicated space for general-purpose, semi-formal, working labs conducive to mentoring by upper-class students. In addition to space and equipment we will also need human resources to maintain such labs.

• Although CSE depends on collaborative work, peer-learning, and work spaces that foster such collaboration and peer-learning, we have had neither the opportunity nor the resources to create the environment needed for this.

3.2.2 Graduate Studies

Our last review of our graduate programs evaluated and made recommendations that address graduate recruitment and retention. The material in this section is largely drawn from this graduate program review. The current approach to graduate student recruiting is ad hoc. While faculty often network with colleagues and generate interest in our programs at other institutions, there is potential to do much more. CSE departments at other universities have upgraded their recruiting practice over the past decade, and we need to do so as well in order to successfully compete for good students.

3.2.2.1 Admission Standards

Goal: Increase admission standards and recruit higher quality students

Strategy: Increase the average GRE Quantitative score of entering students to 157 over the next five years – this corresponds to an approximate increase of 10% in quality.

3.2.2.2 Graduate Enrollments

Goal: Increase M.S. enrollments to reach 40 students over the next 5 years. Increase the number of Ph.D. students to 48 and achieve an average graduation rate of 6 Ph.D.’s per year by 2020.

Strategy: We expect these increases in graduate enrollment to occur as a consequence of the growing number of faculty in the department, the development of new research areas, and the growth in research grants and expenditures.

3.2.2.3 Graduate Recruitment

Goal: Implement a more systematic approach to the graduate recruitment process.

Strategy: We plan to use the following strategies:

• In coordination with the College of Engineering, implement a plan to waive application fees for highly qualified graduate applicants.
• Generate "Dear Colleague" letters or email messages to a managed list of colleagues at other institutions advertising the department and asking them to recommend UNR graduate programs to their stronger graduating bachelors and masters students.

• Develop brochures and other recruitment materials that showcase the unique strengths of our graduate programs.

• Participate in graduate recruitment events in coordination with the Graduate School, and send recruitment materials to select international institutions.

• Develop a standard presentation to be used by faculty traveling to meetings, other institutions or countries, which describes our unique strengths and helps identify and recruit promising students to our graduate programs.

• Schedule an annual "visit days" event for admitted students. Ask current graduate students to help in organizing some of the activities during this event and possibly arrange to host visitors overnight in dorms or apartments. Having current graduate students involved in the recruiting also promotes their deeper engagement and commitment to the community and the program.

3.2.2.4 Masters Students

Goal: Investigate and prototype a reduced-coursework Master’s program targeted to industry professionals and reduce the courses-only degree requirements from 36 credits to 30 in order to make the program more practical for prospective students employed in local industry.

Strategy: Coordinate with the College of Engineering and local industry for the implementation of such a program.

3.2.2.5 Doctoral Students

Goal: Increase focus to the doctoral program.

Strategy: Emphasize the importance of graduating Ph.D. students in annual faculty evaluations, as well as in applications for promotion and tenure. Allocate Teaching Assistantship positions preferably to Ph.D. students. Implement consistent standards for graduating Ph.D. students, in terms of publication record.

3.3 Enhance the Quality of the Research Program

The CSE Department has made remarkable progress in strengthening and improving its research program over the last ten years. Specifically, it has been successful in hiring promising new faculty,
increasing funding through competitive granting programs, developing promising research areas, mentoring and developing close ties with graduate students, and working cooperatively with local and national industry.

3.3.1 Current Research Strengths

Being a relatively small department, we have recognized that the best way to become known as a research leader among our peers is by becoming strong in select areas of research. This was a top priority as outlined in our prior strategic plan and pursued over the last several years. We are now concentrating our efforts on strengthening several select research areas (cybersecurity, unmanned autonomous vehicles, advanced manufacturing, big data, high-performance computing, the Internet of Things (IoT), and bioinformatics) that correspond to the expertise and interests of our faculty: (1) Computer and Network Systems, (2) Intelligent Systems, and (3) Software Systems.

