

# INNOVATION WEEK '12

Innovation Challenge

**THURSDAY, JANUARY 26**  
Memorial Union Great Room  
North Dakota State University

**NDSU**

RESEARCH AND TECHNOLOGY PARK

**Welcome to the third annual Innovation Week! This week is an opportunity to focus on the exciting, creative research and development projects underway at NDSU and at the NDSU Research and Technology Park.**

**A new feature is the Innovation Challenge '12 Competition to showcase the outstanding, innovative work of NDSU students. Twenty-one teams are competing for cash prizes as they present projects that solve real-world problems, advance technology and create new business opportunities.**

**Descriptions of the Innovation Challenge '12 projects are on the following pages. Take some time to discover how our future leaders are already taking steps to shape a better world.**

#### **Steering Committee**

Paul Brown  
Dan Ewert  
Rajani Ganesh-Pillai  
Barb Geeslin  
Ken Grafton  
Tony Grindberg  
Keenan Hauff  
Fariz Huseynov  
Ron Johnson

Cameron Knutson  
Kevin McCaul  
Brandon Miller  
Chuck Peterson  
Tim Peterson  
Erica Pfarr  
J. Bruce Rafert  
Emily Schreier  
Mark Schroeder

Brian Slator  
Gary Smith  
Jan Sobolik  
Jonathan Tolstedt  
David Wells  
Ross Wilhelm  
Bill Wilson  
Brenda Wyland

**“Innovation Week showcases our activities at NDSU. We truly live in a global knowledge economy and higher education is on the front lines. At NDSU, innovation is everywhere.”**

— J. Bruce Rafert, NDSU Provost

## Amiable team #17

### Team members

Kaylee Hofschild  
Alysia Stoffer  
Isha Kukreja  
Geetika Chaudhary

### Adviser

Mark Schroeder

### Abstract

Our goal is to make a unique website tailored to people with disabilities. This website will allow people to search for disability products they need and will return a generated list of specific websites for the product/disability. For example, they may search for autism and the websites with products for autism will be displayed.

Companies that want to be listed on our website may request to do so. It would greatly benefit a company to have their website listed on our site because it will be searched frequently and generate business. Perhaps the greatest feature of our site is the ability to request products. If a product someone is looking for does not exist, they can request those features. Essentially, this website will be a one-stop-shop for disability needs. Our website will have a simple design that will make it easy to navigate. It also will have a good color scheme and be visually appealing.

There are many ways we could expand this website into something more in the future. It could have a blog, help center and perhaps sell products. Selling products, along with possibly charging websites to be listed and having advertisements will help fund our site. Any profit gained from this site can be put back toward building the product requests from people. Opportunities for this website are endless and will greatly help people with disabilities.

## Innovation Challenge Teams

## Aphasia Therapy team #12

### Team members

Trisha McDonald  
Amanda Beller

### Adviser

Paul Brown

### Abstract

According to the National Aphasia Association, one in 250 people in America have aphasia, and the percentage of Americans diagnosed is increasing annually. Aphasia is an acquired communication disorder that impairs a person's ability to process language, but does not affect intelligence. Aphasia impairs the ability to speak and understand others, and most people with aphasia experience difficulty reading and writing (National Aphasia Association). Aphasia can be found equally in people from any race, country, gender or age.

There is a two-year window for aphasia patients to regain language skills they have lost. Our innovative therapy is an advanced software collection that uses word recall and association, audiovisual matching and complex sentence patterns to help rehabilitate professionals and those who have lost complex language skills.

Software for tailored word recall currently is not available for professional styles of speaking that cater to specific career fields. Our product would be the first of its kind for aphasia victims. The product can be implemented through CDs, DVDs, online, phone applications and Kinect. Our goal is to start working with a Kinect programmer to create interactive software that can measure the progress of treatment.

Our aphasia rehabilitation tools will enhance individuals' quality of life and confidence to be able to return to work.

## Aqua Loco team #13

### Team members

Jonathon McCarthy  
Aaron Yaggie  
Mitchell Borgen

### Adviser

Tim Peterson

### Abstract

Swimming is an important skill for every child to have in order to be safe during recreational aquatic activities. Too many children today are not taught the proper skills to become proficient swimmers. Without giving your child adequate swim lessons, you are putting their life at risk. Many parents do not have the accessibility or resources to provide their child with the quality swim lessons needed.

