



*Undergraduate
Research
Conference*

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Spring 2007 Structural Engineering Independent Study

Joseph A. Winkler

This independent research is on residential design in high seismic and wind areas of the United States. Blueprints of residential homes in subdivisions located in Conway, South Carolina were donated from Winkler Construction and these homes are being redesigned to resist wind pressures and seismic forces typical of coastal South Carolina. All gravity (dead and live) and other environmental loads (i.e., rain and snow) are also included in the study. Various elements of the structural system such as studs, headers, windows, and trusses, as well as various connectors throughout the home, are also included as part of the design. Every computation is performed in accordance with 2003 International Residential Code. The purpose of this study is to gain knowledge and experience in timber design which is not normally offered in traditional civil engineering programs.

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Detection of Humans Carrying Concealed Objects

Jeremy C. Webb, Rama Chellappa, Yang Ran

Computer vision methods for detecting humans carrying concealed objects on an ankle or around the midsection were studied. Data was collected, tested and a computer vision system was developed to “see” changes in human gait as a result of concealed objects. It was determined that concealed objects that affect the geometric symmetry in human gait can be recognized by this computer vision system. This work has applications in video surveillance. In particular, the use of computers to recognize individuals carrying concealed objects.

Autonomous Surface Watercraft

Jeremy C. Webb

Navigational charts are a critical tool to every mariner, whether recreational or commercial; however, they are revised infrequently. It is quite possible that channel conditions could change dramatically between revisions. Therefore, a cost-effective means of verifying and/or creating new navigational charts for rivers and lakes is crucial.

The objective of this design project is to produce a seaworthy autonomous surface watercraft capable of traversing, using a global positioning system, a specified portion of a body of water for collecting depth measurements. These measurements can be used for bathymetric chart generation.

The design can be broken down into three main areas: mechanical, software, and sonar. The mechanical aspect consists of the surface watercraft which will house and transport a sensor package, in this case sonar. A pontoon airboat design was chosen because of its stability, simplicity, and large secure area for the electronics necessary for automation and data collection. Software for autonomous navigation and data collection will be run on the Gene5312 PC-104 microcontroller. Algorithms for autonomous navigation will be based on previous work. Existing sonar technology will be used in order to obtain depth readings. Sonar was chosen because of its proven capability to provide distance/depth measurements.

From this project there will be the means to create and/or update navigational charts more often with less cost. Up-to-date charts can prevent unnecessary grounding accidents; which can cause damage to vessels and cargo, environmental hazards, personal injuries and even the loss of life.

A Particle Detector Based on Electron Tunneling

Unsuree Nawapong, Dr. Russell O. Hilleke

We have built a particle detector that is capable of detecting alpha, beta, and gamma particles without absorbing them. It works by measuring the change in tunneling current between a tip and a foil on which the particle exerts a force.

Adsorption of Sarin on α -Alumina surfaces

Richard Terrio and Dr. Michael J. Dorko

Sarin is a highly volatile and deadly nerve agent that has been declared illegal under both the Geneva Conventions and the Chemical Weapons Convention. It poses a continuing threat due to aging stockpiles and its use by terrorist organizations in recent years. Currently there is neither a cost effective nor efficient method of disposal for this chemical warfare agent. Despite its high volatility, sarin has the ability to remain on a surface making any release of the chemical a lasting danger. The adsorption and interaction of sarin on the surface of α -alumina (Al_2O_3) will be studied using Møller-Plesset Perturbation Theory (MP2) and Density Functional Theory (DFT). From the interaction data obtained, it will be possible to determine the binding energy and geometry of sarin on α -alumina as well as possible decomposition pathways. This knowledge will be useful in developing sensors and coatings used for the detection and destruction of sarin.

