UNLV | ECONOMIC DEVELOPMENT

Sports Research & Innovation Initiative

Semi-Annual Progress Report

Reporting Period: September 1, 2021 - February 28, 2022

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April 1, 2022

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Project Purpose

Southern Nevada is currently seeing significant growth in sports-related industries locating to, and being established in, the region. From a myriad of professional, amateur, student, and community-based industries and organizations, a unique opportunity exists to drive economic development and diversification through sports and parallel industries. Sports research and development (R&D) and innovation is no longer limited to just being beneficial to the business of the sports industry with the majority of financial return on investmentsbeing held and experienced by business stakeholders. A 21st century vision of sports R&D must include interdisciplinary approaches, with clearly defined strategies to translate and adapt successful innovations to improve health and wellbeing for the overall population.

UNLV has a long history of conducting sports-related research that goes well beyond traditional sports medicine. From Sports Psychology and Nutrition, to understanding why sports attract a plethora of fans and followers, UNLV has a unique body of cross-disciplinary and dual application research, technologies, facilities,and experts in all sports-related fields. This expertise proliferates throughout the campus and into the community. For example, research on impact-induced concussions span not only sports, but also have significant applications to the military, automobile accidents, and criminal justice. Big data analysis on sports movements can be applied to identify early onset neural disorders such as ALS and Parkinson's disease. Even genetic research resulting in nutritional guidance for athletes can be applied to travelling in space and to broader population health benefits such as new treatments for autoimmune and endocrine conditions to support improved quality of life and healthy aging. The Sports Research and Innovation Initiative will impact not only sports, but the entire community at large, with potential profound impacts on overall population health improvements including addressing disparities in health.

The UNLV Sports Research and Innovation Initiative's purpose is to: 1) generate new products and services to the sports industries using interdisciplinary approaches; 2) partner with and grow Nevada-based companies with real-world opportunities for UNLV faculty, students, and graduates; 3) attract new companies to Nevada todiversify the economy with sports and its parallel industries; and 4) conduct cutting-edge interdisciplinary research at UNLV with the translation of research to improve population health outcomes and reduce health disparities in Nevada and beyond.

Section I: Progress

The following are the major accomplishments thus far as we continue to move the Sports Research and Innovation Initiative forward.

Major Accomplishment 1 – Business Updates

UNLV Sports Research and Innovation Initiative: An Ever-Evolving Space

In a moment that finds Southern Nevada in desperate need of economic diversification, UNLV's Sports Research and Innovation Initiative has launched at an ideal time. Drawing from dozens of campus researchers' work in the field, building upon the newly-approved Sports Management masters' program, and modeling itself after other successful industry-facing initiatives on campus, UNLV finds itself poised to lead and help develop Southern Nevada into what UFC Chief Executive Lawrence Epstein calls a "global intellectual capital of sports at UNLV."

To further develop and unify the university's strengths in this field, the Initiative executed a competitive Catalyst Grant competition, resulting in 16 awards totaling nearly $800,000 for UNLV researchers. The competition's reach was impressively wide-ranging, including awards to researchers in Mechanical Engineering, the College of Education, the International Gaming Institute, Kinesiology, Nutrition Sciences, the School of Medicine, Computer Science, the School of Nursing,

Physics, and the PGA Golf Management Program atthe Harrah College of Hospitality. Moving forward, there are several different potential partners that have mentioned an interest in supporting the Catalyst Grant Program.

Meanwhile, the first cohort of students has made great progress in the College of Education's Intercollegiate and Professional Sport Management (IPSM) Master's degree. Led by Dr. Nancy Lough, this program provides the backbone for the lucrative executive development and leadership programs in sports. Along with the many experiences the IPSM students have been able to have since joining the program, many of the recent SRII wins revolve around events and future partnerships.

UNLV's Sports Research and Innovation Initiative hosted two successful events in early February in partnership with the NHL All Star week. Not only was UNLV SRII able to host the Stanley Cup on campus, but also host an all-female NHL executive speaker panel in tandem with a Sports Industry Mixer. These events combined were attended by nearly 500 people. SRII is looking to build on this momentum with the heavily anticipated UNLV Sport Industry mixer planned for May 2022 in partnership with the UFC.