Three years ago, Jonathon McCarthy created a small swim school called Aqua Loco based in Coon Rapids, Minn. The goal is to provide the highest quality swim lessons at an affordable cost for every parent. Based in Jonathon McCarthy's family pool, Aqua Loco has provided swim lessons for more than 75 different families. McCarthy developed his own structured lesson plan that has been proven to teach children how to swim at a very high level. Charging a flat rate of \$10 per lesson, Aqua Loco has been affordable for every family. Without using any advertising, Aqua Loco grew through word-of-mouth alone.

Communities everywhere have a high demand for exceptional swim lessons without having to pay excessive amounts of money. It is our goal to create a new market for quality swim lessons at affordable rates. We would one day want to turn this innovative idea into a commercial business serving many areas, such as Fargo-Moorhead.

## Innovation Challenge Teams

## Bison M-Venture team #15

### Team members

Erica Pfarr  
Derek Holt  
Cody Mathison  
Deanna Webster  
Danielle Stromme  
Tyler Johnson  
Shelby Schields  
David Sundquist  
Andrew Dalman  
Lucas Budzien  
Joel Hedlof  
Derek Hiam  
Austin Vetter  
Brittany Korynta  
Brittany Gagner

### Adviser

David Wells

### Abstract

#### *Bison M-Venture: Creating a Hydrophilic Porous Ceramic Dental Implant*

The Bison M-Venture is an innovation team at North Dakota State University that is focused on designing a hydrophilic porous ceramic dental implant. There is a large population of people, about 5% of patients who receive an implant, who reject the traditional titanium dental implant. This new implant would serve this population and change the typical dental surgery protocol.

This novel hydrophilic porous ceramic dental implant would be made of hydroxyapatite, and would be considerably inexpensive compared to the traditional titanium implant on the market today. Hydroxyapatite, the type of ceramic chosen, has bone-like properties. Why is something so foreign to the body used, like titanium, when implants could be made out of a material the body would accept better?

This ceramic implant will be made through a poured mold and sintering method, tested against titanium in osteoblast cell culture growth and integration of cells, and then released into the dental market for dentists to order. This ceramic dental implant would be cost-effective compared to the titanium implants currently used and could replace titanium completely in the dental field.

## Bowsher Lab team #4

### Team members

Dacotah Melicher  
Alex Torson

### Adviser

Julia Bowsher

### Abstract

#### *Accessible and Inexpensive Investigation of Gene Sequence Data*

Rapid improvements in gene sequencing technologies have made it fast and cost-effective to perform large-scale sequencing on complete genomes and transcript libraries. This practice has generated an abundance of sequence data which is archived for public use. The data can be used for a variety of purposes such as quantitative studies to demonstrate how organisms respond on a genetic level to different environments or to see how gene sequences evolve in response to different pressures. It is possible to identify individual genes in many species and perform comparative analysis on how changes in sequence translate to changes in function.

We have identified two primary barriers that limit the accessibility of the archived sequence data. The data is archived as fragments which must be assembled into contiguous sequences and compared to existing sequences to determine the gene identities. This process requires access to powerful and expensive computers. The assembly requires technical knowledge and experience to obtain useful data.

We have developed a workflow that uses inexpensive cloud computing resources and automated scripting to assemble multiple complete genomes from a single data set under different parameters. These assemblies are scored to determine which is most complete and has the highest number of unique sequences. This protocol will give individuals with limited technical knowledge access to otherwise inaccessible gene sequence data using a standard computer.

## CPM team #20

### Team members

Rajan Bodkhe  
Chavanin Siripirom

### Adviser

Stuart Croll

### Abstract

#### *Innovative Coating System to Combat Marine Biofouling*

The unwanted and undesirable growth of marine organisms on ships' hulls is known as marine biofouling. Biofouling of a ship's hull causes ship speed reduction, loss of maneuverability as well as an increase in fuel consumption, pollution, dry-docking frequency and voyage time. Designing a coating system that can resist the attachment of a wide variety of marine organisms is challenging. The low surface energy of the coating makes it difficult for marine organisms to form strong adhesive attachments and hence materials with low surface energy are used in designing a marine coating system. With a self-stratified siloxane-polyurethane coating system, a low surface energy siloxane predominates on the surface resisting attachment of organisms while the tough and durable polyurethane forms the bulk of the coating system.