Design of a Heliostat

Miguel Benitez

The project that is most fertile for advancing interest in science among Citadel cadets is over four stories tall upon completion, however, will take less than two rooms of space. The finished product will be a Heliostat, a device which by design can play many roles but for this case will capture an image of the sun in real-time, for over 10 hours each day that can be viewed with the naked eye, and have enough detail to discern sunspots, flares, and possibly other occurrences at the same time. The plan is to install a set of mirrors with the first rotating to compensate for the spin of the earth, the second mirror would direct the reflected light down a 12 meter shaft, and the third would angle the light onto a wall or some sort of viewing display. The only thing completed so far would be a concept, a few measurements taken, and a trip to Arkansas to view a completed design. The next step is to start on a concrete design with necessary materials, getting with professor Dion to take further measurements, as well as the rather illustrious task of working on the project. However, the true reason that the project has not truly moved forward is the very high cost associated with the project: around 15000. Therefore, it would be necessary to come up with the funds, at some point in the future, but not at the moment. The most important part of the project now would be to have a proposal by the end of next week.

Shear and Bending Moment Diagrams Made Easy Using the "Continuous Segment Method"

Christopher Bolding, Wes Wilson, John Greenan

This poster presents the work of three students on developing a student manual for learning structural analysis. The manual expands on the work by former students (Josh Boggs and Ray Foltz) and fully presents a novel and unified approach for analyzing beams and frames that is different than methods typically presented in structural analysis and mechanics of materials textbooks. The "Continuous Segment Method" utilizes an organized bookkeeping methodology that results in a simplified means for solving structural analysis problems by direct integration. The student manual presents various application examples for beams and frames and compares the results to those obtained from commonly used computer software programs.

Variations Seen in Optical Region Photometry of Four Magnetic Chemically Peculiar Stars

Jason Sutton, Dr. Saul Adelman

Photometric observations obtained with Four College Automated Photoelectric Telescope (FCAPT) of BN Cam, EP Vir, FF Vir, and HD 184905 were investigated. This 30" telescope is at the Fairborn observatory which is a hour's drive to the East from Nogales, AZ. It obtains observations for astronomers and their students at The Citadel, College of Charleston, and Villanova University. Measurements were obtained using the four Stromgren Photometric System: u (ultraviolet), v (violet), b (blue), and y (yellow) whose bandwidths are of the order 220 Angstroms.

These stars are magnetic Chemically Peculiar Stars which are similar to late B to early F normal stars except that they have detectable magnetic fields. Hydrodynamic type processes in their atmospheres and the outer parts of their interiors produce abundance variability across their stellar surfaces. These affect the emergent light fluxes and as the stars rotate one sees magnetic, spectral, and photometric variability as for each star its axis of rotation is at an angle to the magnetic axis.

For BN Cam, EP Vir, FF Vir, and HD 184905, FCAPT observations in recent years and those a decade ago are available. These were organized and assembled to enable improving the stars' periods and to see if there were any color variability with time. After the periods were found, light curves were constructed and studied. Both FF Vir and HD 184905 were found to be constant while EP Vir might have variable light curves. The study of BN Cam is in progress.

The UnderDawgs' Aircraft Weight System

Eric Steele, Brad Bruggemann, Thomas James, Beau Parmer

There have been numerous reported accidents involving aircrafts operating in overweight or unevenly distributed conditions. Currently there is no accurate way of solving the problem of an overweight or undistributed aircraft. The current method of using an average weight for males and females is unacceptable and outdated due to the fact that there can be no standard weight for passengers. A problem occurs when ten professional football players and ten grade school boys are treated the same when airlines figure the weight of planes before takeoff. The UnderDawg's Aircraft Weight System proposes to solve this problem in an inexpensive and easily producible manner. The system will allow aviators to operate an aircraft in a safer and more efficiently.

The Aircraft Weight System will give airport personnel access to accurate, real time readings of the weight and balances of the aircraft as it is boarded. The system will have a user input which specifies the type of airplane, and should have the ability to adjust the information to that particular plane. The scale will weigh each passenger and any carry-on luggage, and send this information to a computer which will add up the weights and transmit the sum to the pilot. The system will also evenly distribute the weight around the wings, and will subtract the weight of passengers unloading from the airplane.

Expression of Hyaluronic Acid and Versican Is Altered Significantly in the Premalignant Stage of Oral Squamous Cell Carcinoma: Study with an Improved Mouse Model of Chemical Carcinogenesis.

