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| # | Sponsor | Title | Team Composition | Project Description |
| 1 | Dr. Amir Sadovnik (UTK) | Adversarial Learning – Improving the adversarial attacks online demo | CS | Although deep learning had achieved state of the art results in many computer vision tasks it still suffers from vulnerability to adversarial attacks. Adversarial attacks are small calculated perturbation which when added to an image completely change its prediction by a machine learning system. Last year a senior design group created a first version of an online tool to create adversarial attacks using different known methods. The goal of this project is extend that work to include other capabilities. The project requires knowledge of machine learning and we development |
| 2 | Dr. Anne Skutnik (UTK) | Engineering Resource App | CS | The Office of Student Success is tasked with supporting outreach, recruitment, and retention for Tickle College of Engineering. Recently, we have been in conversations with students about what they need to help support them at TCE. Two topics have come up frequently in these discussions: being aware of what is happening within TCE and connecting to other students within their departments. The need for social connectivity was very apparent and we believe something that needs to be considered as we strive towards raising our retention rates.  One idea that came out of these conversations was an Engineering Resource App that could be used by TCE students. Features of this app would include networking/roommate finding resources, information from engineering student organizations about events, and potentially a points system that allows them to collect points and win prizes for engaging in activities and going to events. This last idea, a points-based system, ties into Academic and Student Affairs initiative to track student event participation to understand what high-impact practices and activities work best to keep students engaged and persisting in college.  What we do not want the app to include is discussion boards or forums; those are difficult to moderate and open the possible of hate speech, stalking, and other unsafe behaviors. We want this to be inclusive, to work for all students, and to be a resource that students want to use. |
| 3 | Dr. Ahmedullah Aziz (UTK) | Privacy-protecting autonomous contact tracing framework for COVID-19 & beyond | CS, CpE, EE | Controlling the spread of infectious diseases, such as the ongoing SARS-CoV-2, is one of the most challenging problems for human civilization. The development and distribution of testing kits cannot keep up with the demand, making it impossible to test everyone. The next best option is to identify and isolate the people who come in close contact with an infected person. Traditionally, during the outbreak of contagious diseases, infected people get phone calls from public health workers making queries regarding their contacts, and those contacts are then asked to quarantine/self-isolate. This process, known as contact tracing, has been used for decades to control the spread of communicable diseases, such as tuberculosis, measles, Ebola, H1N1, SARS-CoV, and SARS-CoV-2 (COVID-19). However, this apparently simple process suffers from two major pitfalls: the requirement of a large amount of manpower to ‘manually’ track the infected individuals and the breach in privacy and security while ‘automating’ the process. Recently, contact tracing mechanism has dramatically evolved, particularly in the context of COVID-19. For instance, South Korea has been maintaining a public database including information about the travel routes of the infected people. Israel is using the cell-phone data to track the movement of infected individuals. In Taiwan, medical institutions were given access to the travel histories of the patients. Singapore has developed a mobile app to track the Bluetooth data on contact. All these approaches suffer from serious privacy concerns because the government, medical institutes, and (in some cases) general people are given access to very sensitive data. There have been reports of software-based approaches to address the privacy concerns, but none are safe from potential cyber-security threats. For instance, Apple and Google have been collaborating on a contact tracing application that will utilize cryptography to ensure anonymity. However, this approach demands that every individual should carry a smartphone. It will be infeasible to deploy such a system on the national/global level because of the immense overhead, especially in the under-developed countries. Therefore, there exists a dire need to establish a more efficient, reliable, and automated contact tracing system to effectively curb the relentless spread of COVID-19 and any future pandemic. This project aims to develop a hardware-based privacy-protecting contact tracing approach based on a wearable contact tracing device (CTD). Unlike the software/app-based contact tracing techniques, our CTD will work mostly offline. Every individual will wear/carry a CTD with unique tags/IDs anytime they go out of their homes. The prime task of a CTD will be to automatically detect the presence of another CTD within a critical distance (e.g., 6 feet for COVID-19). Once such proximity is detected, the pair of CTDs will exchange and store hardware tags/IDs. The hardware ID of a CTD will only be known to its owner and will not be linked with any other personal data or location information. The CTDs will utilize Bluetooth low energy (BLE) to seamlessly communicate with each other, like the smartphone-based approach. However, our proposed CTDs will be built as an application-specific, mass-producible, and ubiquitous tool for contact tracing. We will also need to develop a database to control and store the contact tracing information. This project will require both CS and CpE expertise. |
