Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 9:00 – 9:30 a.m.

Title: Electronic Stethoscope

Department of: Electrical & Computer Engineering

Project Participants: Jorge H. Andrade, Jared Gordon, and William Pentecost

Instructor: Dr. Paolo Ginobbi

Faculty Advisor: Dr. Ebrahim Saberini

Abstract:

This project combines a broad spectrum of technologies and engineering fields and focuses those technologies mainly on one of the most important organs in the human body, the heart. An electronic stethoscope is a device used to capture the sounds from the heart and electronically amplify, filter and record them, thus, facilitating a better diagnosis by a qualified professional. This device is designed to filter out background noise as well as unwanted frequencies and is capable of displaying some basic characteristics of a heartbeat's waveform. The professional utilizing this device is able to store the waveform for later analysis or transfer it to a computer system for further processing of the signal. By electronically capturing and enhancing the signal, the electronic stethoscope delivers a higher quality sound wave than a conventional acoustic stethoscope. This enables a professional performing auscultation to detect heart sounds that might not be heard with a conventional stethoscope.

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No Photo Submitted

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 9:15 – 9:45 a.m.
Title: Propane Tank Scale
Department of: Electrical & Computer Engineering
Project Participants: Robert K. Leahy and Allen Reed
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Daniel Cook

Abstract:

This project is to design and build a scale to measure the amount of propane remaining in a barbecue grill tank based on weight.

Currently, the main device sold for measuring the propane is a pressure gage mounted on the discharge of the tank, which reads the pressure of the propane inside the tank; however, this reading remains the same until the tank is empty.

By utilizing a load cell, amplifying the signal, analyzing it with a microcontroller and displaying the percentage of propane remaining, the scale will inform the griller of how much propane is in the tank and when the tank should be refilled.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 9:30 – 10:00 a.m.

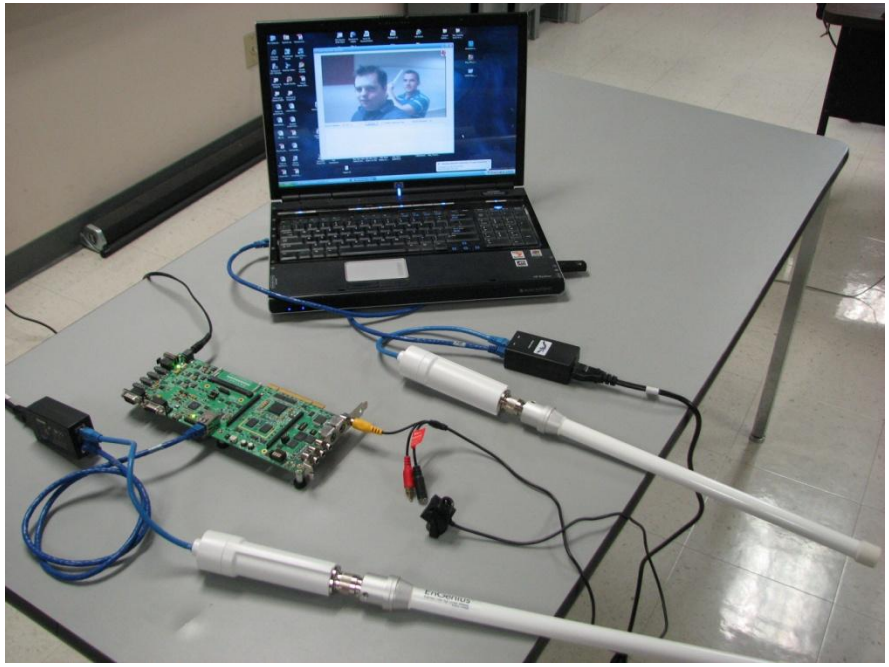
Title: iSpy: Video Transmission

Department of: Electrical & Computer Engineering and Computer Science

Project Participants: Kyle W. Hansen and Michael P. Thorton

Instructor: Dr. Paolo Ginobbi

Faculty Advisor: Dr.Angelo Yfantis



Abstract:

Wireless video surveillance is in high demand in several industries, including media, security, and the military. The purpose of this project is to implement the core components of a video capture and transmission system. This will serve as a proof-of-concept and foundation for ongoing research and development for a low cost, portable surveillance device. In particular, images taken by a camera are encoded and compressed, then transmitted via wireless Ethernet to a client computer where the captured video is shown in real-time.