Ryan Brown and #Mikki Beon, Ph.D.

#Dept. Medicine, Medical University of South Carolina

Purpose: Human oral squamous cell carcinomas (SCC) can be lethal. Five-year survival is approximately 50%. Hyaluronic acid and versican expression was studied in a mouse model by following SCC development. The 4-nitroquinoline 1-oxide (4NQO)-induced chemical carcinogenesis model was ideal for our study because tumors develop gradually becoming malignant. However, animals typically suffer poor health and a high death rate due to the lengthy carcinogen administration. Our goal was to improve the animal model of chemical carcinogenesis.

Experimental Design: We exposed C57B1/6 mice to 20-50 µg/ml of the carcinogen, 4-nitroquinoline 1-oxide (4NQO), for 4 months through their drinking water supply. Mice were examined clinically and by immunohistochemistry for the development of tongue lesions and the expression of ECM molecules. When animals had oral lesions the solid diet was supplemented with a protein/fat enriched soft dough which improved health and survival rates.

Results & Conclusions: 4NQO consistently induced oral lesions. Tongue lesions occurred sequentially and multi-focally, starting from hyperkeratosis, premalignant dysplasia, carcinoma in situ, to invasive carcinomas. Throughout the study, the nutrition-fortified diet effectively prevented mice from weight loss and improved the survival rate 3-fold. Hyaluronic acid and versican expression was substantially elevated in premalignant, dysplastic tissues, and over-expressed in the stroma. Results are consistent with the study using human tissues (Beon et al, 2006), suggesting that the remodeled ECM micro-environment might promote tumorigenesis/carcinogenesis of epithelia. Plus, it demonstrates that the 4NQO-induced mouse tumor model serves as a valuable tool to study the ECM micro-environment undergoing a dynamic alteration in tumorigenesis/carcinogenesis.

Population Connectivity among Barnacles Commensal with Florida Manatees

Margaret L. Bryan and John D. Zardus

Barnacles (Cirripedia) are marine crustaceans with shells that cling to rocks, ships and even other organisms. By using slender appendages, they passively filter-feed in the water. During the early stages of life, barnacle larvae are adrift, and swim with the currents before finding a place to permanently attach or settle. While many barnacle species settle on inanimate objects such as ship hulls, wharf pilings, sea walls or floating logs some are specialized to live on turtles, whales, and many types of shellfish. In this study we investigated patterns of population connectivity in the manatee barnacle, *Chelonibia manati*, specialized for living on the West Indian Manatee, *Trichechus manatus*.

The West Indian manatee is a large plant-eating mammal found in warm Atlantic coastal waters. Their physical characteristics include front flippers, a broad flattened tail, a cleft lip that hangs over the mouth, and tough gray skin with fine hairs thinly dispersed over their bodies. An adult manatee can reach a length of 3-4 meters and a weight of 550 kilograms. Due to habitat alteration through residential and commercial development, encroachment and pollution, manatees are listed as an endangered species and are protected by law.

The difficulties posed for larvae of manatee barnacles in finding a host are increased by the decline in manatee numbers. Using DNA of barnacles collected from stranded manatees, we examined the degree of relatedness in populations around the Florida panhandle to test the hypothesis that genetic variation in the barnacle correlates with limited exchange of manatees among regions.

Quantitative Analysis of Ca, Fe and K in Multi-Vitamins

Aaron T. Shaw, Dr. Suzanne T. Mabrouk

How accurate does a dietary supplement label have to be with respect to the amount of macro-minerals and trace elements it contains? The purpose of this project is to determine if the levels of calcium, iron and potassium in the multi-vitamins are the same as the levels published on the bottles. The analysis of the aqueous solution of these multi-vitamins will be conducted according to EPA guidelines as set forth in The Standard Methods for the Examination of Water and Wastewater. The analyses will be conducted with flame atomic absorption with ionization suppressors. These results will be compiled to create a junior-level chemistry major lab for the course CHEM 302, Instrumental Methods.