SRII also plans to partner with several different companies that highlight the different needs and developments in the up-and-coming Las Vegas sports scene. The first is the Esports Integrity Commission, who's focus is not only work with the integrity of Esports but also other areas including performance enhancement and diversity, equity and inclusion in Esports. The Sports Research and Innovation Initiative will become official research partner of ESIC, helping them to create new research into the Esports space. The next is the NFL Superbowl committee through which SRII plans to launch its new UNLV SRII Internship Program. Starting with the Superbowl, SRII plans to provide many different special event related internship experiences for students across UNLV's campus. Finally, SRII intends to partner with the US Soccer Foundation to help bring soccer related programming to underserved children across the Las Vegas valley and beyond.

SRII Website Maintenance

The UNLV Sports Research and Innovation website is live and serves as a valuable tool to communicate the significant impact this initiative has within sports related research and innovation. Some changes have been madeto the original Pillars of Excellence in order to reflect the ever-evolving sport related research and innovation space as well as areas of research that are being conducted more prominently at UNLV. The Pillars of Excellence are highlighted as well as many of our faculty accomplishments within the areas listed below.

- Brain Health
- Diversity and Inclusion in Sports
- Esports
- Military Health and Performance
- PGA Golf Management Program
- Sport and Health
- Sports Betting
- Sports Business
- Sports Performance
- Sport Psychology
- Sport Technology

We encourage all of our constituents to learn more about SRII at sportsresearch.sites.unlv.edu

Major Accomplishment 2 – UNLV Catalyst Grant Funding Opportunities

The UNLV Division of Research and Economic Development awarded an additional (9) nine Catalyst Grants beginning January 1, 2021. Of these nine Catalyst Grants awarded, (7) seven were POC Grants and (2) two PSDGrant. The following is a list of the successful awards in January:

Approved POC Grants - January 1, 2021:

- Joshua Goldman, School of Medicine - $50,000
  Monitored Compression Therapy: Using Smart Technology to Optimize the Treatment of LowerExtremity Swelling

- Yoohawan Kim, Computer Science - $49,699
  Developing a low cost mobile TBI analysis system for sports safety

- Hyunhwa Lee, School of Nursing - $50,000
  Mobile Health Walking Balance Measure for Accurate Sport-Related Concussion Treatment

- John Menzes, Electrical and Computer Engineering - $50,000
  Monitoring of Tissue Perfusion Through the Combined Use of Thermal, RGB and LIDAR Cameras

- Brendan O'Toole, Mechanical Engineering - $50,000
  Experimental Study of a Patient-Tailored Polycarbonate Urethane Knee Implant Using Custom-DesignedTest Machine

- Michael Pravica, Physics and Astronomy - $50,000
  Development of high-quality reproducible vaccines via useful hard x-ray photochemistry

- Shengjie Zhai, Mechanical Engineering - $50,000
  An artificial Intelligence assisted electronic sports (Esports) medicine and performance assessmentsystem for optimizing healthy body, healthy mind and high performance

Approved PSD Grants - January 1, 2021:

- Christopher Cain, PGA Golf Management University Program - $8,785
  Golf Grip Study

- Kara Radzak, Kinesiology and Nutrition Sciences - $26,877
  Healing the Everyday Athlete – Evaluating the Impact of Incrediwear Use on Musculoskeletal Health inan Occupational Setting

The previously approved POC and PSD Catalyst grants are as follows:

Approved POC Grants - June 2020:

- Julia Silvernail, Kinesiology and Nutrition Sciences - $47,779
  The Healthy Runner (Run Healthy Mobile Application)

- Brian Schilling, Kinesiology and Nutrition Sciences - $49,991
  "Fightpace" Mobile Application for Combat Sports Interval Training

- Kwang Kim, Mechanical Engineering - $49,835
  Field Deployable Modular 3D Printer for Sports Equipment

- Jonathan Hilpert, Educational Psychology and Higher Education - $49,141
  Strength and Conditioning Web Application: Monitoring and Researching Athlete Performance

- Daniel Sahl, Gaming Innovation Administration - $49,952
  Sports Betting and Competitive Esports App Development

- Zhiyong Wang, Mechanical Engineering - $49,349
  Disinfecting Air Containing Viruses from Ventilators, Sports Facilities and Other Circulation Systems

Approved PSD Grants - June 2020

- Brendan O'Toole, Mechanical Engineering - $100,000
  Commercialization Development for Rebel Roof Rack

All in all, there have been a total of twelve (12) POC Catalyst Grants totaling $595,911 and three (3) PSD Grantstotaling $135,662.