The prototype device is implemented using the Texas Instruments DM6437 DSP Evaluation Module. This board includes a Digital Signal Processor (DSP) as well as video decoding and encoding circuitry, Ethernet transmission circuitry, and other supportive sub-systems. The DSP is programmed via JTAG using the C programming language, and is responsible for processing the video data coming from the camera so that it may be packaged and transmitted to the client computer. The client software on the receiving end of the transmission is written in C#.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 9:45 – 10:15 a.m.
Title: Chocolate Temperer
Department of: Electrical & Computer Engineering
Project Participants: Rapheal D. Hicks and Vincent Poteat
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Bill O'Donnell

Abstract:

Our Senior Design project, a chocolate temperer, is an apparatus for continuous tempering of liquid chocolate. It relates particularly to the preparation of tempered chocolate for use in coating applications requiring continuous flow of chocolate . There's a problem that exists in the market concerning the cost of these devices. Prices currently range from $280-$2500 and mostly cater to commercial consumers. Our product is meant to be low cost with a price tag of around $150 and is meant to target the everyday consumer.

The device will only have the most basic functions needed to temper chocolate properly. The chocolate tempered will wither be white, milk or dark chocolate with each having a unique temperature curve. It will increase and decrease the temperature automatically based on the temperature of the chocolate. The temperature is detected by a sensor meant to send data to a microcontroller providing information that allows our device to increase or decrease the temperature accordingly via a solid state relay. Because our chocolate temperer is targeting the everyday consumer every component chosen for out project was done so with the price in mind.

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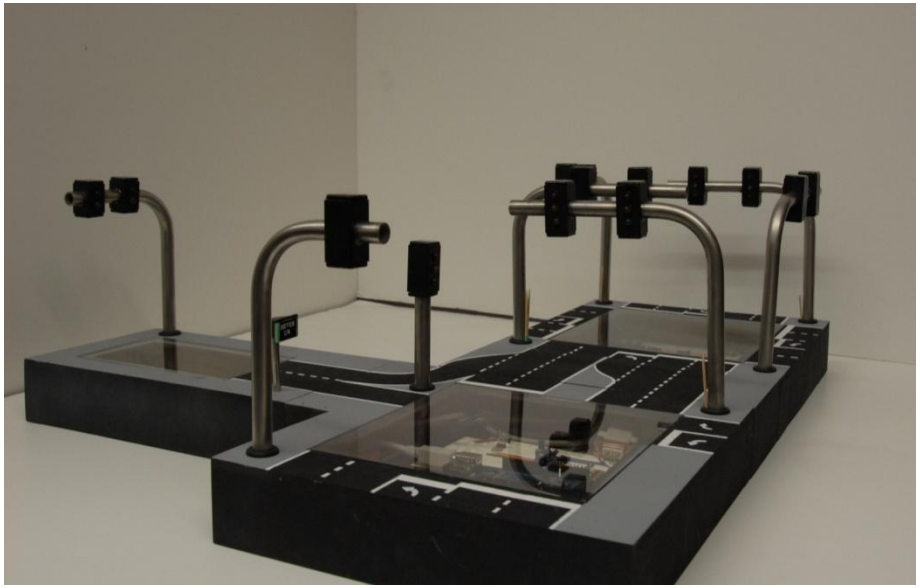
No Photo Submitted

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 10:00 – 10:30 a.m.
Title: Integrated Traffic Control
Department of: Electrical & Computer Engineering
Project Participants: A. Kyle Donohue, Jin Kwon, and Bruce Moore
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Pushkin Kachroo
Community Mentor: Mr. Carl Magnuson and Mr. David Crisler



Abstract:

Efficient traffic management affects our everyday life in numerous ways. Americans waste many hours in their vehicles each year due to poorly managed traffic control systems. Along with lost time, a poorly managed traffic system can contribute to monetary losses. Well-coordinated traffic systems have the ability to reduce these losses as well as the pollution produced by drivers sitting in traffic.

Through the development of system analysis tools, traffic engineers have the ability to maximize the efficiency of such systems. These tools can be used to test controller settings and algorithms before they are placed into service.