The National Academy of Sciences has published dietary Reference Intakes (DRIs) and Tolerable Upper Intake Levels (UL) for the macro-minerals and trace elements of the vitamins for the different sexes and age groups.

Calcium is needed for muscle contraction, and blood vessel contraction and expansion. Iron is an essential component of proteins where it is involved in oxygen transport and for the regulation of cell growth. Potassium is important in the transmission of nerve impulses, and the synthesis of nucleic acids. As indicated here, macro-minerals have beneficial health benefits, but there are also negative health effects.

Future research will be conducted on sample preparation to mimic the digestion of multi-vitamins in the human body. The digestion of the analyte is important, because some of the coatings are water insoluble and can affect the introduction into the analytical instrument.

Storage and Generation of H₂ Gas from Hydrocarbons Adsorbed on Pt / Mg Alloy Surfaces

Cody Sandquist and Dr. Michael J. Dorko

Storage of H₂ under the surface of metal alloys has potential application in fuel cell systems and in metal hydride batteries. The goals of using metal alloys for generation and storage of H₂ gas derived from hydrocarbons are to create a light-weight system with a high H₂ storage capacity that is functional at temperatures lower than 100°C. An alloy composed of Pt/Mg can provide a material that meets the desired requirements of generation and H₂ storage for use as a fuel. The adsorption and interaction of methane and methanol with alloys of varying ratios of Pt and Mg will be studied using Møller-Plesset Perturbation Theory (MP2) and Density Functional Theory (DFT). The possible overlap of the valence band of the alloy with the LUMO of the adsorbates will be investigated to determine which alloys are best at weakening C-H and O-H bonds to generate subsurface hydrogen atoms.

Dissipation of Energy in Structures Due to Earthquakes

Mathew C. Butsick, Steven J. Fulmer, Dr. Timothy W. Mays

Design criteria for bridge foundations as well as pier and wharf type structures are based on a performance driven design procedure that allows the design professional to detail piles based on their anticipated level of inelastic behavior during an anticipated earthquake. More specifically related to this study, the design professional provides an appropriate amount of spiral reinforcing to ensure that plastic hinges which develop in the pile are capable of adequate rotation as required by a pushover or time history analysis. It is often assumed that pushover results are conservative as compared to those obtained from time history analysis. However, experimental testing of precast prestressed piling has shown hysteretic curves are pinched in many instances and the loss of energy dissipation may make pushover analysis non-conservative for design of such structures. The purpose of this research is to analyze an actual bridge in Dorchester County with pinched and fully developed hysteretic curves using time history analysis and to compare these results to those obtained from pushover analysis to determine the applicability of the method.

Rapid Analytical Methods for Determining Toxins Associated
with *Trichodesmium thiebautii*

Lisa M. Bydairk, Dr. Kevin Crawford

Blooms of the marine cyanobacteria, *Trichodesmium thiebautii*, result in toxin(s) that can be harmful to both humans and wildlife. *Trichodesmium* is one of the largest nitrogen-fixers in the marine environment and is thought to be a major source of new bioavailable nitrogen in the ocean. The toxins associated with the blooms have been linked to a number of health effects, the most well known being an illness called Tamandare fever. Respiratory irritation, muscular pain, and a rash are common symptoms associated with exposure to the toxin. The appearance of these toxins corresponds with the appearance of *Trichodesmium* blooms in the area. Recently, we have made significant progress in the isolation and identification of chemicals associated with blooms that cause toxicity to mammalian cell lines. The ability to rapidly determine the presence of *Trichodesmium* toxins in marine waters can be beneficial to limiting the human health effects. The current processes of determining the presence of the toxins are long and involve numerous instrumental procedures. We are developing a means of identifying the presence of *Trichodesmium* toxins that can be used by boats at sea using raw samples. We will report on our efforts to develop an efficient and reliable method of detection of the *Trichodesmium thiebautii* associated toxins.