Catalyst Accelerator Program – Awarded early February 2022

With $100,000 available to build on the success of the Catalyst Grant Program, the Catalyst Accelerator Program was created and launched in November 2021. This unique program was designed to provided funding over a very short period of time such that faculty can further advance or build upon their original Catalyst Grant Program award. For example, it is understood that many awardees have new and unexpected costs with advancing some their deliverables to full completion and/or building on the deliverables with new innovative ideas. A call was put out for proposals, with the stipulation that any money awarded had to be spent by June 30, 2022. Four projects were selected for further funding on February 3rd, 2022.

Kim, Kwang – Continuation of research under POC award, "Field Deployable Modular 3D Printer for Sports Equipment - $17,000

O'Toole, Brendan – Continuation of research under POC award, "Experimental Study of a Patient-Tailored Polycarbonate Urethane Knee Implant" - $20,000

Schilling, Brian – Continuation of research under POC award, "*Fightpace* Moible App" - $35,000

Silvernail, Julia – Continuation of research under POC award, "Healthy Runner App" - $28,000

Commercialization and Partnering with Industry

Research Project One: Sports Equipment for Endurance Performance, Dr. John Mercer

During the Fall 2021 and beginning of Spring 2022 semesters, the following activities have been focused on these main industry partners.

- Lake Las Vegas Sports Club
  The Lake Las Vegas Sports Club continued with a donation ($25,000 / year) to support a graduate student for Fall 2021 – Spring 2022. This student is the main point of contact for the Sports Science Satellite Lab at the club. We have continued to develop that laboratory with equipment and have had research projects conducted at that location.

- Analysis of field data collection with Flo Cycling.
  This project was a continuation of work started in 2019 that involved testing rolling resistance of different wheel and tire combinations using different tire pressures. Flo Cycling used these data to evaluate a new wheel design that was subsequently released late Spring 2020. We continued this work with Flo Cycling as the prototype of a 'smart' wheel has been developed. Unfortunately, the prototype has been delayed due to

supply chain issues.

- Wetsuit testing with HUUB Design.
  There were two projects conducted in this research area:
  1. Core temperature during swimming in different wetsuits. The purpose of this project was to evaluate if a swimmer's core temperature was influenced while wearing different wetsuit designs. Data have been collected for a group of subjects and we are currently analyzing the results.
     1. Due to COVID-19, we are not actively collecting data. Instead, we continue to work manuscripts.
     2. A presentation was made at the international Norseman Science Conference based upon the data from this project.
     3. A manuscript is currently in the review process.
  2. Muscle activity during swimming in different wetsuits. The purpose of this project was to assess how active shoulder muscles are during swimming in different wetsuit designs. Data for this project have been collected and are currently being analyzed. This project is directly related to how a wetsuit is designed from a manufacturing perspective as well as the type of material used to build a wetsuit.
     1. This project has also been placed on hold due to COVID-19; however, we have sufficient data to submit a manuscript. Also, we have continued discussion with the manufacturer (HUUB Designs) and they have redesigned their wetsuit with the intent of reducing muscle resistance during swimming.
     2. Nevertheless, we have a manuscript in the review process presently.
  3. I have also been working with the wetsuit company (HUUB Designs) on a new wetsuit design as well as potentially developing a new deep water running product.

Other activities that have been accomplished Fall 2021 – Spring 2022:

- In collaboration with a colleague, Tedd Girouard, the podcast: The Evidence Based Triathlete has been launched. This weekly podcast draws on the academic knowledge of Tedd and myself in combination with our triathlon experience. The audience for the podcast is the immediate local endurance community but the podcast is now available on regular podcast stations.

Research Grants

Intellectual Property

One patent was filed for this reporting period by Michael Pravica, Physics and Astronomy - Development of high-quality reproducible vaccines via useful hard x-ray photochemistry

Programmatic and Project Changes

With $100,000 still available to build on the success of the Catalyst Grant Program, the creation and of the Catalyst Accelerator program occurred in November 2021.