To examine the benefits of efficient traffic management, we have developed a model consisting of a four-way intersection, freeway intersection, and a ramp meter in which a communication link and decision making capabilities are in place.

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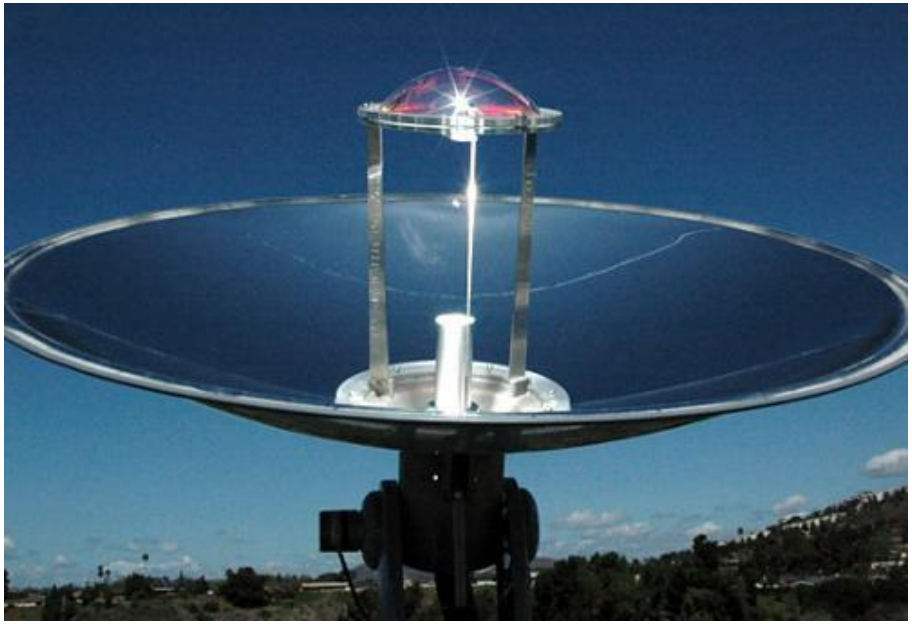
Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 10:15 – 10:45 a.m.
Title: Solar Tracker
Department of: Electrical & Computer Engineering
Project Participants: Herb Akinyele, Sean Andersen, and Justin Williams
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Paolo Ginobbi



Abstract:

The Solar Tracker is a motorized parabolic mirror that concentrates the sun's rays into a fiber optic cable. This light can be transmitted to provide natural light for various applications. Bypassing the enormous power loss inherent in converting light energy to electrical energy, the dish is a viable source of renewable energy.

In order to maximize the amount of energy captured by the dish, it needs to continually direct itself towards the sun. Using motors and a custom built controller, we have added the capability to control the exact position of the Solar Tracker. As the sun moves across the sky every day, our controller calculates its position and the dish follows accordingly.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 10:30 – 11:00 a.m.
Title: Virtual Mommy
Department of: Electrical & Computer Engineering
Project Participants: Zineb Benchekroun, TaRae Kim, and Frankil Rojas
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Mr. Glenn Mercier

Abstract:

Current technology has made it easier to monitor a baby's activities in a separate room. Many feature-packed baby monitors allow a parent to talk back through the monitor to the baby, can remotely monitor a baby's room temperature, and activate lullabies and light shows. Other available features include security technology to prevent signal interference, protecting the family's privacy.

However, current mainstream baby monitors are essentially only radio transmitters on a fixed frequency; the marketplace is severely underdeveloped in products that could go beyond simple "listening", "walkie-talkie" or "light show" type of devices.

Virtual Mommy will not only be a one-way transmitter, but it will allow parents enough time to reach their distressed child by providing temporary comfort. This modified crib mobile will activate the music in addition to the motor for mobile rotation to further soothe and let the baby interact with its environment until the parent arrives.

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No Photo Submitted

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 11:00 – 11:30 a.m.
Title: Solar Pool Alarm
Department of: Electrical & Computer Engineering
Project Participants: Edgar Tavares and Chris Wong
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Rama Venkat

Abstract:

Reports from various consulting companies show that a disturbing high number of infant deaths involving swimming pools in the United States over the last ten years, especially, during the summer months.

In this project, we have developed a surface floating device that detects objects or persons entering the water either willingly or by accident. This device is capable of triggering a real-time alarm locally and at a distance away from the pool.

