



Working toward
universal access
through research,
design & education

December 2016

Dear Friends & Supporters,

Thank you for reading our annual newsletter. The Beneficial Designs (BD) team had another busy year.

News about our work and history was highlighted in several places this year. In January, Peter gave his annual lecture to the Perspectives in Assistive Technology class at Stanford. The 2015 60-minute presentation on Universal Design philosophies, what BD has accomplished over the decades, and what BD is doing now can be watched at <http://youtu.be/eJh5fBcuThA>. A short web video about BD created in spring 2015 by UNR journalism student Kelsey McCutcheon is available at <https://www.youtube.com/watch?v=LJMcGcVWRsE>. This summer, Nathan Tolbert explained BD's trail assessment and signage projects to Andrew Yeager at WBHM in Alabama, where a pilot project was completed at Oak Mountain State Park, the article is available at <https://news.wbhm.org/feature/2016/pilot-project-aims-to-make-trails-more-accessible/>. BD's work with the RESNA Committee on Inclusive Fitness was highlighted in an article in the Clinical Exercise Physiology Association Summer 2016 newsletter.

Testing, standards, and projects continue to keep the BD staff and consultants working hard. Our wheelchair test lab was quite busy this year and we continue to devote time and resources to wheelchair standards development. We have also continued work on standards for the universal design of fitness equipment, the cognitive accessibility of everyday technologies, adaptive ski equipment, and other assistive technologies. The trails and pedestrian access components of Beneficial Designs continue to grow. We are developing new technologies with USDA government-funded research and development that improve the efficiency of conducting assessments of outdoor recreation environments. We are also conducting PVA-funded research on assistive technologies to improve air travel comfort and safety for wheelchair users.

The Series 100 Rotational Penetrometer (RP) has been available for two years now. The RP is an instrumented surface indenter for measuring the firmness and stability of all types of indoor and outdoor ground and floor surfaces, from carpet to sand. The durability and precision of the RP has been greatly improved. We are offering upgrades to the new Series 100 RP. Please call for details. For more information, visit <http://beneficialdesigns.com/products/surface-measurement-accessibility>.

We are now offering sidewalk assessment services as a result of the successful completion of our Automated Public Right-of-Way Assessment Process. This year, BD staff members have teamed up with engineering firms to assess pedestrian right-of-ways in cities across the US. The associated equipment reduces the time to identify safety hazards and access issues in the sidewalk environment by up to 80%. The work was highlighted in Wired Magazine and an SBIR success story available at <https://www.sbir.gov/node/828741>. If you are interested in further information regarding these services, please visit our website <http://www.beneficialdesigns.com/products/trail-and-sidewalk-assessment-equipment-software/prowap>.

We would like to share with you the status of our current projects and our successes over the last year. Thank you for your continued interest in our work. We wish you the very best for the New Year!

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STAFF

- ❖ **Peter Axelson**, Founder and Director of R&D, presents our work worldwide. He loves spending time with his daughter and is an avid mono-skier and pilot.
- ❖ **Allison Ansel**, Office Assistant, attends UNR and enjoys a good book, listening to music, and playing her trombone.
- ❖ **Bill Blythe**, Facility Manager, enjoys spending time with his wife; likes to cook, play guitar, and work with computers; and leads music at his church.
- ❖ **Heather Gertsch**, Office Assistant, loves gardening, crafting, Disneyland, and a good cup of coffee.
- ❖ **Debbie Hester**, ArcGIS Expert, provides GIS expertise to our sidewalk assessment projects.
- ❖ **Kyle Hollingshead**, Intern, attends WNC and writes code to assist with data conversion in our sidewalk assessment projects.
- ❖ **Maegan McKean**, Office Assistant, attending WNC, loves a good book, running, acting, and playing the piano.
- ❖ **Stephen Pieters**, Wheelchair Technician, enjoys riding motorcycles, fishing, and spending time outdoors.
- ❖ **Paul Schnorbus**, Machinist, likes Legos, machining, target shooting, camping, and a well-told story.
- ❖ **Samuel Schnorbus**, Shop Assistant, attends UNR and enjoys snowboarding, paintballing, and shooting.
- ❖ **Stephanie Schnorbus**, Office Manager and Research Assistant, enjoys making music, laughing with family and friends, and trying recipes from her grandmother's cookbooks.
- ❖ **Emery Schreckengost**, Shop Technical Assistant, attends WNC, enjoys music, hiking, reading, and traveling.
- ❖ **Cameron Tolbert**, Shop Assistant, a student at Douglas High School who enjoys playing drums and piano.
- ❖ **Paola Vazquez**, Office Assistant, attends WNC, enjoys being with family, jogging, and working with children.