POC Catalyst Grants: Research Updates

- Joshua Goldman, School of Medicine - $50,000
  Monitored Compression Therapy: Using Smart Technology to Optimize the Treatment of LowerExtremity Swelling
  - One working prototype has been built and tested locally, measuring pressure applied at three levels on the leg: the upper calf, the lower calf, and the lower leg. A smartphone application has been designed and implemented for Android phones which connects to the leg sleeve wirelessly via Bluetooth and displays the pressure readings at each sensor level. Next steps (current work) include the addition of a temperature sensor for monitoring potential skin infection, the inclusion of an algorithm to measure/determine/quantify patient compliance with the device, and improving upon the smartphone application.

- Major Accomplishments:
  - Limiting the device to a 1cm diameter
  - Achieving exceptional linearity with the sensing mechanism
  - Successful Bluetooth connection/communication between sensing mechanism and smartphone
- NEW PUBLICATION: Monitored Compression Therapy: Using Smart Technology to Optimize The Treatment of Lower Extremity Swelling - James Skelly

- Yoohawan Kim, Computer Science - $49,699
  Developing a low cost mobile TBI analysis system for sports safety
  - We have developed Smart Walking Movement Master (SingM2) mobile application (app) to collect motion sensor data using the smartphone. SingM2 is a smartphone application that continuously collects walking movement data of its users. To achieve the primary goal of building a deep learning model with a high prediction accuracy, it is essential to gather specific data sets applicable to the research. We collected the sensor data from a traumatic brain injury (TBI) group. We constructed deep learning models such as feedforward neural networks and convolutional neural networks using Keras and Tensorflow. For training the models, we use the motion sensors data collected by the mHealth application. We examined the deep learning models with the motion sensors data of TBI group. Participants with TBI experience showed a lower body balance. For our mobile app to be usable by the users, a reporting service is necessary. We tested and researched the cloud service for the mHealth system using ThingSpeak™ cloud service. ThingSpeak™, representing a popular commercial version of cloud service, is an Internet-of-Things (IoT) analytic service platform to aggregate, visualize, and analyze the live data streams in the cloud.

- Hyunhwa Lee, School of Nursing - $50,000
  Mobile Health Walking Balance Measure for Accurate Sport-Related Concussion Treatment
  - On October, 2021, an international visiting post-doc scholar (Dr. Jinyoung Park) joined my team from South Korea for this project. She has been closely working with me (PI) for the project, along with the consultant in the project, Dr. Sungchul Lee in South Kore, to test and measure 3 app systems synchronously when assessing walking movement and balance. The new protocol, which will examine and test Aim 2 of the study, to recruit participants using the 3 app systems synchronously (front, back of the body, and right lower pocket) has been reviewed by Biomedical IRB (#UNLV-2021-198), since November 26, 2021. We responded to the reviewers 3 or more times, but haven't received an approval yet.
    Once it gets approved, we will recruit up to 70 participants including athletes.
  - NEW PUBLICATION: Lee, S., Hwang, E., Kim, Y., Demir, F., Lee, H., Mosher, J. J., Jang, E., & Lim, K. (2022). Mobile health app for adolescents: Motion sensor data and deep learning technique to examine the relationship between obesity and walking patterns. Applied Sciences, 12(2), 850. https://doi.org/10.3390/app12020850 (indexed in SCIE, Impact Factor or IF = 2.679)

- John Menzes, Electrical and Computer Engineering - $50,000
  Monitoring of Tissue Perfusion Through the Combined Use of Thermal, RGB and LIDAR Cameras
  - Desktop version of prototype device and associated data capture software completed
  - Initial data collection has begun (5 participants to date)
  - Preliminary data has been used to develop the deep-learning based image perfusion models. Development scripts will be adapted to improve performance as more data becomes available. Training considers different backbone CNN models (ResNet, VGG, Inception, etc.) and different input sensing modalities (RGB, IR, Thermal)
  - Deep learning-based Yolov5 model trained for hand and finger detection using two different public datasets (UGFD and TI1K).
  - Completed tutorials on semantic segmentation using HR-Net with Cityscapes car data. Started converting RITE eye retina dataset to approximate hand dataset for segmentation of vessels.