| 4 | Professor Cary Staples (UTK) | Bio Pesticide Game Development | CS | Partnering with Dr. Kimberly Gwinn in the Herbert College of Agriculture, our team is developing an playable experience to allow users to explore the possibilities and pitfalls associated with various pesticide strategies. The science and basic mechanics have been developed by Dr. Gwinn's students last year. This year they will participate as "Primary  Content Authors" and work with design and CS students to develop the visual vernacular , assets and game play. We anticipate building this game in Unity so it can be distributed to a variety of platforms. |
| 5 | Dr. Catherine Schuman (UTK) | Neuromorphic Autonomous Racing Application | CS, CpE | The TENNLab group at the University of Tennessee explores brain-based, Neuromorphic computing. In this project, we will be building two small racecars and using the TENNLab group's neuromorphic software and hardware to train and deploy neuromorphic solutions. As part of this project, the group will evaluate the sensor design on the cars, investigate different training approaches and measures of success, and deploy and evaluate neuromorphic solutions on the physical cars. |
| 6 | Dr. Chien-fei Chen (UTK) | Making the Impossible Possible- Designing an Equitable Transportation Electrification Plan for Low-to-Moderate Income Communities | EE | Low-to-moderate income (LMI) communities are disproportionately affected by climate change, air pollution, environmental health, and energy and transportation burdens. Therefore, proposing an equitable energy transition plan to help communities improve energy equity is needed. Used or new plug-in electric vehicles (EVs) can be at the forefront of solutions for reducing fuel costs and greenhouse gas emissions (GHG) for LMI communities. However, barriers to adopting EVs are well-documented, including EV front-end costs, car dealerships’ lack of EV knowledge, tax incentives or rebate programs for low-income drivers, availability of charging stations for renters, and negative EV myths. Despite these challenges, many local stakeholders have widely promoted EV adoption for LMI communities, implementing EV car-sharing programs, investing in charging infrastructure, and installing chargers in low-income neighborhoods. Tennessee has ambitious goals to have 200,000 EVs statewide by 2028 by building a statewide charging network that targets low-income families. The state plans to introduce rebates for new and used EVs and coordinate with utilities and private corporations to develop appropriate infrastructure. However, Tennessee is still not in the top 25 states supporting EV drivers and needs improvement in serving LMI communities. For example, Tennessee offers a rebate of $2,500 for most EV drivers, but this is only for new EVs. Registering an EV in Tennessee is expensive due to the EV fee added to regular payments. Furthermore, there are no programs specifically for low-income drivers, including public housing initiatives, car-sharing programs, or enough EV chargers for low-income areas. The Biden administration has announced a $3.1 billion plan to boost domestic manufacturing of batteries in a broader effort to shift the country away from gas-powered cars to EVs, which is an excellent opportunity for improving EV adoption.  This project will ask you to design EV adoption strategies, used/new batteries with lower loss, and equitable charging infrastructure for LIM in Knoxville. The design activities for LIMs could include the following items but are not limited:  1. Battery design and plans for improving used EVs with lower cost and sustainable strategies for car companies in Tennessee (Volkswagen, Nissan)  2. Strategies or tools to place EV charging stations in low-income areas, Knoxville (e.g., using GIS tool, etc.). Please make a plan to convince the city of Knoxville.  3. Design EV charging infrastructure beyond just a charging station (e.g., can it become a social-gathering place). Make a plan to convivence the city of Knoxville.  4. Charging solutions for people who are renters or living in public housing. Make a plan to convince the public housing authority or landlord association.  5. EV adoption strategies/pathways/activities for LIMs – how to encourage people to adopt used/new EVs beyond just telling them to save money or better for the environment.  Your design should include engineering, social, economic, and policy components. Please be creative and enjoy! |
| 7 | Dr. Dan Wilson (UTK) | Data-Driven Identification of Dynamical Models Using Machine Learning Approaches | CS,CpE,EE | Model identification is a fundamental problem in control applications where practical implementation of a given algorithm is contingent on first finding an accurate model that replicates the salient system behaviors. In  many applications, the mechanisms that underlie the dynamical behavior of the measured observables are obscured, thereby precluding the direct derivation of models from first principles. For this project, students  will leverage machine learning algorithms to develop algorithms capable of learning dynamical models from observable data. For this project, data will be obtained from simulation of numerical models; students should be proficient with Matlab and/or other scientific computing software. |