CONSULTANTS

- ❖ **Todd Ackerman**, Trail and Sidewalk Assessment Coordinator, leads trail and sidewalk assessments and enjoys outdoor activities, traveling with his wife, and teaching the trail assessment process.
- ❖ **Martin Clemons**, Electrical Engineer, designed the HETAP 3 electronics and firmware and is the lead engineer for the new DORAP assessment process that will use mobile devices to assess outdoor recreation environments
- ❖ **Barton Cline**, Software Developer and Electronics Technician, assists with maintaining and improving HETAP and PROWAP software and equipment.
- ❖ **Ben Hubbard**, Graphic Artist, is currently traveling on charity work with his wife and loves to paint and hike.
- ❖ **Seanna Kringen**, Research Associate, focuses on universal design projects and enjoys traveling with her husband.
- ❖ **Art Nemirow**, Electrical Engineer, provides assistance with troubleshooting electrical components.
- ❖ **Mike Passo**, Trails Project Specialist, provides technical expertise in trail accessibility and sustainability.
- ❖ **Tip Ray**, Trail Assessment Coordinator, helps with trail trainings and assessments.
- ❖ **Carla Shepard** is now the fulltime bookkeeper at Max Mobility for past employee Mark Richter, making the new SmartDrive. Carla continues to assist with our grant work accounting as a consultant.
- ❖ **Jonathan Skelton**, Trail Assessment Coordinator, helps with trail and sidewalk assessments, especially on the East Coast, where he is also a substitute teacher.
- ❖ **Jo Anne Snarr**, Accountant, owner of The Balance Sheet, is our bookkeeper working here in the Carson Valley. Jo Anne loves to ride her bike, ride horses, and play golf when she is not crunching numbers.
- ❖ **Nathan Tolbert**, Sidewalk Assessment Coordinator, loves hiking, fishing, and camping with his wife and sons, and enjoys coaching a variety of sports.
- ❖ **Sharon Vazquez**, Consulting Administrative Assistant, enjoys spending time with her husband, daughter, and new baby boy as well as reading and living life.

BOARD MEMBERS

- ❖ **Bill Axelson** left us on Memorial Day this year. **Nancy Axelson** continues to live in Scottsdale, Arizona. We are so grateful for their contributions as directors providing Peter with valuable financial and project leadership advice since 1981.
- ❖ **Chris Lynskey** is intimately familiar with the sidewalk assessment process. With his vast range of financial and management experiences, he is able to guide and advise BD when needed. He loves golf, skiing, and gets regular exercise when he and his wife are walked by Micah their golden retriever.
- ❖ **Kent Nelson** is a UTAP trainer who also assists with designing amusement park ride recommendations. For BD as a whole, he offers valuable advice based on common sense and an ability to see to the heart of issues.

Universal Trail Assessment Process & High Efficiency Trail Assessment Process (UTAP & HETAP) Workshops

NIH/NICHD SBIR Phase II Grant #2 R44 HD29992-02

NIH/NICHD SBIR Phase II Grant #2 R44 HD36538-02



There are currently over 1200 trail enthusiasts who have been trained to lead assessments using the Universal Trail Assessment Process (UTAP). UTAP/HETAP workshops were held throughout North America

this past year. Training started in March at the Sustainable Trails Conference (in partnership with PTBA) in Knoxville, TN and continued in April at the California Trails & Greenways Conference that was held in Riverside, CA. Over 50 individuals were trained at Oak Mountain State Park in Birmingham, AL (in partnership with the Lakeshore Foundation) and at Whiskeytown State Park in Redding, CA. Last month, BD staff took to the sky and headed north to Canada for a training at RV Anderson in Toronto and in December staff will be heading down to Arizona for a training at an Arizona state park near Phoenix. Workshops planned for 2017 include trainings at the Sustainable Trails Conference in Bend, OR (March), California Trails and Greenways Conference in Monterey, CA (April), and the International Trails Symposium in Dayton, OH (May).

Beneficial Designs provides the UTAP training materials and tools through PaxPress while American Trails coordinates the training courses. HETAP 2.5 or 3 software and TrailWare 2.0 can be used to generate Trail Access Information, signage,

Nature Trail

Fort Churchill
State Historic Park

Length 1.6 mi (2.5 km)

Elev Gain 46.2 ft (13.8 m)

Elev Loss 265.7 ft (81.0 m)



Hikers



Bikes



Dogs on Leash



No Equestrians



No Motorized Vehicles



Grade

Typical Grade 3.8%

8% of trail is 10% to 20%

132 ft (40 m) is 20% to 37%

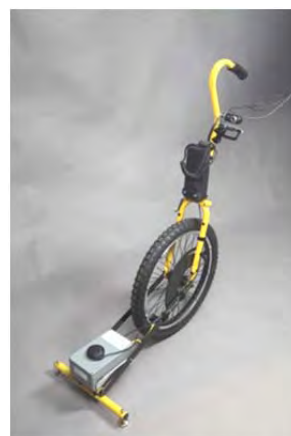
Standard Ramp Grade 8.3%

Trail Access Information Signage Sample

and trail management reports. Data is uploaded to the TrailExplorer Website, www.trailexplorer.org. For more trails related information contact trails@beneficialdesigns.com or visit www.americantrails.org.