Amphiphilic surfaces have the potential to resist the attachment of a wide variety of marine organisms. An amphiphilic surface contains both hydrophobic and hydrophilic moieties. Therefore, in this work we have designed a novel siloxane-polyurethane coating system having an amphiphilic surface using a novel polymer architecture i.e. siloxane-polyethylene glycol (PEG) copolymer. Designing such a copolymer was challenging since the synthetic route involved the preparation of a thiol terminated PEG (SH-PEG) whose commercial price is comparable to gold, and literature regarding its synthesis is limited. Therefore synthesis of SH-PEG was an important step during this synthesis. The siloxane-polyurethane system having siloxane-PEG copolymer has improved marine biofouling performance.

## Dubstep Modulator team #24

**Team member**  
Tyson Morlock

**Adviser**  
Dan Ewert

### Abstract

Electronic music is a huge industry for instruments and music production. I am currently in the process of designing a new music instrument. It is tailored specifically to an Electronic Genre called "Dubstep." Dubstep is becoming extremely popular in the world (especially in Europe). It is heard in songs from popular artists like Rihanna, Britney Spears and many others. It is the next generation of music. Dubstep is described as a bass-like wobble sound that is very distinct in nature. Right now, the only way to produce Dubstep's unique tones is to use computer-aided software. There are no hardware-only based Dubstep modulators on the market as of yet.

My idea is to create this hardware version of a Dubstep modulator. I want to make it user friendly so that anyone who wants to play Dubstep can play it. It will have a keyboard-like look to it and play like a piano (except the notes will produce different Dubstep tones). You would be able to alter the sound with different effects, filters and waveforms.

This is the overall, broad idea I want to complete and invent. It would revolutionize the electronic and Dubstep industry.

## Innovation Challenge Teams

## EcoGlass team #2

**Team members**  
Brandon Miller  
Andrey Patselov  
Yuan Wei

**Adviser**  
David Wells

### Abstract

#### *Commercial Products from Recycled Glass*

Post-consumer and post-industrial glass products are incapable of decomposing. It takes hundreds of thousands of years to break down the ingredients within glass matrices. It also is very difficult to economically use post-user glass in new products. These factors account for an abundance of glass in landfills - especially in areas that do not promote recycling - and one that continually accumulates over time. The western portion of North Dakota currently does not recycle glass products due to limited space and lack of manufacturing technology for economically producing value-added products with high recycled content. In an unrelated trend, communities in the Midwest highly dependent on agriculture have seen persistent rural out-migration due to ongoing consolidation trends affecting local schools and businesses.

Producing recycled glass products is often hindered by logistics, limited product-imagination and lack of innovation in cost-effective manufacturing. Recycled glass manufacturing is, at the moment, highly limited to new glass containers (dominated by a few large companies) and commodity products. The EcoGlass team has designed a method to manufacture glass tiles produced entirely of recycled glass content having a high variation of ingredients in each piece of glass - formerly thought to be an impossible process - creating an inimitable and unique design in each recycled glass tile. The tiles are value-added products designed for construction and remodeling applications such as countertops, backsplashes, bath walls and flooring.

A production system and marketing strategy has been developed for commercial production in small-town western North Dakota, giving justification for this area to recycle glass products along with the opportunity for community stabilization in the form of non-agricultural employment.

## Grid Free Energy team #7

### Team members

Nick Welch  
Cole Palloch  
Cody Kofstad  
Chris Hoffarth  
Ankit Dhingra  
Trevor Tabaka

### Adviser

David Wells

### Abstract

In an ever-changing global environment there has become an increased emphasis on sustainability. There is a new need for alternative energy sources that will allow for expected future growth. Grid Free Energy is focused on creating innovative solutions that allow homeowners to be self-sustainable, or more specifically, independent of the electric grid.

The team will perform an energy assay to determine the energy products. The team will be able to customize a system that best fits each home and its environment. The technologies used in these systems include but are not limited to wind and solar energy. These products will be designed and/or procured by the Grid Free Energy team at an affordable price for the ideal home or small business owner.

Although renewable energy products for homes and small businesses exist, the idea of an affordable and customizable system retrofitted into a new or existing establishment is in itself innovative. The variety of products will allow for diverse market penetration in almost every climate region of the United States and other future markets.

As the general population becomes more concerned with the need for sustainable energy systems, there will be an increased desire for energy-independent systems at the household level. Grid Free Energy believes that by offering affordable renewable energy systems to consumers or small business owners, a new market will quickly emerge and be a first step in solving the much larger energy crisis.