This device is sufficiently small in size to be portable and be used in different places, i.e., a friend's place with a pool, but no alarm. Our device is also economical when manufactured in bulk quantity.

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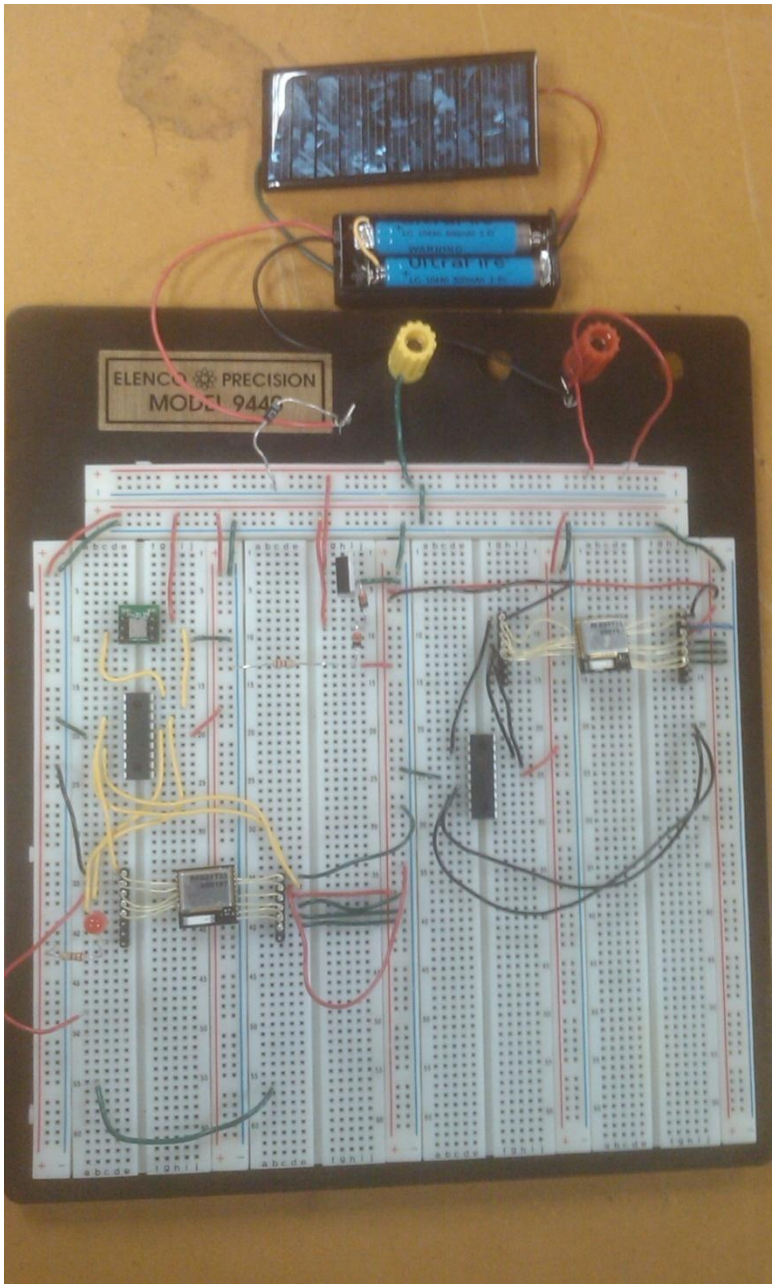

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 11:30 - Noon
Title: Automatic License Plate Recognition (ALPR) System
Department of: Electrical & Computer Engineering
Project Participants: Carl Barnes, Kristopher Buchanan, and Jacob Zodieru
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Emma Regentova

Abstract:

Due to the high demand for parking enforcement applications, it is necessary to develop low-cost systems that can provide secure, efficient, and convenient parking experiences. Existing methods for meeting this demand are prevalent, particularly automatic license plate recognition systems. However, these systems are typically very expensive with today's technology, easily reaching as far as $25,000 for the installation of a single police license plate recognizer on a vehicle.

Hence, the purpose of our project is to develop a means for satisfying the current need for parking enforcement accurately and efficiently through license plate recognition, while at a much lower cost than the industry standard.