Bullying in the Internet Generation:
Exploration of “Cyber Bullying” in Middle School Students

Benjamin R. Pettis, Conway F. Saylor, PhD

Bullying is a growing societal concern. This study examines student-reported rates of on-line (cyber) bullying relative to more traditional forms of verbal and physical bullying and examines potential demographic correlates of internet bullying. Subjects were 179 middle school students (grades 6-8, aged 11-15, 48% male, 77% caucasian). whose parents completed IRB-approved consents and questionnaires. Consenting students completed multiple measures including student observations of school bullying (SOSB), and the Activities and Beliefs Questionnaire (ABC). Preliminary analyses of the first 60 students' report on the SOSB revealed differences in rates of the three types of bullying. Students described verbal/social bullying as the most common form at their magnet middle school of the arts: 30% of respondents said girls did this at high rates and 25% said boys did this at high rates. High rates of physical bullying were mainly attributed to boys (23%) versus girls (0%). In contrast, high rates of online bullying were attributed mainly to girls (17%) versus boys (2%). Further exploration revealed that having access to a family computer did not increase rates of self-reported online bullying but that students who have a “MySpace” page were more likely to say they were bullied online, $t(55) = -2.58$, $p < .01$. Additional analyses in full sample of 179 students will allow for further exploration of this relatively new form of bullying relative to gender and age.

INVESTIGATING BULLYING: EXPLORING THE RELATIONSHIP OF GENDER AND AGE.

M. Catherine Park & Conway F. Saylor, Ph.D.

The purpose of this study was to examine the relationship of gender and age in self-reported bullying of students in elementary schools (ES) and students in middle school (MS). Students in MS completed two measures by Reynolds (2003)- the Bully Victimization Scale (BVS) and the School Violence Anxiety Scale (SVAS) while those in ES only completed the BVS. It was hypothesized that girls would report significantly more bullying and victimization than boys in both MS and ES. In subgroup analyses MS girls admitted to significantly more bullying behavior than MS boys, $t(69)=-2.62, p<.02$. MS girls tended to report higher overall anxiety about peer victimization at school, $t(70)=-1.89, p<.07$. Girls were also significantly more likely to report fear of peer harassment, $t(71)=-2.72, p<.008$. Boys were more likely to admit to individual acts of physical bullying, "I beat up someone". In the MS sample that completed the SVAS, girls were significantly more likely to report diverse worries about safety and victimization at school including having bad things happen, being "picked on or worse", being made to do things they did not want to do, and having mean things or jokes about them. While overall ES and MS girls and boys reported comparable levels of bullying and victimization, closer analysis revealed that MS girls are either more anxious about specific kinds of victimization or are more likely to admit to their fears. Furthermore girls may participate more in group harassment of their peers whereas boys may engage in more individual physical attacks.

Study of the reaction of NO₂ with carbon nanotubes

Tzu-Hung Chu, Dr. Holly Bevsek

Carbon nanotubes are a focus of intense study because of their unique physical and chemical properties. One of the most intriguing properties of carbon nanotubes is their electrical conductivity which can be highly sensitive to the presence of functional groups and adsorbed species. This finding has driven researchers to focus on understanding the surface chemistry of carbon nanotubes with small molecules for the development of nanoscale chemical sensors. To further this understanding, the reaction of carbon nanotubes with NO₂ will be investigated at high and low pressures using diffuse reflectance infrared Fourier transform spectroscopy (DRIFTS). Possible reaction products and trapped or adsorbed species will be identified by their absorption frequencies while reaction rates will be determined by monitoring product growth as a function of time. This information together with estimates of product binding energies will be used to develop a mechanism for the NO₂-nanotube reaction.

Young Adult Choices of Heroes: A National Sample of “MYSPACE” Sites.

Caleb J. Dispenza & Conway F. Saylor, Ph.D.