| 8 | Greg Hazyen (General Graphene Corp) | A Graphene Based Touch Panel | CS, CpE,EE | Develop a Graphene based touch sensitive panel with a single sheet of graphene. As a material is stretched, or elongated, the electrical resistance across the material changes. By detecting the change in resistance (from a slight deformation of the graphene sheet), across the many combination pairs of electrical contacts, the location of the touch point can be calculated. The goal of the project is to design hardware & software to sample, analyze, and determine the location of the touch. |
| 9 | Dr. Hairong Qi (UTK) | Self-Driving Cars | CS, CpE, EE | The team will develop a real-time perception system, including object detection and tracking, in a self-driving car. Students will learn how to collect and analyze data collected from multiple sensing modalities, including LiDAR, Radar, and camera. A stretch goal of this team is to design energy-efficient ACC algorithms and integrate with the perception system.  Team will gain hands-on experience with the sensors and how the different systems are deployed in an actual vehicle with Level-2 autonomy. |
| 10 | Jake Working and Rachel Duncan (UTK) | My Degree Plan | CS | My Degree Plan is a proposed web application accessible through MyUTK for students and advisors to edit and save their personalized degree plan. As you all know, the current way students and advisors plans classes is outdated and the information is not centralized.  This program would allow for multiple possible plans, the ability move courses around, add minors, add additional terms, and more. Information will be centralized and accessible at any time.  Students on this project would be working closely with two advisors from Tickle in order to develop a program that meets the needs of students and advisors. |
| 11 | Dr. Jim Nutaro (ORNL) | SimClimate | Cs, CpE | In 1990, SimEarth was released. It was an educational simulation program that presented a plausible model of a planet’s evolution over geological time scales, with the user able to control key variables while receiving an interactive lesson in climate, geophysics, and other fascinating topics. This project proposes SimClimate, an interactive simulation that incorporates elements of modern climate science and the social-technical-environmental model pioneered in Limits to Growth. I anticipate a spiral development model that releases a usable and increasingly informative simulation at the end of each spiral, to culminate in an Android application available via Google Play. |
| 12 | Dr. James Plank (UTK) | Neuromorphic Optimization | CS | The TENNLab group at the University of Tennessee explores brain-based, Neuromorphic” computing. The most challenging part of our research is training and optimizing spiking neural networks for specific applications. In this project, the customer will work with the student group first to get them onboarded with our computing framework. Next, the student group will experiment with several optimization techniques, all implemented in the software framework. Although the techniques have been implemented already, their effectiveness has not yet been explored, because the exploration space is very large, and our group has not allocated the human resources to do the exploration. The job of the student group will be to plan, perform, and digest the results of this exploration. Key to this is a 1000+ node cluster that TENNLab uses and supports. Students will get experience not only with a novel computing methodology, but with cluster computing, handling large amounts of data, and then digesting them. |
| 13 | Dr. Jayne Wu (UTK) | A low cost and portable breath analyzer for fitness | CpE, EE | Electrical impedance spectroscopy (EIS) -based sensors have been reported for countless applications such as the detection of various disease biomarkers, pathogens, polluting agents, water contamination and toxins. This research aims at developing a portable EIS measurement device using off the-shelf microcontrollers and integrated circuit chips.  The main components include a keypad, a LCD, a microcontroller unit, an impedance and electrochemical front end (e.g. AD5940, ADuCM355) and other ICs. The microcontroller will communicate to a PC or phone either through a USB cable or wirelessly, to create a Nyquist plot of the impedance data and to extract the resistance (Rct). The impedance measurement uses an excitation voltage of 10 mVrms and a frequency range of 0.1 Hz to 200 Hz.  The project involves circuit design, coding for microcontroller, and data analysis coding. |
| 14 | Dr. Jian Huang (UTK) | DataSocial - A Social Platform for Sharing Data-Centric Insights | CS | Knowledge is power. In a data-intensive knowledge economy, insight from data is a new embodiment of knowledge. Yet, unlike other forms of knowledge, passing this kind of new knowledge from one person to another is not easy. Known barriers include accessibility, reproducibility, cost, and efficiency. There are unknown barriers as well, such as how to track changes of these digital objects when sharing, how to add annotations to such objects, and how to publish at scale. Recent research breakthroughs in using cloud computing to widely share interactive data visualizations is enabling this possibility. However, as shown by social media platforms that have transformed the world during the past 15 years, the “social” element is unfathomable until realized in practice. In this project, the primary goal is to build a social media platform for data insights. The intended social platform should work on desktop, mobile, and/or VR. Imagine use cases of parents sharing data insights about school COVID cases, citizens sharing data insights about rezoning, gaps in K-12 education, crimes patterns in their communities. Similarly, commercial use cases abound. |