Our automatic license plate recognition system operates by gathering NTSC composite video frames of the license plate using an infrared camera. It then digitizes the analog video data with a video decoder into grayscale, enabling it to be stored and processed in a digital signal processing (DSP) board. The cleanliness and clarity of the image can be controlled via a microcontroller in terms of brightness and contrast. The image, once stored in the DSP, can then be processed using a license plate recognition algorithm. The plate will be extracted, the characters will be separated and recognized, and the processed image will be displayed on a computer monitor.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 1:00 – 1:30 p.m.
Title: Locking Bicycle Pedal
Department of: Mechanical Engineering
Project Participants: Jill Carlston, Joe Lasco, Natallia Shabanava, and James Warner
Instructor: Dr. Brendan O'Toole
Faculty Advisor:

Abstract:

The current economic crisis, high cost of fuel and an increasing social desire for environmentally friendly modes of transportation has prompted a surge in the use of bicycles in everyday life. With an increase in bicycle use, comes an increase in bicycle theft. From children riding to school to people commuting to work, bicycles are locked up in public areas and are vulnerable to theft. It is estimated that over 1.5 million bicycles are stolen every year.

There have been a number of accessories developed for bicycle security and theft prevention. Currently, there are no devices on the market that effectively incorporate the bicycle and security device as one element. The "Locking Bicycle Pedal" allows for an additional theft deterrent that is a part of the bicycle itself and only requires the owner to carry a key. When the pedal is disengaged, the pedal will collapse once enough force to operate the bicycle is applied. When the locking mechanism is engaged, the pedal functions as a normal usable pedal. The "Locking Bicycle Pedal" is a separate add-on to bicycles and can be modified to fit any crank.

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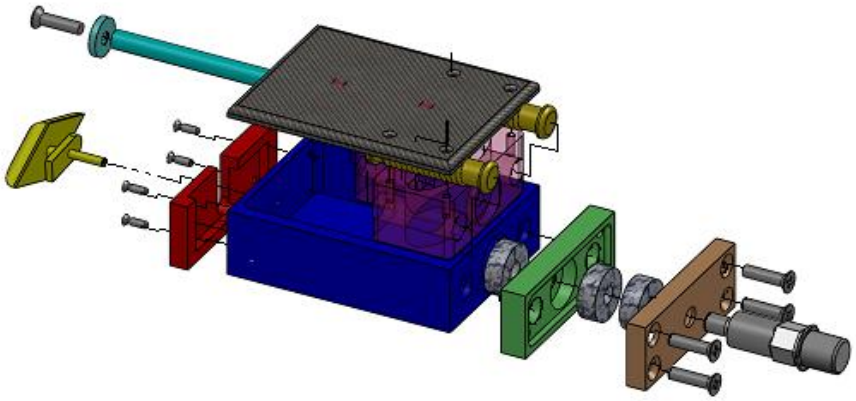

3D Solidworks Exploded View of Components

Completed Prototype in Disabled Position

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 1:15 – 1:45 p.m.
Title: Car Chassis
Department of: Mechanical Engineering
Project Participants: Chris Salisbury and Daniel Corriea
Instructor: Dr. Zhiyong Wang
Faculty Advisor: Dr. Robert Boehm

Abstract:

The world is going green. Electric cars are not only one of the cleanest vehicle options, they are one of the most efficient.

We have designed a chassis for an electric vehicle that is very strong, very light, and very rigid.

By placing bars through the standard engine compartment, we have increased the strength and rigidity over a traditional design. Finite element analysis is used to optimize and verify all design choices, with very good results.

The final product is rigorously tested for rigidity. From a very poor initial design weighing over two-thousand pounds, we now have a very rigid and strong chassis design weighing 276 pounds.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 2:00 – 2:30 p.m.
Title: The Universal Lock
Department of: Electrical & Computer Engineering
Project Participants: Festus J. Ariche and Arinze B. Uzowihe
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Rama Venkat

Abstract:

The primary purpose of this project is to implement a lock and key system which minimizes the physical requirements of the traditional lock and maximizes security and power conservation. In addition the need for multiple keys will be alleviated via the use of a digital key. The lock itself will be unsusceptible to a lot of the issues affiliated with a stereotypical mechanical lock. Overall the engineering principles used in this project were primarily programming of a microcontroller, PCB design, microelectronic circuit analysis and application.