Hero(ine) choices reflect both individual characteristics and cultural influences. This study uses MySpace.com™ (MySpace) to gather a nation-wide survey of hero selections. The purpose of this study was to examine young adults' choices of hero(ine)s and their relationships to gender, race, education, religion, and geographic region. Using an IRB-approved protocol, trained undergraduates gathered data from 320 MySpace sites posted by users aged 18-22. 40 males and 40 females were selected from 4 regions of the US. Ethnically, the resulting sample was self-identified as follows: 61% Caucasian, 15% African American, 15% Hispanic, 3% Asian, 2% Native American, and 4% not listed. In all 174 (54%) posted names of hero(ine)s. There were no differences in listing heroes vs. not by gender, race, or region. However, Chi Square analyses revealed that the subjects who were listed in higher education were significantly more likely to name heroes than those who were not, $\chi^2(3, 320) = 11.95, p < .008$. Significant gender trends were noted in choice of heroes vs. heroines $\chi^2(4, 174) = 14.34, p < .006$. Male subjects were significantly more likely to name male heroes (51%) or mixed gender groups, such as “parents” (35%). Female subjects named male heroes (39%), female heroines (30%), and mixed groups (29%) about equally. Also, religious differences were noted $\chi^2(12, 174) = 21.80, p < .04$.

Child Heroism Concepts: Relation to Parent Concepts and Family Experiences

Nicholas M. Mengis, Dr. Conway Saylor

The purpose of this study is to describe middle school students' appraisal of potentially heroic acts, to examine whether they are similar to those of their parents; and to evaluate whether experiences such as family meals and recreation are related to differences in appraisal of heroic acts. Participants in this study were 179 students aged 11- 15 from a public magnet middle school of the arts (grades 6-8). Preliminary analyses with the first 60 students revealed several correlations between the parent appraisal of heroic acts (HA) and child appraisal of heroic acts (HAC). For example, children whose parents rated community service, working in teaching and health care areas and taking care of one's family financially as more heroic were more likely to view working to support one's family as more heroic. Children whose parents rated being an emergency responder and doing community service were also significantly more likely to rate serving in combat as more heroic ($p < .05$). T-tests revealed that children who report eating dinner with their families regularly are significantly higher in their appraisal of several heroic acts, including serving as an emergency responder [$t(58) = -1.99, p < .05$], helping disaster victims [$t(58) = -2.03, p < .05$], and serving in combat [$t(58) = -2.58, p < .02$]. Additional analyses with data from all 179 students will be conducted and reported in the poster presentation.

The characterization of green rod, red cone, and violet cone opsins in *Xenopus laevis*

Brent McCarragher, Dr. Alix Darden

Introduction: Opsins are membrane bound G-coupled receptor proteins which interact with a chromophore to initiate visual transduction. There are two types of photoreceptors; rods and cones which mediate dim light vision and color vision, respectively. The life stage at which these opsins are detectable helps to understand the visual development of an organism. Research was conducted to characterize *Xenopus laevis* opsin development, specifically green rod (XGN), red cone (XRC), and violet cone opsins (XVC). *Methods:* Polyclonal antibodies to green rod, red cone, and violet cone opsins were made in rabbits. Western blotting was used to detect these proteins using their specific antibodies. The opsin proteins were isolated from adult and tadpole *Xenopus* retinas. Primary and secondary antibody concentrations were optimized. Western blotting was performed and then exposed to the optimized antibodies; the specific opsin was visualized using chemiluminescence. Antibody specificity was verified by neutralizing the antibody with specific opsin peptide. *Results:* The results show the optimized antibodies binding in adult opsin samples. The tadpole opsin samples differed slightly in molecular weight from the respective adult opsin. Research is continuing to determine the specific stage at which these opsins are detectable using western blotting to help characterize *Xenopus laevis* opsin development.