## The Innovators team #18

### Team members

Jacob Marshall  
Yichuan Zhao  
Thsering Angmo  
Feng Guo

### Adviser

Chao You

### Abstract

#### *Cloud Assistant Remote*

Using the idea of a universal remote, we are designing a remote for people with physical disabilities. This remote will be able to control multiple electrical devices using a two button input. As the user navigates through various options, a voice output will tell the user what he/she is selecting. We will use radio frequency and infrared signals to make our remote communicate with the other devices. The radio frequency will control an X10 device (X10 is a communications "language" that allows compatible products to talk to each other using the existing electrical wiring in the home). The infrared circuit on the remote will read and transmit the frequency required to control a particular device (TV, VCR, etc.). We will include a real time clock that can act as a timer to switch a device on or off at a set time.

The remote will use cloud computing to increase its applications by adding features like information storage space, quick access to entertainment such as music, videos, news, etc. The cloud can store the infrared frequencies of multiple devices which can be retrieved by the user in place of using the infrared to read the frequencies. We will use an LCD screen or a small projector to help the user navigate through the cloud network. We can have a built-in audio output.

This remote will make it easier for a person with disabilities to control devices used daily. Although the idea of a universal remote is not unique, a remote designed for people with physical disabilities and utilizes cloud computing is. The application of cloud computing is relatively new and is increasing in popularity and this is what makes our remote innovative.

## International Market team #11

**Team member**  
Matthew Lee

**Adviser**  
Rajani Ganesh Pillai

### **Abstract**

*Company* - International Market is an early stage company in the process of creating a website designed to offer people health and beauty products from their home country. The International Market team is composed of founder and CEO Matthew Lee.

*Concept description* - International Market is creating an e-commerce website designed to offer health and beauty products from around the world. Our primary target market will be first generation immigrants and transnational employees who are working in the United States.

*Opportunity* - As the world becomes more transnational, there are more people living in areas other than their home countries. This shift in commerce has created a niche market for websites to sell products to individuals who can no longer find the products available in their home country.

*Innovative solution* - We will provide a shopping experience for people looking for health and beauty products unique to their home country and are difficult to find in the U.S. The site also will allow people interested in imported health and beauty products to find them easily. Providing the products at a reasonable price is also a goal of International Market.

*Competitive advantage* - Our competitive advantage is that we are the first to offer this service. Most ethnic websites currently concentrate on food, but very few concentrate on only health and beauty products. Those websites that do focus more on health and beauty products seem to concentrate on only one culture. With International Market selling products from several cultures, we would stand apart.

*Executive team* - Matthew Lee is the president/CEO. His past experience of running an online health and beauty products website will be a crucial skill. Lee also has vast entrepreneurial connections that will be necessary for hiring new employees as the need arises.

## Launch Ministry Team team #14

### Team members

Katie Johnson  
Jordan Gehlhar  
Robynn Anfinrud  
Kathryn Smith  
Luke Brodeur

### Adviser

Amber Raile

### Abstract

The Launch Ministry Team is coming together from diverse areas across campus to bring a new opportunity to NDSU students. We believe there is a large number of students on our campus who are seeking a relationship with God, but do not have an adequate avenue to do so. Therefore, we are working diligently to redefine campus ministry here at NDSU. In the fall of 2012, our intention is to launch a new, engaging ministry on campus.

There is no doubt there already are several options for students to experience Christian worship at NDSU. However, we as a team believe we need to completely redefine the way students go about developing a relationship with Christ. Two key components to our new ministry will distinguish us from other available options. First, there will be great emphasis placed on connecting students to a local church, beyond just attending events at NDSU. Having a “church home” is the piece that often leads students to losing their faith connection when they go to college. The second key component will be to provide opportunities for students to engage in local and global mission work. We believe that being servant leaders in cultures across the globe is a necessary factor for achieving a well-rounded faith.

The ultimate goal of the Launch Ministry Team is to encourage NDSU students to know and grow in Christ’s love. We believe this original approach to campus ministry will allow us to achieve this objective for many of our peers.