Research in computer and network systems is currently supported by seven faculty members [Murat Yuksel, Mehmet Gunes, Shamik Sengupta, Ming Li, Arslan Munir, Dwight Egbert, Yaakov Varol], including three recent hired faculty. There are two areas within this field: (i) computer networks and (ii) parallel and distributed computing and embedded systems. The research emphasis has been on wireless systems, optical wireless communications, cognitive radio, network management, routing, network science, complex networks, network security, public safety communications, network measurement, network architectures, network economics, embedded systems design, and data communications techniques for real-time computing systems.

Research in intelligent systems is currently supported by seven faculty members [George Bebis, David Feil-Seifer, Alexis Kostas, Jim La, Sushil Louis, Mircea Nicolescu, Monica Nicolescu], including three hired in the last two years. There are four areas within this field: (i) computer vision, (ii) robotics, (iii) evolutionary computing and (iv) games and simulations. Research has focused on topics such as genetic and evolutionary computing algorithms, co-evolution, computational intelligence in design, agent modeling and control, algorithmic motion planning, object detection, tracking and recognition, 3D reconstruction, biometrics, visual surveillance, robotic vision, human-robot interaction, robot learning, socially assistive robotics, autonomous control and interaction, path planning, navigation, navigation and multi-agent systems.

Research in software systems is currently supported by four faculty members [Sergiu Dascalu, Eelke Folmer, Fred Harris, Lei Yang]. There are four areas within this field: (i) software engineering, (ii) high performance computing and visualization, (iii) data engineering and (iv) human-computer interaction. Research has been primarily focused on software methods and tools for interdisciplinary research, requirements specification, software environments, software frameworks, user interface design, assistive technologies, wearable computing, UAVS, and interaction design for virtual reality simulations, and on collaborative research and tools.
3.3.2 Development of Future Research Areas

**Goal:** Enhance the quality of our research program.

**Strategy:** Strengthen the three research areas by pursuing high impact, high visibility research. Increase the number of journal publications by 30% over the next five years. Publish in high quality journals and conferences, recognize and reward those faculty and students who publish consistently in such venues. Aligned with UNR plans, recruit at least 10 new high quality faculty within the next 5 years. Specifically, our Fall 2014 request to UNR for new faculty lines asked for new positions with expertise as follows: 2 in cybersecurity (that is, 2 in Computer and Network Systems area), 2 in unmanned autonomous vehicles, and 1 in advanced manufacturing (thus, 3 in total in Intelligent Systems area), 2 in big data, and 2 in high-performance computing (thus, 4 in total in Software Systems) and 1 in bioinformatics. Increase the number of NSF CAREER and other prestigious awards over the next five years. Recruit high quality graduate students. Attract senior faculty to join our department by seeking funding to establish at least one endowed-chair position over the next seven years. This goal is consistent with UNR’s strategic goals, under Theme 2 – Discovery, to *invest in disciplinary and interdisciplinary research areas* and to *strengthen infrastructure* (by providing high-performance computing resources necessary to support computational research). In particular the unmanned autonomous vehicles, cybersecurity and high-performance computing positions are specifically identified by the UNR plan.

**Goal:** Support the College’s plan to build nationally and internationally recognized research programs in areas of national priority.

**Strategy:** Align our future research efforts with the College’s plan to build strong programs to support research in the following areas: (1) Infrastructure and Environment, (2) Security and Defense, and (3) Human Development. Specific research plans and CSE’s contribution are discussed below:

A priority within the **computer and network systems** group is strengthening our research in big-data and cloud networking, Unmanned Autonomous Systems (UAS) networking, economics of cyber-security, cognitive radio, and optical wireless. Specifically, members of the group plan to work on self-organizing device-to-device communications for public safety, integration of optical wireless communications into indoor lighting structures, heuristic optimization of large-scale networked systems, network measurement, and network security. The embedded systems sub-area expects to continue to undertake research projects for local industry in a variety of areas related to embedded and real-time computer systems. The parallel and distributed computing sub-area will continue actively collaborating with the Brain Lab on brain simulations.
Within the **software systems** group, there are plans for expanding research work on topics pertaining to software engineering for cyber-infrastructure development, processes and tools in support of interdisciplinary research, model-driven development, and project management. The human-computer interaction group plans to expand their research into the following topics: (1) new input methods for mobile virtual reality; (2) assistive applications using UAVs; (3) exploring the use of ultrasound for mobile applications. The visualization and virtual reality sub-area plans to expand its work on virtual tools for research in bioinformatics as well as brain visualization.

Within the **intelligent systems** group, future plans include expanding research into the areas of cognitive science and computational biology, adaptive context-sensitive user interfaces, opponent modeling, intelligent tutoring systems, visual surveillance, bioinformatics, medical imaging, developmental learning in robotics, robotic healthcare, multi-robot systems, motion planning, advanced manufacturing, intelligent transportation systems and unmanned aerial vehicles.

### 3.3.3 Interdisciplinary Research

Building strong interdisciplinary research has been and will continue to be critical for strengthening and maintaining highly competitive research programs within our department. Currently, there are several on-going interdisciplinary research collaborations within our department.

The networking group is pursuing research with the Psychology department on behavioral scientific analysis and modeling of a network administrator’s actions in response to network dynamics such as failures or demand spikes. With game theorists from math, the networking group aims to increase cyber-sharing of wireless resources and seamless negotiation and organization of peers for a better wireless experience. Further, the group works with public safety management experts from management science to incorporate global patterns in emergency and disastrous scenarios to local wireless protocol design.

For instance, the software systems group has been developing interactive software frameworks that support model and sub-model interconnectivity in environmental science. The robotics group has been working on problems related to transportation (in collaboration with faculty from civil engineering), as well as on assistive robotics for children with autism spectrum disorders (with faculty from psychology and speech and language pathology).

**Goal:** Build stronger interdisciplinary research.

**Strategy:** Continue current and develop new interdisciplinary research collaborations as outlined in the previous section (e.g., the computer networks group plans to collaborate with material
physicists to apply network modeling techniques to increase understanding of nano-scale structure and thin film growth dynamics, the computer vision group plans to expand its research in bioinformatics and medical imaging and the robotics group plans to collaborate with researchers in social studies on telepresence robots for medication management.)

We plan to continue collaborating with other departments and colleges at UNR in expanding existing and creating new research clusters in the areas of unmanned autonomous systems, big data, cybersecurity, advanced manufacturing and Internet of Things. We will also submit joint proposals with faculty from other departments and universities to programs that support interdisciplinary research such as NSF’s Cyberphysical Systems program, and DOD’s Multidisciplinary University Research Initiative (MURI) program. In addition, our existing faculty and new hires will actively participate in multi-disciplinary centers established within the COEN and UNR. Our faculty already participated in establishing the UNR Cybersecurity Center, the Advanced Manufacturing cluster, and will continue to pursue new interdisciplinary avenues. This is consistent with UNR’s strategic plan, under Theme 2 – Discovery, to invest in disciplinary and interdisciplinary research areas.

3.3.4 Research Awards and Expenditures

Over the last ten years, our research has been supported both by Federal (e.g., NSF, NASA, ONR, DOE, DARPA) and industry sources (e.g., Flirtey, Inc, Ford Motor Company, AT&T Labs, Bally Technologies, Google, Microsoft and General Electric). Specifically, research funding has increased significantly: over the last five fiscal years new awards have exceeded the $1M mark each year, with $2.7M in 2014. Annual expenditures have also reached $1.7M in 2014.

Goal: Increase annual research awards and expenditures by 30% over the next five years, to an average of $160,000 per faculty per year.