Evidence of Histone H3 in the Mitochondria

Bryan Everitt, Dr. Kathy Zanin

Histone H3 protein is important in stabilizing nuclear DNA in eukaryotic chromosomes and also helps regulate gene expression. This protein was believed to be absent from mitochondria and thus to have no role in the wrapping or regulation of mitochondrial DNA. However, our studies indicate that, in fact, Histone H3 protein is found in the mitochondria. Using differential centrifugation we isolated nuclear and mitochondrial organelle fractions from *Brasica oleracea*. Western blots of both organelle fractions using a polyclonal antibody directed at the highly-conserved C-terminus of Histone H3 identified Histone H3 in both organelles; Histone H3 proteins in the mitochondrial fraction showed a slight difference in molecular weight when compared to nuclear histones. As a control we blotted the same two organelle fractions for Fibrillarin, a protein known to be specific to the nucleus. Blots showed Fibrillarin only in our nuclear sample indicating that our mitochondrial fraction was free of nuclear proteins. We also western blotted both organelle fractions with an antibody to Histone H1, but that Histone was only found in the nucleus. We are currently in the process of isolating mitochondrial Histone H3 using Ionic Exchange Chromatography; once we have purified Histone H3, we will submit the protein for N-terminal amino acid sequence analysis to verify the identity of the protein as true Histone H3.

Assessing the fine scale spatial genetic structure of *Lindera melissifolia* in North and South Carolina.

ANTHONY GIUNTA, Jr., DANNY J. GUSTAFSON, DENNIS DEEMER¹, AND CRAIG S. ECHT¹. USDA Forest Service¹

Lindera melissifolia (Walt) Blume is an endangered perennial dioecious clonal shrub that occurs in seasonally flooded wetlands located in 1 – 4 counties in eight states (AL, AR, FL, GA, MO, MS, NC, SC). Microsatellite genetic markers were used to estimate the number of genetic individuals within and among populations in North and South Carolina. All populations showed extensive genotype clones and each population contained essentially unique genetic combinations. The South Carolina site in Beaufort County and both North Carolina sites (Pondberry Bay, Big Pond Bay) were considerably more genetically diverse than all the populations of the Francis Marion National Forest (SC), however even these diverse sites contained less than 18 genetically distinct individuals from the 52-71 randomly sampled stems. Based on the lack of genetic variation and no observed female flowering plants in the South Carolina populations, we recommend a genetic rescue management program that includes bringing in female plants from North Carolina to augment the South Carolina populations and promote sexual reproduction.

Heroism Concepts and Bullying in Female Adolescents

Lee C. Maxwell, Dr. Conway Saylor

The problem of bullying is of broad concern, especially as “bullying” is no longer limited to males exhibiting physical aggression and harassment. The purpose of this study is to document the methods and frequency of female bullying behaviors in 6th-8th grades and to consider whether having hero(ine)s of various types and genders relates to girls’ bullying behavior. Subjects will be 93 girls 11-15 years of age from a public magnet middle school of the arts, 30% 6th grade, 36% 7th grade, and 34% 8th grade. Students whose parents consented to an IRB-approved protocol completed 2 bullying scales (BVS and SOSB) and the Heroic Acts for Children (HAC). Descriptive statistics will be used to examine the rates and types of female bullying reported on BVS and SOSB measures by grade. In addition the bullying behaviors of girls who list female role models and hero(ine)s will be compared to those who do not. Similarly, girls who more highly value certain heroic acts will be compared to their female peers to examine potential connections between heroism values and bullying in adolescent girls.

Traffic Engineering Research in South Carolina

Timothy J. Lewis, Dr. Jeff Davis

Junior year I took my first transportation engineering class and developed an immediate interest in the subject. My interest in transportation led to me seeking options to do work outside of the classroom. The first opportunity came in October of my junior year which would lead to a summer internship in which I worked on traffic engineering analysis for West Carolina Avenue for the town of Summerville. The project consisted of researching engineering methods, transportation standards, and analysis techniques applied during data collection, operational analysis, summarizing important recommendations, and making presentations to government leaders. Another project was a scenic corridor study in conjunction with the local government on Bohicket Road. The Bohicket Road project involved conducting highway safety and crash analysis, capacity and level of service, an inventory of the corridor conditions, and preparation of materials for a policy report based on engineering research and analysis. A third project involved research on rural crashes in South Carolina communities in conjunction with Clemson University. For that project I conducted data collection and evaluation of site conditions at various rural locations across the state which is experiencing roadway safety problems. The technical results of these projects will be summarized in my presentation. Conducting this engineering research has helped me choose transportation engineering as my career path.