| 15 | Dr. Jian Liu (UTK) | Adversarial Machine Learning Attacks Against Speech AI Models | CS | Deep neural network (DNN) model has been revealed to be inherently vulnerable when facing intentionally distorted inputs. For instance, adversarial examples (i.e., a specific type of attack by injecting imperceptible perturbations into the input) could fool the model to make false classifications. In this project, students will explore the vulnerabilities of speech AI models (e.g., speaker recognition, and speech recognition) as well as corresponding defenses. |
| 16 | Dr. Keven Bai (UTK) | Using energy storage and solar panel to power the electric grid | CpE,EE | The project will use solar panel and battery pack to power the electric grid. The students are expected to build some power electronics converter to connect solar and battery/ultracap packs with the grid. Energy should be able to flow bidirectionally between grid and battery/ultracaps. Students are exposed to the knowledge of power electronics firmware, FPGA and power electronics and system control. |
| 17 | Kimberly Mitchell (UTK) | Creating Socially Assistive App | CS, CpE, EE | My team has created a low-cost social robot to help with companionship for those with Alzheimer’s and related dementia. We would like to add on additional companion app and features like a customizable diffuser, medicine dispenser, story time book, and photo album. |
| 18 | Markus Woelfel | EECS IT Equipment Checkout System | CS | This project will consist of a combined database and hardware system to allow the EECS IT staff to efficiently check out, track and retrieve items. When a customer checks out an item, e.g. a laptop or an adapter, the system will take inputs from a number of sources such as a bar code scanner to assign the item to the customer. Once an object has been checked out the system will generate periodic reminder emails as well as repots of outstanding items. When items are returned, the system will similarly facilitate the check-in process. |
| 19 | Matt King (Ad Hoc) | InterGauge | CS | The Inter-Gauge platform allows instructors and presenters to actively monitor the audience’s understanding as well as their current engagement with the lesson through individual, anonymized, responses to the class’s session. The extremely user-friendly interface creates an environment where students can easily signal their confusion and need for clarification, when they may not have previously been confident in doing so. This live feedback allows the presenter to pace themselves with their audience, going quickly over things which are already understood as well as taking a step back when they go too quickly. Lectures and talks can also be recorded and reviewed, allowing presenters to find the exact  spot they lost their audience, and tweak the talk for the next iteration. This also allows schools and boards to review the overall performance of the presenter, quantitatively. |
| 20 | Dr. Michael Langston (UTK) | GrAPPA Rebuild | CS | GrAPPA (grappa.eecs.utk.edu) stands for Graph Algorithms Pipeline for Pathway Analysis. It is a web-based interface that hosts a repository of powerful, scalable, graph theoretical algorithms developed by the Langston Lab and focused primarily on analytics for high throughput biological data. Constructed on the Galaxy software framework by various programming leads, GrAPPA has become something of a legacy system that now requires a refactoring of its codebase. Major project tasks are to upgrade to the latest Galaxy release, verify that GrAPPA’s software tools remain functional, migrate GrAPPA’s codebase to a version-controlled environment, implement a system for automated software updates, and provide documentation for future developers. As the work proceeds, it may also prove advantageous to augment GrAPPA with new analytic functionality. In that case, collaboration with beta testers from the biological sciences will also be required. |
| 21 | Dr. Michael Langston (UTK) | Porting Codes to Python and R | CS | Over the last couple of decades, the Langston lab has devised numerous graph theoretical clustering methods that find use in a wide variety of genome scale applications. A good example is the popular paraclique algorithm. It produces noise-resilient dense subgraphs using state-of-the-art clique finding techniques. These algorithms have been realized with codes written in C and C++, with performance, reliability, and portability in mind. Many non-CS users are more comfortable, however, with simpler and more understandable languages such as Python and R. The main goal of this project is to create a Python package for Anaconda and an R package for Bioconductor that utilize the aforementioned codes without significantly sacrificing performance. |