The Universal Lock is divided into the Lock Unit and the Key Unit. The Lock Unit consists of a microcontroller, a time delay circuit, a solid state relay and a series of integrated circuits. On the other hand, the Key Unit is comprised of a microcontroller, 2 status LEDs and a push button. The Key has been programmed to store a number of pass codes; upon insertion the key transmits a pass code to the lock. The Lock authenticates the pass code with the access code programmed on the lock and depending on the result access is either granted or denied.

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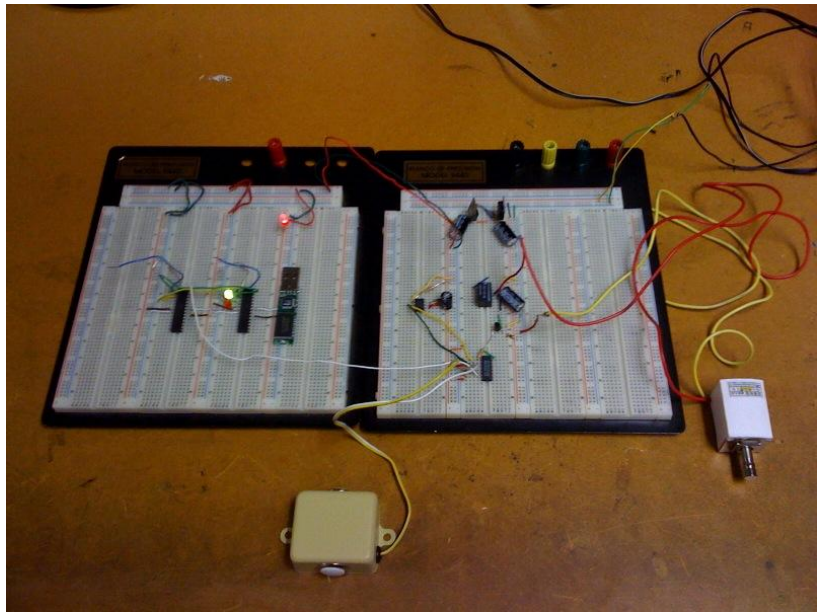

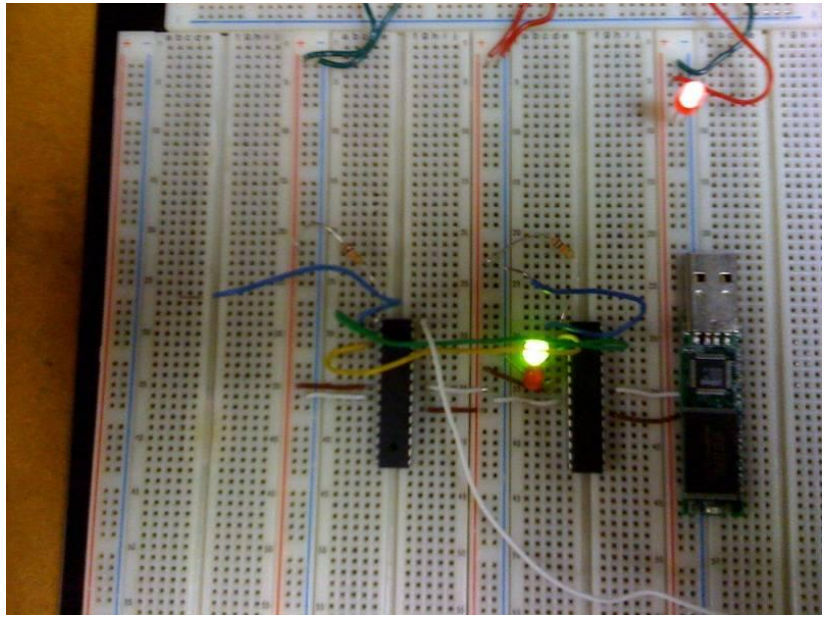

Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 2:15 – 2:45 p.m.
Title: Motor Efficiency Controller
Department of: Electrical & Computer Engineering
Project Participants: Benjamin Eickhof, Jorge Paz, and Nick Reichelt
Instructor: Dr. Paolo Ginobbi
Faculty Advisor: Dr. Yahia Baghzouz

Abstract:

The majority of machines in operation today use AC induction motors which currently consume more than 25% of the electricity in the United States. This project explores how using a triac motor controller can increase the efficiency of single phase AC induction motors while operating with light or continuously changing loads.