## Innovation Challenge Teams

## LEAP for Flexible Electronics team #22

### Team members

Jordan Voller  
Craig Knochenmus  
Matt Walla

### Adviser

David Wells

### Abstract

This capstone team was approached with research from CNSE regarding the use of their LEAP technology for flexible microelectronics assembly. The goal of the research is to use this technology to improve methods of assembly by increasing speed and quality, and reducing costs. Our team’s goal is to take this research and design an application to assemble and insert RFID tags quickly, accurately, in a cost-effective manner and systematically move this design into commercialization.

In the long run, the hopes of CNSE and this capstone group are to use this technology to enable a more rapid introduction of RFID technology into numerous markets, the first being smart cards and financial paper. In order to start working toward the goals, it was first necessary to analyze the smart card and financial paper markets and infer what kind of potential this technology could have on them.

It also was imperative to understand and model the current production processes of both markets thoroughly. System design tools that normally are used just within the design were utilized to help understand the markets and production processes, which is not a typical method.

An ideal outcome of these understandings is to be able to market this technology in a way that shows entrepreneurs new methods for analysis and design. The direct markets intended to be targeted for this application are those who want to add security to cut down counterfeiting and theft in financial paper, those who want to lower costs, and easier methods of creating and using smart cards. The commercialization of this technology would likely be directed toward government agencies, security companies and smart card manufacturers.

## Mechanical team #19

### Team members

Ryan Whitacre  
Bevan Bredeson  
Tryg Bredeson  
Jason Hemmer

### Adviser

Majura Selekwa

### Abstract

Standing upright wheelchairs are needed to provide disabled people the benefits of standing. The benefits are both physical and psychological. Some of the physical benefits include prevention of pressure sores, slowing the decline of bone density, improved circulation and preventing the stiffening of muscles and joints. Psychological benefits include the ability to function as if there is no disability. Disabled people who stand have improved self-esteem and are less likely to become depressed.

The goal is to design a standing wheelchair that is inexpensive, lightweight and compact. However, the chair must not sacrifice the most important qualities - being safe and comfortable for the user. Standing wheelchairs have a much higher risk of tipping. The design will ensure the chair will not tip under typical use. The chair also must be designed to maximize the independence of the user and operate with only one hand including transitioning in and out of the wheelchair. All systems of the chair must be powered by electrical components to ensure a simple, low maintenance product. In addition to the functional characteristics, the chair also must be aesthetically pleasing. If the chair does not have these qualities, consumers will not be satisfied with the product. By improving the characteristics of standing chairs, the expected result is to improve their popularity and use among wheelchair users.

Standing upright wheelchairs currently are produced, but are not very popular. Existing standing upright wheelchairs are bulky and heavy for stability and expensive because they usually have more features than typical power chairs.

For this project, the goal is to make a lightweight, inexpensive and compact upright wheelchair. The wheelchair will be battery powered, user friendly and will be designed so the user can live independently regardless of mobile disability.

## Nixon team #6

**Team member**  
Josiah Nelson

**Adviser**  
Erin Gillam

### Abstract

#### *The "Nixon" Over-water Mist Netting System: A Novel Biological Research Tool*

The unique habitat of the Northern Great Plains presents challenges to biologists conducting ecological studies of bats. Traditionally, mist nets are used to capture bats and other flying animals for research purposes. Mist nets are nylon nets that are stretched between two sets of poles anchored into firm ground. To be successful, bat mist netting efforts must be concentrated where bats funnel through corridors such as forested trails, rivers and streams. Traditional mist netting methods are problematic in the Northern Great Plains, as the habitat includes large expanses of open space, small pockets of trees and bodies of deep water with soft mud bottoms that are not crossable on foot.

The purpose of this work was to develop an innovative means to solve these problems for field biologists. To do this, a basic conceptual design, called the "Nixon," was developed for a mechanical gate-like mist net support system that could swing out over water. This novel research tool supports traditional mist net poles and nets.

Once a preliminary model was proven effective, a stronger, more durable and versatile device was built. This system was deployed in spring 2011 to test for efficiency and effectiveness. Initial results indicate that the Nixon increases overall bat captures and could be more effective for capturing bats than traditional netting focused on the biology of bats. A patent application is being developed.