Strategy: Reward efforts to secure individual and collaborative grants, seek strategic and capacity building earmarks, and target strategic research grants such as NSF EPSCoR, NSF I/UCRC, NASA EPSCoR, DOD EPSCoR, DOT, NSF MRI, and DOD MURI.

Goal: Increase proposal submissions to funding agencies by 30%.

Strategy: Reduce teaching load for research-active faculty to 3 courses per year. Additional strategies are to encourage and facilitate more grant-writing, promote course buyouts, and provide an extra course release time for every course buyout. Reducing the teaching load is consistent with UNR’s strategic plan, Theme 2 – Discovery, of becoming a “Carnegie Research University/Very High”, through aligning teaching loads with discipline specific standards at peer and aspirant research universities.
**Goal:** Increase industry funding by 20%.

**Strategy:** Continue and expand successful partnerships with local organizations to secure additional funding from the local industry (e.g., IGT, Scientific Games, General Electric) by offering quality education in computer science and engineering that supports their needs for highly qualified employees. Submit joint research proposals with local and national industry organizations to programs supporting university-industry collaborations such as NSF/DOD SBIR/STTR, NSF Industry and University Cooperative Research Program, and NIJ Electronic Crime Program.

**Goal:** Establish a path for commercialization of intellectual property.

**Strategy:** We plan to get involved with the activities of the newly established Nevada Advanced Autonomous Systems Innovation Center (NAASIC), whose main goal is to create industry-university partnerships to commercialize technologies developed at the University of Nevada, Reno.

### 3.4 Outreach Programs

#### 3.4.1 Local and State Outreach

**Goal:** Increase the department’s state outreach activities.

**Strategy:** Faculty will continue to participate in outreach activities such as Nevada Bound, Engineers’ Day, the annual College of Engineering summer camps, offering internships to Davidson Academy students and participating in the Newton project. The department will also continue to organize its own Hour of Code and summer camp event (specialized on robotics and video games), from where we hope to attract more underrepresented groups such as females and minorities into CSE. Our faculty (Dr. Feil-Seifer) is a co-organizer of CodeReno.org aimed at encouraging children (in particular elementary and middle-school) to learn computer programming. Additionally, we are reaching out to local schools, designing modules for the ME2L program and organizing a programming competition to be hosted at the Discovery Museum. In collaboration with the campus chapter of the Association of Computing Machinery, we will continue to pursue the programing open house event at the Discovery Museum, a K-12 outreach event where children participate in an Hour of Code (cdedweek.org). In addition, faculty will include funding for summer camp scholarships in their grant proposals to have students from low-income households participate. The department will also make an active effort in tracking the participating students in the summer camps to see whether they actually enroll into our program.

**Goal:** Strengthen the department’s student societies.
**Strategy:** We will have faculty working closely with our student societies such as WiCSE and ACM to organize regular activities with CSE students. In addition, we will leverage funds from the differential fees to facilitate and increase the number of student-organized events.

### 3.4.2 National and International Outreach

**Goal:** Increase the department’s national outreach activities.

**Strategy:** The department has developed a promotional package that includes posters and flyers. Faculty will be encouraged to distribute these to prospective undergraduate or graduate students at conferences or their visits abroad. The department will also make a more active effort to promote our department and the Reno/Tahoe area as the ideal place for outdoor activities while pursuing a college education. Faculty will participate in out-of-state outreach activities such as the organization of summer schools or camps in particular topics or participate with their students in national competitions to increase the visibility of our department and attract students into our department. We will also engage in community building with other majors, alumni, and industry constituents.

## 4 Resources

Here we outline the goals for improving our department’s resources and describe the strategies to reach these goals.

