

Using Student Projects for Recruiting Engineering Students
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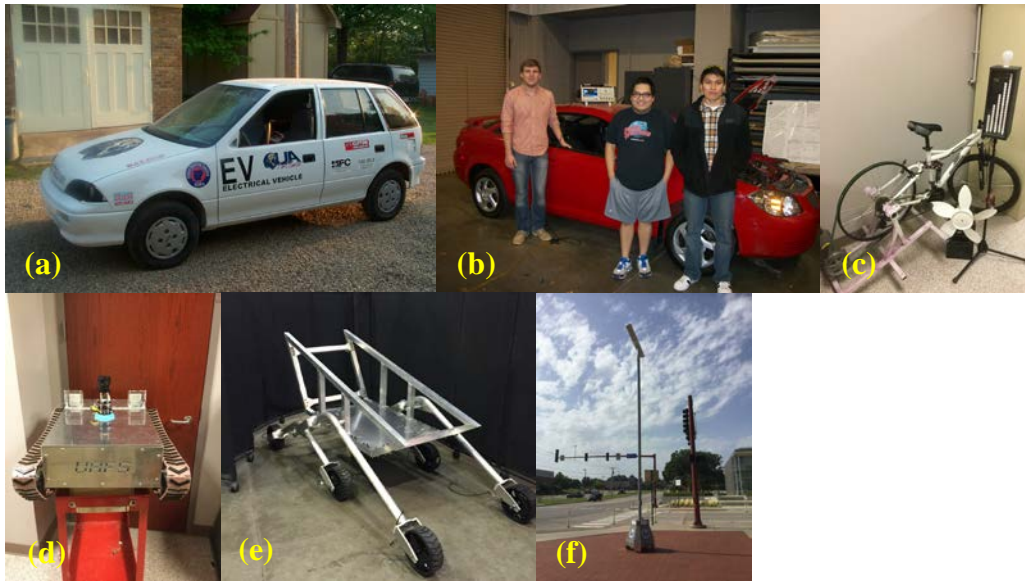


Figure 1: (a) This photograph shows the first electric vehicle built at UAFS; (b) this is a photograph of the second electric vehicle built at UAFS; (c) this is a bicycle powered generator built by first year engineering students; (d) this is an autonomous rover being built at UAFS; (e) this large rover is being constructed to transport one astronaut; (f) this is a photograph of a mobile streetlight constructed in 2017-18.

Figures 1 a-d show student led projects that are used to recruit high school students into the engineering profession. The projects are selected to grab a high school student's attention at the same time they can be designed and built by engineering students in their first two years of engineering school. These projects offer a dual benefit to the engineering department by providing quality demonstrations used in recruiting efforts and quality experience for those training to become engineering

Selecting a student led project involves three criteria: 1) costs associated with materials and equipment, 2) technical difficulties associated with building the project, 3) does the project grab the attention of an 18 year old high school student. 1) The UAFS engineering department usually budgets \$500 to \$1,000 for a student led project; this can vary if we involve outside donors. 2) The selected project must be able to be built using equipment found on the UAFS campus or possibly a local company that is willing to donate machine time. 3) Selected student led projects must pique the interest of potential recruits. Project that involve physical interaction or the use of their cell phone have proven to be very successful.

This poster will summarize six projects and explain the impact they have had on the UAFS campus and the student involved with them.



Abstract

Student led projects that are used to recruit high school students into the engineering profession have proven to be an effective tool at UAFS. These projects are selected to grab a high school student's attention at the same time they can be designed and built by engineering students in their first two years of engineering school. These projects offer a dual benefit to the engineering department by providing quality demonstrations used in recruiting efforts and quality experience for those training to become engineers.

Selecting a student led project involves three criteria: 1) costs associated with materials and equipment, 2) technical difficulties associated with building the project, 3) and ability to capture the attention of an 18 year old high school student. 1) The UAFS engineering department usually budgets \$500 to \$1,000 for a student led project; this can vary with involvement of outside donors. 2) The selected project must be able to be built using equipment found on the UAFS campus or access a local company who is willing to donate machine time. 3) Selected student led projects must pique the interest of potential recruits. Projects that involve physical interaction or the use of their cell phone have proven to be very successful.

This poster will summarize six projects and explain the impact they have had on the UAFS campus and the students involved with them.

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Background and Future Plans

The Electric Vehicle Project (EVP) was the first student designed project that was used for recruiting purposes. During the time the EVP was being funded, two electric vehicles were designed and constructed. Initially, the electric vehicles were being constructed for purely research purposes. As the project matured, these two electric vehicles were used for demonstrations at numerous middle and high schools. The feedback from these school visits was extremely positive and created excitement among exposed young students. In essence, the EVP research provided the impetus to tailor undergraduate engineering projects for use as a recruiting tool.

Since the beginning of the EVP, four more recruiting oriented projects have been completed at UAFS. Other projects discussed on this poster involve physical activity, cell phone use, and safety; each of these projects will be discussed in this poster.

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Figure 4: This photograph shows a large Mars rover being developed at UAFS. This rover is capable of carrying about up to 15 mls using controls similar to a zero turning lawn mower.

Figure 4 is a photograph of a large Mars rover that can be driven by one astronaut using controls similar to a zero turning lawn mower. All the electronics used on this rover are being developed at UAFS. The rover is based on a rocker-bogie design which ensures all 6 wheels are in contact with the ground at all times resulting in better traction. This project has drawn much attention from UAFS students. At this time it has not been used as a demonstration in local schools. Around one dozen UAFS students have contributed to this project.



Figure 5: This photograph shows a mobile streetlight powered by a solar panel.

Figure 5 shows a photograph of a mobile solar power streetlight that was designed and constructed by first year engineering students. The streetlight has a 3 day backup battery and is placed on a UAFS campus corner that is very dark at night. This street crossing is used by many students between dorm rooms and a parking lot. Over two dozen UAFS students have contributed to this project.

Figure 2 is a photograph of a Mars rover constructed by UAFS engineering students. This rover can be driven by using a laptop computer. The rover streams live driving video which can be viewed with a cell phone. Students are excited by using their own cell phones in the process of driving the rover. This project also highlights the use of microcontrollers and the advantages of programming. Over three dozen UAFS students have contributed to this project.



Figure 3: This photograph shows a bicycle powered electric generator. A LED speed indicator and fan are shown in the photograph.

Figure 3 shows a bicycle powered electric generator. This electric generator can be connected to several different power devices as shown in the photograph. The black stand is a LED speed indicator which increases as the bicycle is pedaled faster; this indicator uses an Arduino Uno which teaches the UAFS students how to program. The fan is turned by pedaling the bicycle and its speed is directly proportional to the pedaling speed. This teaches students about power generation and transmission. Students can physically sense this difference between when the fan is connected to the generator and when it is not connected to the generator by how hard they have to pedal. The bicycle is mounted to a student designed mobile base that can easily be transported to local schools for demonstrations. Over three dozen UAFS students have contributed to this project.



Figures 1a and 1b: These photographs show both electric vehicles used as research projects and in recruiting efforts.

Figures 1a and 1b above show the two electric vehicles used by UAFS for recruiting purposes. These vehicles are taken to local middle and high schools where students are given rides followed by a discussion of the technology used in constructing these vehicles. Several students participating to UAFS have mentioned these vehicles as a motivating reason for entering engineering. Over two dozen UAFS students have contributed to this project.



Figure 1: This photograph shows a Mars rover constructed by UAFS engineering students. This rover is controlled by a laptop computer and cell phone.