- Performed tutorials on camera calibration to learn how to apply to the protoype device.
- Updated to use of Spinnaker API (through PySpin binding and Easy-PySpin wrapper) for improved camera control. Expected for use in V2 prototype.

- Brendan O'Toole, Mechanical Engineering - $50,000
  Experimental Study of a Patient-Tailored Polycarbonate Urethane Knee Implant Using Custom-DesignedTest Machine
  - The design phase of the testing machine was finished during the last six months. A motion analysis was completed so that the final dimensions of the test cell drive linkages could be determined. These parts were then drawn up and sent to the machine shop for fabrication. In addition, thin sheets of potential bio-implant material were obtained which will be used for the initial experiments.
  - Accelerator Grant application submitted and accepted; awaiting funding.

- Michael Pravica, Physics and Astronomy - $50,000
  Development of high-quality reproducible vaccines via useful hard x-ray photochemistry
  - We have succeeded in measuring the energy dependence of x-ray damage of various nucleotides at various energies during in person experiments at the canadian light source (pls) last december (2021). Data is currently being analyzed but in summary, we are narrowing the range of optimum energies for selected nucleotides.
  - For the first time, we have demonstrated that by irradiating metal salts just above the l-edge, we can initiate damage by irradiating lead oxalate just above the lead k-edge. This enhances our ability to selectively damage/target biological compounds. We will analyze our samples this may of 2022 at the canadian light source using infrared spectroscopy.
  - With the difficulty of performing x-ray damage experiments due to the lack of operating synchrotrons, we have been pursuing an alternative method of damaging the genetic materials via electrochemistry. We have succeeded in damaging genetic components (nucleotides and ribose) and the tobacco mosaic virus (tmv). The electrochemically damaged tmv virus was used to infect bean plants. Far weaker infections were observed in these plants compared to other bean plants (control) that were infected with the unadulterated virus.
  - We analyzed electrochemical damage of various nucleotides using mid- and far-infrared spectroscopy at the cls and observed that thymine, uracil and guanine had irreversible/measurable damage. Adenine and ribose, on the other hand, suffered little if any damage. Thus, we will concentrate further efforts on thymine, uracil and guanine.
  - NEW PUBLICATION: "Damaging Tobacco Mosaic Virus Using Electrochemistry: A Novel Method to Synthesize High-Quality Vaccines" Angelica Diaz and Michael Pravica, Journal of Undergraduate Research (submitted)

- Julia Silvernail, Kinesiology and Nutrition Sciences - $47,779
  The Healthy Runner (Run Healthy Mobile Application)
  - We have begun the creation of the website to coordinate with the app and have progressed the app development to the final stages. Additionally, with the additional funding, the app is being expanded to work with additional smart watches and devices.
  - Accelerator Grant application submitted and funded.

- Brian Schilling, Kinesiology and Nutrition Sciences - $49,991
  "Fightpace" Mobile Application for Combat Sports Interval Training
  - Accelerator Grant application submitted and funded.

- Kwang Kim, Mechanical Engineering - $49,835
  Field Deployable Modular 3D Printer for Sports Equipment
  - The accomplished design considers a printing platform that can expand the print volume. The print base and the support structure expand using modular components. This allows for easy

assembly, disassembly, or expansion. During the reporting period several advancements have been made. Structural analysis work has been completed for the Modularly Expandable 3D Printer (ME3P) concept. To determine the optimum design, research was conducted on additive manufacturing, conventional 3D printing systems, general structures, the dynamics of robotic manufacturing systems, and market research. After the research was conducted and the initial design concepts introduced, the engineering analysis took place. The analysis was conducted using analytical calculations in conjunction with finite element analysis using the software, SolidWorks. The results determined the high stress and high deflection points for individual components and the system as a whole, under various conditions. All in all, the frame has seven component patterns that are convenient to assemble. To expand the print frame, the additional Standard Rail component or Extension Rail component can be used. To expand the print bed, there are only two component patterns: the modular square build plate and the miniature I-beam connector. The connectors interlock with the plates on either side creating the larger build plate. The project is currently in the prototyping phase. Conventional 3D printer systems are being used to fabricate some of the prototype components. As part of this experimental phase, different materials are being used to determine what will provide the most stability for the prototype. The current material being used for the prototype the thermoplastic, Polylactic Acid (PLA). This material provides consistent post-printing dimensions, easily prints the components, and provides enough strength and stability for the components. The prototype testing determined that the best course of action is to have the final components produced in metal. This can be achieved by machining the components or using metal 3D printing technology. However, this prototyping phase also presented the many advantages of the PLA material. Spare parts can be printed on the modular printing platform as temporary replacements to the metal components; therefore, the system is self-sustaining. The figure below shows the modular print bed assembly, the stress results of the z-axis motor mount and guide rod connection point from the finite element analysis in SolidWorks, and the prototype components for the modular print bed, respectively.

