

- Title: Data Glove
 One of the difficulties in designing virtual environments is tracking user finger movements, and recently acquiring user bio-stats (e.g. heart rate). For finger movements, a widely used solution is a data glove. A typical data glove contains sensors that measure joint angles of a person's hand and force exerted on the fingertips. However, other glove-like sensors exist for measuring bio-stats such as a person's heart rate, skin conductivity, and skin temperature. This project would involve designing a data glove that would incorporate real-time finger bend sensing and force sensing, heart rate monitoring, and galvanic skin response monitoring in a compact, wireless fashion that does not impede the user's movement. The project would utilize Sun Spot wireless devices, which allow high-level prototyping of sensor-based projects. Java programming language experienced by at least one group member is required. In addition, familiarity with electronic circuits is recommended for most team members. Funds would be available to purchase the necessary equipment for this project, not to exceed \$500.
- Title: Conversion of existing mill to a electrical power generator
 The client wishes to develop designs for the potential conversion of a mill to provide part or all electrical requirements for a 4-room bed and breakfast hotel from a hydro-powered mini turbine. An existing mill (said to be about 25 Hp) has been operated since 1840 and is now used 2 days each week for about 4 hours, with surplus water even during the drought. The project will involve documentation of the water power available by surveying and assessing flow rates, evaluating the placement of a mini-turbine and evaluation of power storage and usage as well as maintaining the aesthetics of the current site.
- Title: Environmental Technologies Demonstration Facilities
 The leadership of 4-H in Georgia and the leadership at Rock Eagle would like to have the facility serve as a model for environmental technologies. Currently, there are several areas where erosion and stormwater management problems are evident on the campus. In addition, the facility is entering a new building phase where many of the cottages and the main dining hall are being replaced and this presents opportunities for incorporating new technologies. This project would include development of a comprehensive list of potential projects, prioritization of the projects, development of a long term plan, and detailed planning on at list one minor project to be implemented during the term.
- Title: Bike Share Program
 As gas prices continue to increase and the climate changes, people are beginning to turn towards alternate modes of transportation. Some use bikes, others walk, and even more use Athens Transit public transportation buses. In a city that is so bike friendly, the need for a bike share program like New York City, Denver, and many European cities is growing. Bike Share programs consist of public bikes that are available for citizens to ride to work, school, or just around town and then return to the most convenient bike share hub. This project is focused on the partial design of the Bike Share Athens project, in particular the /design of hubs, the location of hubs, and all related aspects of this project/. It is important that the designs proposed in this group integrate seamlessly with the senior design group designing locking mechanisms and computer programs for the locking mechanisms. Furthermore, this project should be designed and planned so that implementation of this project is feasible for a pilot run in the summer of

2009. While this project involves many aspects and different areas of engineering, Mayor Heidi Davison, County Commissioners, Bike Athens, Partners for a Prosperous Athens, Georgia Cycle Sports, and the UGA Cycling Club have already agreed to partner in such an undertaking as it is believed that this program will benefit Athens greatly.

- Title: Circular Motion Machine

A faculty member from the Lamar Dodd School of Art has sketch of motion machine that engages the use of cams, brass plump bobs, heating plates, water flow and other mechanical mechanisms. This project will engage the engineering student(s) with this faculty member in creating the artistic aspects as well as the technical aspects of the device and will involve the fabrication of a prototype.

- Title: Test Fixture for Bottle Handling Equipment

This project will involve the design of an easily reconfigurable test fixture for specifically-designed “bottle handling equipment” covering a range of capping system turret diameter dimensions (ranging from 320mm – 480mm pitch circle diameters). Powered rotation would be a desirable feature, as well as the ability to be configured in a “twin-turret” configuration. The test fixture should be adaptable to utilize the current, and previously developed, mounting and hold-down fixtures. Incorporating a functional method of storing the various change-parts in an organized and efficient manner is an associated goal. Lowest practical cost for the testing system is necessary.

- Title: Bulk-Delivery Cap Elevator System

Design of an “operator-friendly”, easily-activated lid-opening system for a Bulk-Delivery Cap Elevator System (BDC). Current machinery provides cap elevating systems that lift non-oriented caps that have been dumped into hoppers (bins) of various capacities (ranging from 12-120 cubic feet). Employing cleated belts, the caps are lifted to a higher elevation and transported across a plant, over various processing and packaging machines, into cap orientors adjacent to the capping machine. To prevent the entry of dust, dirt or other foreign matter onto the caps, the BDC are equipped with lids covering the bins. This project would be to design a lid opening system that would allow the bin cover to be easily opened to allow the manual loading of more caps into the bin. Goals for the design include low initial cost, minimal operator involvement, operator safety and low maintenance. Operation options include both “powered” and “manual” operation.

- Title: Cap Inspection-Rejection System

By means of appropriate sensors (including vision, color, metallic proximity, luminescent, or other detection criteria), caps would be inspected at speeds up to 1,400 caps per minute to assess their compliance with established standards. If those standards were not satisfied by any individual cap, it would be removed from the stream of caps and delivered into a “reject” bin. Cost minimization and a high degree of accuracy (99.6% reliability) are primary criteria.

- Title: Renewable-energy regeneration of milk coolers

There are over 2.5 million smallholder dairy farms in Uganda and the dairy market is separated into two main channels: an informal and a formal channel, which commands nearly 75% of the market. In the informal channel, the morning milk can be taken to markets because it is daytime

and people can safely travel. However, the evening milk is either wasted or processed into low-value products because it is highly perishable and cannot be kept fresh until the morning, when it is safe to travel (smallholders have no access to electricity and night travel is unsafe). This postharvest loss estimated at 50% is unacceptable and the development and deployment of a “bottom of the economic pyramid” solution is needed. Previously, students successfully reengineered a beer cooler to make it applicable to milk cooling at the smallholder level. The cooler is based on vacuum and zeolite adsorption cooling technology. They also developed and tested a charcoal-powered regenerator which, together with the cooler, constitutes the complete milk cooling system. In preliminary field tests, the customer has come to the realization that cooler regeneration in the hands of the farmer is unreliable and would like to explore centralized regeneration that serves a community of approximately 50 farmers.