| 22 | Dr. Mohammed Olama and Dr. Aditya Sundararajan (ORNL) | Hyper-localized predictive analytics for a PV-Energy Storage-Load system | CS, CpE, EE | The goal of this project is to develop an open-source, low-cost predictive analytics module that can be integrated into an existing renewable power system to gather real-time data and incrementally generate localized predictions. The project will involve three phases: (a) the design and setup of a simple low-capacity system of a PV array supported by an energy storage module to meet a local load component; (b) the integration of voltage, current, power, weather, and other measurement sensors with a Raspberry Pi module that will serve as a data logger and compute node to perform the required predictive analytics; and (c) a robust incremental learning algorithm that trains and validates on streams of time series data from the system to forecast PV power, the energy storage state of charge, and load consumption while accounting for missing observations and disruptions in data availability. |
| 23 | Dr. Mongi Abidi (UTK) | Benchmarking of Face Detection Artificial Intelligence Algorithms | CS, CpE, EE | The objective of this project is to build a GUI application that implements Artificial Intelligent and Machine learning algorithms and train them to detect/recognize different objects (like face, people, car, license plates). Application areas that will benefit from this technology include: first responders responding to disaster sites, crime prevention, and transportation security. |
| 24 | Dr. Mongi Abidi (UTK) | 5G Communication for a Drone Edge Processor | CS, CpE, EE | The objective of this project to add a high-bandwidth transmission system (like 5G) to an existing drone. The drone has a high-resolution camera which needs to communicate with its control station and its edge device, which is capable of many different Artificial Intelligence and Deep Learning applications, such as object detection. Being able to transmit high-resolution images enhances the speed and accuracy of the algorithms. The goal is to quantify these improvements. |
| 25 | Dr. Mongi Abidi (UTK) | Improving Drone Video Compression using Artificial Intelligence | CS, CpE, EE | The objective of this project is to add an efficient video compression algorithm to a drone, in order to allow for more efficient Artificial Intelligence and Machine Learning methods in detecting objects like faces, people, cars, and license plates. Neural networks have shown great potential in understanding certain video representations for both lossless and lossy compressions. The goal is to quantify the improvement in speed and accuracy on the drone performance. |
| 26 | Dr. Peter Fuhr (ORNL) | Design and Development of a CubeSat/TubeSat for a High-Altitude Balloon Flight | CpE, EE | Develop and deploy a sensing and communication module based on an existing CubeSat/TubeSat design. The module will be integrated with a power module and deployed in the payload section of a high-altitude balloon. After successful laboratory-based performance verification, the activity will shift to a proposed flight (~60,000 feet) over east Tennessee. |
| 27 | Dr. Peter Fuhr (ORNL) | Observation of Pulsars at 12GHz using a Custom Built Radio Telescope | CpE, EE | Design, develop and operate a radio telescope using DIY rules. Using (provided) HW/SW and an existing mechanical design, the students will construct a radio telescope. The proof-of-concept will entail observations of our Sun's emissions in the 12 GHz radio band. After successful trials, the focus will shift to detecting millisecond rotation pulsars' emissions. |
| 28 | Ben Claybrook, Peter Gent, & Alex Nelson (Denso) | Chatting with a Robot: AI Speech Comprehension, Mobile App | CS | Use/create an AI model to analyze speech patterns, convert speech to text, evaluate meaning of text, take action based upon understood meaning, and feedback data to human in audible English. Develop an Android/iOS app OR WearOS/WatchOS application to use as the speech input and to report feedback. |
| 29 | Ben Claybrook, Peter Gent, & Alex Nelson (Denso) | Cobotic Revolution: MoMa+ Platform | CS, CpE, EE | Develop a flexible mobile robotic platform capable of manipulating objects with moderate precision in electronics production environment. Integration of 2D & 3D optics to allow robotic arm and mobile platform to perceive and compensate for variation & changes to its environment. Additionally develop integrated PC application that can assist engineering and maintenance teams with simulation & rapid deployment. |
| 30 | Walter Squires (UTK) | Solar-Powered Thermoplastic Recycling | CS, EE | While plastic polymers are all technically 100% recyclable, the recycling rate for post-consumer plastics in the United States in 2021 was reported to be 5% to 6%. Rather than relying on commercial scale recycling programs, this project seeks to enable consumers to inexpensively recycle thermoplastic polymers at home using the sun as the primary source of heat as well as solar panels as a means to power the electronic components. Ideally, the project would allow for the recycling of multiple types of thermoplastics with different thermal characteristics and ensure that the heat being applied falls within the acceptable range for each. Additionally, this project should then enable users to produce usable plastic materials, in the form of plastic wood lumber, injection molding, or as material that will be later used in additive manufacturing. |