- Accelerator Grant application submitted and funded.

- Zhiyong Wang, Mechanical Engineering - $49,349
  Disinfecting Air Containing Viruses from Ventilators, Sports Facilities and Other Circulation Systems
  - The project has been finished after being tested at the university of Oregon

PSD Catalyst Grants: Research Updates

- Christopher Cain, PGA Golf Management University Program - $8,785
  Golf Grip Study
  - Data collection for both phases of the study are completed and white papers (results of product performance) was completed in October 2021

- Brendan O'Toole, Mechanical Engineering - $100,000
  Commericalization Development for Rebel Roof Rack
  - A website has been created and is updated regularly with project updates. Please see the website for some videos and other information not included in this report.
  - https://www.mojaverail.com/
  - Noah Malgeri and Rachel Elias completed an NSF ICorps Seed Grant where they were able to do a preliminary 'Customer Discovery' evaluation as part of the Business Model Canvas.
  - Fabrication and Testing of Roof Rack Prototype 1 (Sept 2020 – May 2021). A video demonstration of this prototype can be viewed on the website link above.
  - Redesign and Fabrication of Prototype 2 (May 2021 – December 2021). A telescoping rail system with a simpler round geometry was used to design a second prototype. A CAD model of this system is shown below.
  - A new tower support system was also designed and fabricated.

- All of the individual components for this second prototype were manufactured by December of 2021.
- Assembly of Prototype 2 (January 1 - February 28, 2022). Custom cylindrical bearings were designed to allow the tubes to telescope. Several iterations of these bearings were fabricated during the first two months of 2022.
- Final assembly and testing of this prototype is scheduled for April – June of 2022.

Looking Forward

Identify industry needs and engage to create collaborations that will benefit the Las Vegas community and our growing sports research and innovation presence.

Leadership Updates:

- Bo Bernhard has been named Interim Vice President of Economic Development, effective January 1, 2021.
- Jay Vickers, Chief Business and Revenue Officer has been named to the U.S. Soccer Federation Advisory Council for Diversity, Equity and Inclusion.

Deploy Catalyst Funding:

- Engage corporate partners
- Create new innovations
- Collaborate with sports and human performance industry
- Build a facility that addresses the needs of the sports industry and academics.
- Data Analytics
- Innovation
- Wearable Technology
- Diagnostics and Therapeutic Devices

Impact Workforce Development

- Student Engagement - Research
    - Commercialization of Innovative Products & Research
    - Support Research Initiatives
- Student Engagement - Careers
    - Startup Companies
    - Diversify Job Creation within the Sports Industry
    - Career & Internship Placement
        - Creation of the New UNLV SRII Internship program

Create a learning environment that will maximize all of our internal and external engagements to advance research and innovation opportunities by providing our students the platform to learn about the many facets of sports research and innovation.

Section II: Performance Narrative

Following are the outcomes we expect to generate from this research as originally proposed in our grant application. Our hope and mission are to develop sufficient funding such that these outcomes canstill be accomplished within five years:

- Six (6) new startup companies from direct Sports Research and Innovation Initiative activity

- At least five (5) new products and/or services licensed to existing companies forcommercialization
- $7,950,000 in grants and corporate funding over five years
- At least $3.6M in donations over five years
- Establishment of interdisciplinary Sports Research and Innovation Initiative lab and clinics at UNLV
- Twenty-eight (28) research sponsorships over five years
- $500,000 in license revenue over five years
- Creation of over 897 jobs (direct and indirect) over five years
- Research translation into at least two (2) new UNLV interdisciplinary initiatives to improvepopulation health outcomes in Nevada