### 4.1 Faculty

Having a strong body of research active faculty is crucial to succeeding in a demanding academic environment as a department. Currently, the department has 16 tenured or tenure track faculty members across the three research areas of Computer and Network Systems, Intelligent Systems, and Software Systems. Some faculty members belong to more than one area, but not all areas are equally strong. The goal is to strengthen the faculty body by increasing and balancing the number of faculty per specialization area. This will support the teaching needs of the specialization areas, which are not equally well supported at this time. In particular, there is a present need to hire a new faculty member to bolster the department’s ability in offering hardware related courses. Balancing faculty numbers across specialization areas should also take student interests and enrollments into account.

**Goal:** Develop proactive plans for faculty retention.

**Strategy:** While faculty retention has not been a major issue for our department, we plan to be proactive about it in order to minimize the likelihood of our faculty leaving the CSE Department. We have already established a Best CSE Researcher of the Year award and we plan to look into the following additional options: provide reduced course load for faculty active in research,
provide increased travel support (in particular for students), enable early tenure and promotion for truly outstanding faculty, assign increased research space for active research faculty, provide increased support for student recruitment, offer higher startup packages to newly hired faculty, offer additional opportunities for training and professional development, provide increased mentorship to junior faculty and increase faculty involvement in large proposals.

**Goal:** Add at least ten more tenure-track faculty positions within the next five years.

**Strategy:** As the enrollment numbers are increasing across campus, the university is planning to hire approximately 200 faculty over the next five years. CSE department has surpassed other departments in the number of incoming freshmen in the College of Engineering, which also surpassed other colleges. Hence, we expect to be able to hire at least five more tenure-track faculty through the growth plan of the University. This is consistent with UNR’s strategic plan, under Theme 1 – Learning, to *provide high-quality undergraduate degree programs.*

**Goal:** Increase the number of Research Professors, Adjunct Professors and Postdoctoral fellows involved in funded research.

**Strategy:** We will increase the number of grant proposals that involve funding for such positions. We will also plan to recruit Postdoctoral fellows who have their own funding: we plan to make our department attractive to them through our enhanced infrastructure and research expertise. This goal is consistent with UNR’s strategic plan, under Theme 2 – Discovery, to *become a “Carnegie Research University/Very High”.*

**Goal:** Increase the number of visiting professors coming to our department.

**Strategy:** We will increase the department’s visibility in the scientific community through participation in conferences and other scientific meetings, and we will actively aim to encourage colleagues in the field to visit our department for their sabbatical years.

**Goal:** Transform existing soft-money lecturer positions into continuing lectured positions with funding derived from state funds.

**Strategy:** Currently there are two (2) lecturers in the department. These two faculty members have greatly supported our teaching mission and helped in improving the research productivity of the department. Such faculty members can significantly enhance the teaching environment of the department, and are effectively used by many other highly research productive peer departments in the nation. We will continue to apply for new lecturer positions as part of the campus faculty hiring initiative over the next few years.

**Goal:** Add two more lecturer positions to the departmental faculty within the next five years.

**Strategy:** We plan to apply for new lecturer positions as part of the campus faculty hiring initiative over the next few years. We may also increase the number of lecturers by leveraging differential
tuition and ICR accounts as funding sources. We will ask “research active” faculty members to buy out of courses so that these positions can be reasonably funded. This buyout-based scheme aligns well with the motivations of the research active faculty in that they will get less teaching load to perform more research while the extra funds coming from the buyouts will be spent for hiring lecturers.

The above goals are consistent with UNR’s strategic plan, Theme 1 – Learning, to decrease the professional advisor:student ratio.

4.2 Space

The CSE Department currently has approximately 16,500 sq ft of space, consisting of 4,300 sq ft for 24 offices, 7,200 sq ft for 15 research labs, 3,500 sq ft for 6 instructional labs and 1,500 sq ft for the CSE office. This is significantly smaller in comparison to the space given to similar departments at other universities in the US, which averages 37,996 net square feet. This lack of space negatively affects the department’s research, teaching, and service missions and impedes our ability to reach our goals. Space detracts from personnel’s performance, the quality of teaching, as well as the working and living environment of the department and its productivity.