| 31 | Walter Squires (UTK) | Distribution of Official Transcripts via Blockchain | CS | Oftentimes, an individual is required to provide an official transcript from the university that conferred their degree to them; this takes time (and often money) for the university to locate the records and then send them to the requesting entity. Blockchain technology is, at its core, an immutable public ledger; the proposed project would be a system in which students' official transcripts are first encrypted with a secret key that is shared only with the entity that is to receive the official transcript. This encrypted  transcript would then be signed using the university's private key before being appended to the blockchain. The university's public key would then be used the verify that the transcript is in fact from that institution, but without the individual's consent (sharing the secret key), the contents of the transcript would be unreadable. |
| 32 | James Cooper (UTK) | POLARIS (Propulsion Orienting, Launch And Redirect Instrumentation System) | CS,EE | To ensure that a rocket flies normal to the ground some sort of stabilization system is required. For smaller rockets this is usually done with passive control structures know as fins. For larger rockets traveling at high speed or low accelerations a more active system is required.  The Student Space Technology Association (SSTA) has worked on these systems in the past using paddles in the exhaust of a motor to manipulate the axis of its thrust. Due to material constraints this was unsuccessful. This year we are attempting this project again using a TVC system that angulalry changes the orientation of the nozzle similar to the first SLMB Polaris. We  will rotate a canted nozzle to achieve asymmetric thrust. By controlling three nozzles with some clever programing and servo motors we will be able to control lateral thrust and rotation of the craft. With the absence of fins this will decrease the drag of the rocket and with active control stabilize the craft in even high wind conditions. Depending on the interest, we can expand into propulsively landing the rocket as well but perhaps not until next year. Using a PID control system we can continuously update the desired correction and keep the rocket pointed straight up. A rocket's worst nightmare is a large gust of wind (which often occurs, especially with multi-level winds). Usually a rocket will either weathercock into the wind or enter a decaying oscillation. Neither scenario is ideal and both decrease the performance of the rocket. Adding the TVC system will lower the risk of weathercocking and the oscillatory motion will decay much faster. This active stabilization will assist UT with more precisely hitting a target altitude, which is what most rocketry competitions are about. Once this system has been flushed out we can apply this technology to any rocket that UT flies.We have the required minimal personnel to complete it, but would appreciate the extra help. |
| 33 | Nicholas Crowder (UTK) | SPAR (Steerable Parachute for A Rocket) | CS,EE | To understand the need for such a system, take a hypothetical launch of our Spaceport America Cup entry to only 30,000’ or roughly 6 miles high. Consider an apogee deployment: lower stresses on the airframe but a longer hang time resulting in much higher lateral displacements that could take half an hour to descend through high upper level winds drifting dozens of miles away. Now consider dual deployment. which is analogous to an autonomous HALO (High Altitude Low Opening) jump where rather than drifting, the rocket falls until a few hundred feet above the ground at which point it opens a large parachute and drops to a safe landing speed. This lands the rocket quickly and prevents it from leaving the waiver, but your harness observes extreme shock loads generally greater than the forces observed during its boost phase, which can damage the rocket if it is not properly simulated and designed. For most launches to the top of any waiver cylinder there is no way to stay in the waiver radially unless using dual deployment or a steerable parachute system. A steerable parachute  doesn’t decrease the time in the air but wraps that trajectory around the cylinder. Furthermore it allows selection of a landing zone such as near a road or in a clearing by the road. Spaceport America is not just in a desert, the name of that land is La Jornada del Muerto, which literally translates to the Journey of Death. It is one of two sites that can accommodate a spaceshot. That desert is covered in thorns between 2 and 3 inches in length that will puncture shoes. Being able to guide a parachute to an easy recovery near one of the few roads in the area is game changing. Hiking miles through this nightmare of a desert is not pleasant and as these rockets approach hundreds of pounds without fuel this becomes even more challenging. Dual deployment is a stop gap and recovery by helicopter is not in anyone’s budget, unfortunately. We have several rockets expendable enough to work for this project as test articles that  we can launch at low cost. We have already retrofitted a rocket to test deployment electronics and a GPS tracker, which is designed to take a hard impact. If a large airframe is needed we also have that available as well. Overall, the steerable parachute is a desirable next step in controlling  the descent of our rockets because it reduces the stress on the airframe by redirecting the shock experienced during deployment, would enable a safer recovery compared to dual deployment, and assist in the rocket recovery as a whole decreasing the distance needed to carry a 100 pound  rocket. Furthermore, such a system could be used for humanitarian purposes and guide relief aid to specific drop zones when dropped from aircraft. |