Engineering Student Technology Committee
http://www.engr.colostate.edu/ESTC
College of Engineering
Colorado State University

1. Title of Proposal: *Virtual Reality (VR) lab to foster engineering innovation*

2. Proposal Participants:

Name: Sudeep Pasricha_____E-Mail: sudeep@colostate.edu _____

Department/Major: Electrical and Computer Engineering_____

Check One: ___X__ **Faculty** _____ **Staff** _____ **Student**

3. Proposal Abstract (limit to 100 words):

Virtual Reality (VR) has gained significant momentum as an immersive medium for gaming and entertainment in recent years. Interestingly, VR technology has many uses beyond gaming, including for rehabilitating patients with limb movement disabilities, improving cognitive learning in educational environments, overcoming mental health disorders such as PTSD, and for big data management. This proposal seeks to purchase VR-kits to establish a small VR lab that will foster innovation and new applications with VR. The kits will be used in ECE courses with Engineering-wide undergraduate student enrollment, as well as senior design and independent study projects.

4. Proposal Budget

HTC Vive (1 unit): $829/unit = $829
https://www.htcvive.com/preorder/en-us/

Samsung Gear VR (1 unit): $99 (headset) + $430 (Samsung Galaxy S6 phone) = $529
http://www.samsung.com/global/galaxy/wearables/gear-vr/

Oculus Rift (1 unit): $629/unit = $629
https://www.oculus.com/en-us/rift/

Zeiss VR One (1 unit): $129 (headset) + $690 (Samsung Galaxy S7 phone) = $819
http://vrone.us/zeiss-vr-one-headset

Dollar or percentage amount requested from ESTC:

Total (1 unit each for 4 VR kits): $2806

5. Full description of proposal:

Virtual Reality (VR) promises to revolutionize the gaming and entertainment landscape, by providing deeply immersive experiences, the like of which have never been experienced before by consumers of digital media. However, VR technology also has several uses beyond gaming and entertainment, including for rehabilitating patients with limb movement disabilities, improving cognitive learning in educational environments, overcoming mental health disorders such as PTSD, and for big data management. I have been involved with a pilot senior design project in my lab during 2015-2016 with 3 ECE undergraduate students who have used an old Oculus Rift VR development kit to develop a virtual environment to train patients with neurological disorders so that they can control a smart home. This pilot project has motivated me to set up a small VR lab that will be used by undergraduate students for VR-centric projects, to use VR technology in new and interesting ways. Design and hands-on experience with VR technology is a skill that will become increasingly valuable for all engineering students that are impacted by technology, especially with many new companies coming up that are looking for "VR-ready" students to design new hardware VR solutions as well as software content for a variety of VR platforms.

As part of this proposal, I am requesting funds to purchase 4 VR kits from different vendors. The kits have been selected carefully out of many other VR-kit alternatives as they are the ones that show the most positive reviews and have vibrant developer communities. The reason for choosing the different vendors is to allow for comparisons regarding the efficacy of these different solutions for different projects, especially given that VR is such a new and emerging field. Moreover, having multiple kits will allow multiple teams of students to simultaneously work on different projects. Initially, the VR kits will be used on undergraduate projects related to rehabilitating stroke victims, supporting brain controlled smart homes, and easier visualization for big data applications. Subsequently, many other types of projects can be explored based on student interest and progress on the above themes. I believe that the VR kits will prove to be an exceptional resource in the hands of our undergraduate engineering students to foster creativity, collaboration, and learning; allowing them to develop expertise in a new, exciting, and growing area.

I intend to use the VR kits right away for open-ended group projects in my "CS/ECE561: Hardware/Software Design for Embedded Systems" course (typically every offering of this course has at least 20 hands-on projects related broadly to the use of and design of technological solutions to benefit society) in Fall 2016. In the past this course has been taken by undergraduate and graduate students from Electrical Engineering, Computer Engineering, Mechanical Engineering, Biomedical Engineering, Mathematics, and Computer Science. I will also use these VR kits for new senior design projects starting from AY 2016-2017 that will include Electrical Engineering, Computer Engineering, and Mechanical Engineering undergraduate students. Lastly, these kits will also find use in independent study projects for undergraduate students in ECE.