Performance Metrics

GOED Requested Metrics	Current Result / Year-End					
	07/01/19 – 09/30/19	10/01/19 – 02/29/20	03/1/20 – 09/30/20	10/01/20 - 02/28/21	3/1/21 - 9/30/21	3/1/21 - 9/30/21
Number of companies that moved to Nevada as aresult of the project	0	0	0	0	0	0
Number of start-ups	0/6	0/6	0/6	0/6	0/6	0/6
Number of jobs created	0	0	0	0	0	0
Intellectual property licenses/options	0/5	0/5	0/5	0/5	0/5	0/5
Intellectual property revenue received by the University	0	0	0	0	0	0
Number of research grants awarded to (and received) by research teams and faculty	2/12	2/12	9/12	12/13	16/17	19/21
Amount of research funding received by the research team from industry or public sector agencies	$400k	$400k	$396,047	$335,526	$335,627	$329,962
Number of sponsored research contracts executed on behalf of the research team	0	0	1	3	3	3
Number of patent applications filed	0	0	0	0	0	3
Number of issued patents	0	0	0	0	0	0
Number of students placed with companies	0	0	0	0	0	1
Number of faculty / students / temporary hired	0	3	4	0	2	26
Amount/value of gifts/donations received by UNLV in support of the research team	$150k	$150k	$150k	$150k	$150k	$250k
Total number of student internships	2	2	2	2	3	3

Section III: Budget

Company: University of Nevada, Las Vegas
Period: FY 2022 - 08 February
Worktags: Grant: GR08858 UNLV-Sports Research and Innovation Initiative

Ledger Account Summary	Original Budget	Budget Amendments	Current Budget	Current Period Actuals	LTD Actuals	Obligations	Commitments	Actuals + Obligations + Commitments	Remaining Budget	Percent Remaining
Direct Expenses										
Personnel Expenses	$2,958,000.00	($2,557,267.00)	$400,733.00	0.00	$337,554.09	$0.00	0.00	$337,554.09	$63,178.91	15.77%
Professional Salary	$2,900,000.00	($2,603,953.00)	$296,047.00	0.00	$261,238.80	$0.00	0.00	$261,238.80	$34,808.20	11.76%
Graduate Salary	0.00	$0.00	$0.00	0.00	0.00	0.00	0.00	0.00	$0.00	0.00%
Hourly Wage	0.00	$31,093.08	$31,093.08	0.00	$12,802.05	$0.00	0.00	$12,802.05	$18,291.03	58.83%
Fringe Benefit Expense	$58,000.00	$15,592.92	$73,592.92	0.00	$63,513.24	$0.00	0.00	$63,513.24	$10,079.68	13.70%
Other Direct Expenses	$1,352,000.00	($1,278,441.00)	$73,559.00	$229.42	$5,431.25	0.00	$0.00	$5,431.25	$68,127.75	92.62%
Travel Expenses	$30,000.00	($27,525.00)	$2,475.00	0.00	$974.78	0.00	$0.00	$974.78	$1,500.22	60.61%
Materials and Supplies	0.00	$9,126.00	$9,126.00	0.00	$4,087.15	0.00	0.00	$4,087.15	$5,038.85	55.21%
Services	$22,000.00	($15,743.00)	$6,257.00	$229.42	$369.32	0.00	0.00	$369.32	$5,887.68	94.10%
Sub-Awards	$1,200,000.00	($1,144,299.00)	$55,701.00	0.00	0.00	0.00	0.00	0.00	$55,701.00	100.00%
Tuition and Fees Expense	0.00	$0.00	$0.00	0.00	0.00	0.00	0.00	0.00	$0.00	0.00%
Capital Equipment	$100,000.00	($100,000.00)	$0.00	0.00	0.00	0.00	0.00	0.00	$0.00	0.00%
Total Direct Expenses	$4,310,000.00	($3,835,708.00)	$474,292.00	$229.42	$342,985.34	$0.00	$0.00	$342,985.34	$131,306.66	27.68%
Facilities and Administration Expense	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Total Direct & Indirect	$4,310,000.00	($3,835,708.00)	$474,292.00	$229.42	$342,985.34	$0.00	$0.00	$342,985.34	$131,306.66	27.68%

Note: the Personnel Expenses were reverted June 30, 2021. Budget snapshot continues to reflect these amounts, but they are not available to spend.