**Goal:** Increase the department’s space to 41,000 sq ft in the next five years.

**Strategy:** The College of Engineering is slated to build an Engineering building in the University Strategic plan and planning is underway. Department has been in constant communication with the university administration and there is a general consensus that the space for the CSE department is grossly inadequate. We will continue to emphasize our space needs to obtain additional space dedication. The department has already optimized the use of its existing space through internal reorganization and it will strive to keep doing so depending on the needs and the availability of space. The space we aim for is in order to reach the goal that the President and Provost have set in the University's master plan of 700 square feet per researcher. Considering the additional space for faculty offices and teaching laboratories, we will strive to reach our goal of 41,000 sq ft in the next five years.

**Goal:** Dedicate a lounge for departmental students organizations.

**Strategy:** The department has two active student organizations, but we are the only department in the college with no space available for a student activity room or lounge. Upon the availability of new space and once other critical needs of the departments are covered (e.g., teaching labs), space needs of our student organizations will be given high priority. This is a crucial need for changing the environment in the department and fostering mentoring and peer learning.
The space goals are aligned with UNR’s strategic plan, under Theme 2 – Discovery, to strengthen infrastructure, by beginning construction on an Engineering building, renovating Palmer, SEM, and other COEN labs.

4.3 Equipment

Goal: Upgrade and acquire new lab equipment to keep up with future research and teaching needs. Strategy: We will use money from our differential fees as well as reach out to the industry to help us equip and renovate our labs. We will also pursue infrastructure grants from federal and state programs. The department has been quite successful in obtaining such infrastructure grants from the university, as well as the EPSCoR and DURIP programs. In addition to these, we will target NSF’s CRI and MRI programs.

4.4 Support staff

The department currently has two Administrative Assistants, one IT manager, and one student worker to serve the secretarial and computing needs of the faculty. The departmental faculty lacks significant support in grant proposal writing and preparation. Most similar departments in other universities have well-established support staff to help the faculty in preparing proposal budgets and paperwork. The current practice in the department (and in many other departments of UNR) is that the faculty members themselves have to handle all the paperwork and budgeting for proposals being submitted, since OSPA does not provide such services. Reducing the level of faculty effort required to conceive and follow through on proposal submission will result in more and better proposals being submitted and funded.

The CSE department currently has 8.5 TA positions, which can barely cover the needs of 100-300 level courses. CSE courses are very heavy in terms of programming projects and assignments, which require extensive time for grading and student mentoring. We need more TA positions to support the departmental faculty, so that they can spend more time on research proposals and projects.

Goal: Recruit a new staff member to support grant proposal writing and management activities. Strategy: Realistically, at this time a new grant writing new staff member can only be recruited by the CoEN. If this person handles the proposals of the entire college only a minimal amount of support can be provided to each faculty member. Nevertheless, we strongly support and will advocate for sponsoring this new staff member within the CoEN.

Goal: Add at least six more teaching assistant positions within the next five years, once the average annual research expenditure exceeds $2.5M for the department.
**Strategy:** We will need to have more TAs in the department. We plan to leverage differential tuition and ICR accounts for funding these new TA positions.

### 4.5 Development and other plans of growth

**Goal:** Maintain and strengthen our links with industry and national labs.

**Strategy:** We will establish an annual departmental or college level “affiliaties meeting” that will bring representatives from various companies to the campus. This meeting will go beyond the gaming industry and the focus of our current spring symposium and will be setup to maximize the benefits to participating companies. Such a meeting can include presentations both from the industry representatives and from faculty members, as well as posters from our graduate students.

**Goal:** Maintain and strengthen our links with researchers at top-tier Universities.

**Strategy:** We will aim to invite renowned researchers from top-tier Universities to our Colloquia Series. During the visits we will arrange laboratory visits with members of our department, to increase potential for collaboration and increase the visibility of our department with the CSE research community.