Power consumption can be decreased by controlling the amount of voltage being applied to a motor. Voltage control is achieved in this project by varying the firing delay angle of a triac placed on the main power supply of the motor. An optimal firing angle is determined with the use of current and voltage detection circuits and a microcontroller.

These detection circuits continuously monitor the current and voltage to instantly adjust the firing angle of the triac based upon the load conditions of the motor.

As a result the motor maintains its rated speed and torque under variable loads while reducing the energy consumption of the motor. This project brings the hope that one day a similar controller will be incorporated into modern day home appliances, allowing people across the world to reduce their energy consumption, and therefore reduce their utility bill at the end of the month.

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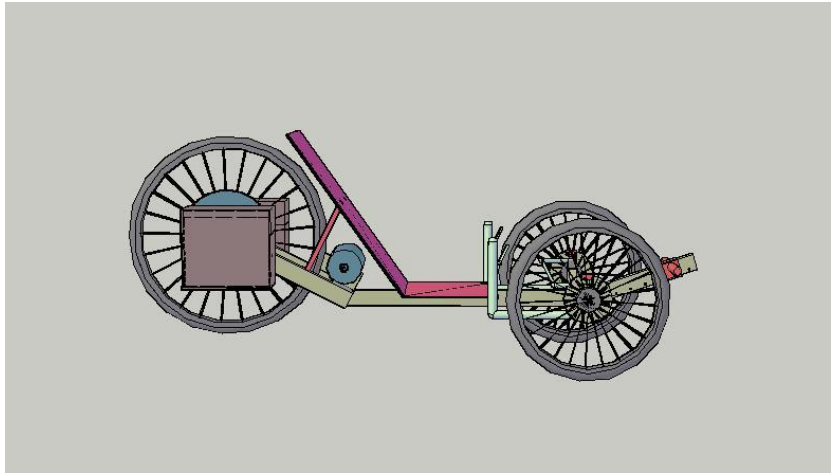
Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 2:45 – 3:15 p.m.
Title: R.E.V. (Recumbent Electric Vehicle)
Department of: Mechanical Engineering
Project Participants: Jonathan Burgos, Gregory Johnson, and Rick Null
Instructor: Dr. Zhiyong Wang
Faculty Advisor: Dr. Brendan O'Toole



Abstract:

With the increasing price of fuel and dependence on foreign oil, there is a growing market for cheaper, more environmentally friendly transportation. Electric vehicles are becoming very popular in today's society, but due to high cost and limited range, they are not practical for the average person. With this in mind, we set out to design and build an affordable, single person, electric vehicle.

Rather than converting an existing vehicle to electric power, we started from the ground up to make a vehicle as inexpensive and simple to operate as possible.

With a fully electric drive train and compact size, the R.E.V is a very efficient and economical mode of transportation. By implementing brushless motor technology and regenerative braking of the 48-volt system, the vehicle boasts a top speed of 40 miles per hour and a range of over 35 miles.

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Senior Design Project Abstracts

Thomas T. Beam Engineering Complex,
Dr. William R. Wells Great Hall

December 2, 2009

Time: 3:00 – 3:30 p.m.
Title: Curf Board
Department of: Mechanical Engineering
Project Participants: Erol Dizon and Patrick Pellacani
Instructor: Dr. Zhiyong Wang
Faculty Advisor: Dr. Daniel Cook

Abstract:

Skateboarding has been around for fifty years and its origins are traced to the California surf scene of the 50's. Since then, there have been numerous modifications and upgrades in the way skateboards are produced, assembled, and even in their features.

Our team successfully created an extra degree of freedom to the way the rider can steer his board. Traditional skateboards turn by shifting weight either forward or backwards over the long axis of the board. This in turn rotates the trucks a certain degree causing the board and rider to turn in the direction the weight was shifted.

Our design allows the rider to steer his board by using his forward foot to point the noise in the direction he wants to go, while still keeping the traditional mode of steering. Furthermore, the input torque by the rider exerted in the steering is translated into forward momentum through the restoring force of the springs we utilized.

On a reasonable grade, this feature allows the rider to keep his forward momentum and add energy at the same time without ever having to dismount the board. Our component will be an add-on to any type of skateboard with universal fittings.

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