## Innovation Challenge Teams

## pRxoActive Rx team #1

**Team members**  
Justin Jones  
Ankit Patel  
Alan Yan, Jr.  
Tegan Buckley

**Adviser**  
Christian Albano

### Abstract

The pharmacist's role has evolved into one of the most visible, accessible and trained health professions that manage and improve chronic disease states such as diabetes and those caused by tobacco use. The ability to clearly express information, describe logical solutions to health-related problems and positively modify patient behavior are fundamental provider skills that are sometimes lacking, suboptimal or negatively impact health. To improve patient outcomes (knowledge of and compliance to treatment), it is vital for pharmacists to be knowledgeable about health literacy and cultural competence to effectively communicate so patients are compliant and adhere to their medical and pharmaceutical treatment.

National Action Plan to Improve Health Literacy states that nearly 9 out of 10 adults have difficulty using everyday health information that is routinely available in our health care facilities, retail outlets, media and communities. Understanding the gap in comprehensive communication between healthcare professionals and patients is key in improving patient and health outcomes.

Innovative and cost-effective services geared toward integrating and improving patient outcomes, care and education are the crucial approach to improving health literacy and well-being. Our company pRxoActiveRx will evaluate and improve the clinical outcomes of patients at individual pharmacies (retail and community) through the analysis of pharmacy services and patient outcomes data, and consequently, to implement innovative services and programs (medication therapy management). The overall mission of our company will be to yield a higher return on investment while improving quality, access and cost of care with a patient-centered approach.

# Innovation Challenge Teams

## The Progressive Students 1 team #9

### Team members

Josh Massingill  
Vivek Mathew  
Pedro Safatle

### Adviser

Mark Harvey

### Abstract

Recent educational research studies significantly demonstrated a decline in students' understanding of history parallel to an increase in apathy among students in that discipline. This is occurring in both primary and secondary educational institutions and not limited to the discipline of history. Studies also have shown this is relative to the new and prevailing paradigm (i.e. what is commonly referred to as the technological revolution). Finally, studies also have recognized the significant lacking in much other empirical research currently taking place to approach these problems and changes in our society.

The educational problems within this new paradigm present questions that should have been asked yesterday. With the significant decreases in performance and increases in apathy among students across the world, what will be our future? How this is relative to the rise of technology? What will be the costs that future generations pay?

New substantial research must be done in order to predict negative costs of these subordinate problems of the biggest problem (i.e. regression). Such research must maintain study on minute levels, which are the students themselves. In addition to these studies, substantial attempts at suppressing the problems must occur simultaneously.

We begin by setting goals to suppress student failure in the classroom, the university and the post-educational periods of his/her life. The broadest recommendations include but are not limited to financial investments of universities upon revolutionary institutions that may track students' individual performance to facilitate the achievement of higher marks; additionally tracking their conceptualization of their understanding of the given discipline (e.g. history).

Substantial research - on the largest scale of purpose - must achieve greater understanding of the past and current society and its effects on students. Also, the research may include but may not be limited to significantly tracking students according to their individual learning processes; and setting goals based on the previous and perpetual research to appropriate students together according to each type of learning process.

This research and its institutions may grant substantial progression of students relative to previous progressive patterns, and it may grant the indefinite longevity of success of students and its counter-part (the research facilitating such progression).

## The Progressive Students 2 team #23

### Team members

Josh Massingill  
Vivek Mathew  
Pedro Safatle

### Adviser

Mark Harvey

### Abstract

As college tuition increases every year, students from varied socioeconomic backgrounds must contend with augmented costs, as they pursue a quality university degree. Now more than ever, college-age students are in desperate need of affordable education as they struggle to fund their schooling. Moreover, student loan debt is on the rise due to increased tuition. College graduates find it immensely difficult to satisfy their debt, as interest rates are high and tuition continues to rise.

A justifiable solution to a formidable problem would be scholarships for students deserving to attend college. Based on the Kalamazoo Promise, students in the Fargo Public Schools system, who attend school within the district, earn at least a “C” average and attend a state college in North Dakota, would be eligible to receive 100 percent of their college tuition paid for by community donors who want to invest in the future of North Dakota. As a result, test scores will improve, high-school dropout rates will decline and more graduates of public schools will proceed to higher education.

In order for students to receive the full scholarship, they are required to attend and fulfill requirements for their K-12 education. Students also must be enrolled as full-time students, make regular progress toward a degree according to satisfactory guidelines and maintain a “C” average.

When entering a state college, the scholarship will provide for up to four years of tuition fees for post-secondary education. Students must be full-time students and take a minimum of 12-credits per semester. Post-secondary education must be completed within 10 years after students graduate high school. An exception is made for individuals in the military.