Radio Telescope

William L. Harrell

Have you ever wondered what the storms on Jupiter or the solar ray bursts on the Sun sound like? The device that I am building; a radio telescope; can listen to these out of the world sounds. My radio telescope does not use a dish. It uses a different mechanism to receive radio waves from its two primary targets, Jupiter and the Sun. The telescope that I am using is a kit purchased from NASA named the Radio JOVE telescope. My telescope looks much like two clotheslines when it is put up. The antennas measure approximately 20 feet long and are separated by about 20 feet. These cables are connected to a receiver which is then hooked up to a computer. The computer using SkyPipe software is then able to display the waves and record them so that they can be analyzed and listened to. The real beauty of this project is not only that I am learning valuable electronic and astronomy skills but also that this project will be able to be used for many years. The astronomy classes and some of the intro level physics classes will be able to incorporate my project into their curriculum and use it to understand what the teachers are talking about. One of the best ways to learn is to see something working and happening. Giving students the opportunity to take data of their own will help to spark interest in the subject.

Sleep Problems In Children On Medication For ADHD

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The purpose of this study was to compare children receiving pharmacotherapy for ADHD who reported sleep problems versus those reporting no sleep problems. All sleep problems were reported subsequent to first medications for ADHD. In this IRB-approved study, potential subjects were general or developmental pediatrics clinics at MUSC. Review of 3,221 records revealed 388 eligible patients aged 6-12, with ADHD diagnosis, and receiving medication targeting ADHD. Of qualifying subjects, 25 subjects of each gender and clinic were randomly selected. Seventeen of the 100 Children were categorized as having “sleep problems” based on reported sleep problems found in any clinical records over a 24 month period. Chi Square (χ^2) and t-test analyses revealed a number of differences in children with ADHD who had sleep problems (SP) and children with ADHD who had no sleep problems (NoSP). The children in the SP group were significantly more likely to be white, to receive care in the developmental pediatrics specialty clinic, to have a co-morbid psychiatric disorder, and to be on more than one stimulant simultaneously ($p < .001$). There was a trend toward male gender ($p < .06$), with 24% of the boys and only 10% of the girls (all with ADHD) having SP. In a sub-sample of 34 subjects (17 SP and 17 NoSP matched by clinic, gender, ethnicity, and age within one year) there was still a significant difference in days to subsequent follow-ups ($t(98)=2.64$, $p < .01$) and in poly-stimulant use, $\chi^2 = 3.78$, $p < .05$.

The Sofa Kings

Shaun Chronister, Douglas Knapman , William Mohseni , Dr. Jason Skinner



1. Objective or Goal. The objective was to highlight the electrical engineering department of The Citadel to anyone with a computer in a user-friendly enjoyable way.
2. Method and Materials. The selected method was a robot stationed on Grimsley Halls 3rd floor. The robot is Internet controllable through a webpage providing near real-time video feedback. The LanBOT uses split channel communication links for control signals and video feedback. The user computer communicates control commands through the Internet to the server, which passes the commands via 2.4 GHz Bluetooth to the LanBOT Board of Education (BoE) basic-stamp. The BoE interprets and sends control signals to the motor controller, which provides electrical power for turning gearmotors at 50rpm moving the LanBOT forward, backward, left, and right. A radio frequency (RF) camera transmits a video signal at 20 frames per second (fps) over a 1.2 GHz RF link to an RF receiver connected to a video frame grabber. The video frame grabber converts the signal from analog to digital, which is connected to the server and sent to the user computer. A LabVIEW virtual instrument file is used for control interfacing. A 12V DC battery provides power. The LanBOT travels approximately 1.5 ft/sec on 6.75” diameter wheels attached to 4 independently driven gearmotors mounted to an aluminum chassis with a steel cover upon which the 1.2 GHz RF camera is mounted.
3. Results. The LanBOT continues testing and demonstration, and has proven fully functional.
4. Discussion/Conclusions. The project is a success. The process included team building, design, scheduling, documenting, and reporting with each design phase.