Education is important for a fruit bearing life. In order to have a healthy financial well being, education must be central in achieving economic stability. This scholarship will provide bright futures for students in the Fargo Public Schools.

## Supercapacitor team #16

**Team member**  
Zhengping Zhou

**Adviser**  
Xiangfa Wu

### Abstract

#### *Electrospun Nanofibers for Use of Porous Electrodes of Supercapacitor*

This project aims to synthesize carbon nanotubes (CNT)/metal-nanostructure-coated carbon nanofibers (CNFs) used as porous electrodes of electrochemical double-layer capacitors (EDLCs), i.e. supercapacitors for energy storage applications. The continuous CNF grafted with carbon/nickel nanostructures were synthesized by controlled carbonization of continuous polyacrylonitrile (PAN) nanofibers containing nickel (II) acetylacetonate [Ni(AcAc)<sub>2</sub>] and carbon nanostructure growth via chemical vapor deposition (CVD) in a reaction furnace. The prototype solid-state supercapacitor device was made of the porous CNF films as a symmetric electrodes and a thin layer of poly (vinyl alcohol) (PVA)/H<sub>3</sub>PO<sub>4</sub> (10 wt. %) as polymer electrolyte.

The electrochemical behavior of the solid-state supercapacitor was characterized using cyclic voltammetry (CV) and galvanostatic charging/discharging. The experimental results showed that the specific capacitance of the porous carbon-fiber electrodes was up to 185 F/g at the discharge current density of 625 mA/g and the specific capacitance value of 114 F/g can still be maintained even at a discharge current density of 2.5 A/g. Scanning/transmission electron microscopy (SEM/TEM) was used to characterize the morphology and structure of the porous CNF electrodes; the ultrahigh specific surface area and related unique nanostructures are responsible for the high electrochemical properties measured in this study.

## Innovation Challenge Teams

## Team Awesome-O team #21

**Team members**  
Erik Ritland  
Shannon Kempenich

**Adviser**  
Fariz Huseynov

### Abstract

#### *All Things Rent*

*Mission statement:* To provide an online rental payment platform that creates a seamless transaction between owners and tenants for a reasonable price.

*Vision statement:* Connecting renters with owners every day in every way.

*Business philosophy:* What is important to you in business? Bringing cash flow to you.

#### *Company goals and objectives*

- All Things Rent will be the premier rental e-payment platform.
- The ultimate goal is to have a majority of payment transactions in the national rental market (multi-family housing, commercial leasing and self-storage facilities) executed through All Things Rent.
- Our objective is to have a fully functional rental property payment platform no later than December 15, 2011.
- All Things Rent will develop in our local rental market (Fargo), expanding from there into the national market.

## Virtual Farm Manager team #8

### Team members

Ryan Raguse  
Jacob Fannik

### Adviser

Paul Brown

### Abstract

Our intention is to consolidate an entire farm's records and management information systems in one place.

Currently there are places for farmers to run their accounting, operations, grain marketing, insurance, record keeping, grain temperature monitoring and contracts. By consolidating every information system of the farm into one area, it will create a better flow of that information.

We will start by creating a minimum viable product (MVP) for the marketing of the grain-to-gain market penetration and then create a website that consolidates all the cash prices of the grain elevators in one place for farmers to view. They also will be able to input estimates of financials, have the website calculate a profit margin and then send that information back via text. The market can move up to 30 cents a day, around 5 to 10 cents on average. The average farmer may have 100k to 150k bushels of grain to sell creating a \$5,000 to \$15,000 swing in the bottom line per day. Farmers also will be able to compare profit margins for each elevator in order to maximize profits.

In addition to the marketing of the grain website, as part of the MVP, we also will create quick field records via a smart phone app. This will include features such as GPS tracking and coverage logging that coincide with the inputted field records that are automatically uploaded to the cloud for anyone with an account to view from a computer. In real time, farmers can see from their offices the work that is being done.

Updates to the website will have new releases to the product. Those releases will include online accounting software, operations record keeping, rain reports and weather data, grain temperature monitoring from grain bins, and the ability to upload grain contracts for smooth calculation in profit margins. All these features will be integrated and work together. This will be the first time a farm's entire information system will be consolidated into one place using already existing technologies.

I have an integrated view on farming because I grew up on a farm, my friends are farmers, my neighbors are farmers, and it's the only life I really have known.