High Efficiency Trail Assessment Process (HETAP)

USDA SBIR Phase II Grant #2005-03226



This project created the Wheeled Instrumentation Sensor Package (WISP) to collect more accurate, objective information about trails, including shared-use paths, backcountry single-track trails, OHV, and cross-country ski trails. HETAP systems are being purchased by private entities, state and city land managers, and the National Park Service

throughout the U.S. and Canada. This system has been commercially available through Beneficial Designs since 2009. HETAP workshops are available to help train personnel on using the HETAP software and hardware (see UTAP & HETAP Workshops). A new fully digital HETAP 3 tilt sensor box with improved accuracy and settling time is now available on HETAP 3 carts & rolla-wheels. The new cart design boasts a stronger 1.0-inch frame, with solid "no-flat" tires and new upholstery that provides improved storage and functionality. Contact us for more information at:

trails@beneficialdesigns.com.



Surface Accessibility

NIH/NICHD SBIR Phase II Grant #2 R44 HD30979-02

Beneficial Designs is now shipping the new Series 100 Rotational Penetrometers (RP). RPs are precision measurement devices that have calibrated, spring-loaded surface indenters to measure firmness and stability. BD has re-engineered the heart of the system to provide an increase in resolution and accuracy of readings for measurement of all surfacing. The new Series 100 RP model has increased accuracy and measures with a resolution of 0.0005 inches. Parks, recreation programs, and school systems should use an RP to ensure that the surfaces of their playgrounds are kept in firm and stable condition. When the DOJ published the 2010 ADA Standards for Accessible Design (15 Sept. 2010), the standards expanded to include requirements for playgrounds. The requirements state that ground surfaces shall comply with ASTM F1951 and shall be inspected and maintained regularly and frequently to ensure continued compliance with ASTM F1951. With the new RP, the results received when testing playground surfaces correlate with the ASTM F1951 standard. The National Center on Accessibility has used the RP to conduct longitudinal studies of various trail and playground surfacing materials to determine how well those surfaces maintain firmness and stability that meets federal requirements. Therefore, an agency can now implement a maintenance schedule using the BD Series 100 RP to verify that required firmness and stability is maintained. For more information about the RP and outdoor surfaces, please visit the US Access Board Website and review the published research under "Exterior Surfaces":



www.access-board.gov/research/completed-research and the "Accessible Exterior Surfaces Technical Report" dated 24 April 1999:

www.access-board.gov/research/completed-research/accessible-exterior-surfaces.

A Standardized Assessment Process of Outdoor Recreation Facilities (DORAP)

USDA SBIR Phase I & II Grant #2008-33610-18906

Since the Accessibility Guidelines for Outdoor Developed Areas (AGODA) became law for Title I entities in September 2014; it is only a matter of time before a similar version is adopted for Title II

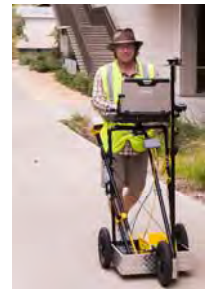
entities. BD was awarded a Phase II grant in 2013 to complete the development of the Developed Outdoor Recreation Assessment Process (DORAP). This project has created repeatable measurement methods for assessing the accessibility of outdoor constructed features found in outdoor recreation areas such as parks and campgrounds. A precision study of the process was presented at the 2015 RESNA conference and is available at: www.resna.org/sites/default/files/conference/2015/jea/hsu.html Mobile devices will be able to access wireless technology that will assist with the assessment of outdoor recreation facilities. These features include picnic tables, tent pads, outdoor rinsing showers, grills, and fire rings, among others. This project will include the testing of a prototype mobile app.



Nevada Recreation Trails Program & NV State Parks

NVRTP Grant #FY 2008-22 & FY 2010-11

We have finished all of our Nevada Recreational Trails Program projects to provide signage throughout Nevada. Our goal is to continue making Trail Access Information (TAI) widely available in Nevada for a variety of trails and trail users. We have assessed over 200 miles of trail in 26 different park areas. We have installed 73 different panel maps and over 200 TAI signs.



Public Right-of-Way Assessment Process to Determine Accessibility

US DOT #DTRT57-08-C-10058 & DTRT57-10-C-10081
Beneficial Designs has developed the automated Public Right-of-Way Assessment Process (PROWAP) that systematically measures elements within the pedestrian environment, such as curb ramps, severe cross slopes, trip hazards, and pathway obstructions. We are able to reduce the time to perform assessments by up to 80% of the time generally required to perform assessments manually. In addition to the assessment cart, we have wireless devices to measure tripping hazards and linear measurements of features and sidewalk panels. This past year, BD completed sidewalk assessments on 100 miles of sidewalk in Coppel,

TX and 250 miles of sidewalk in Suffolk County, NY We continue to assess college campuses and we have been actively seeking opportunities to provide assessment work for other agencies to help them prepare their federally required ADA Transition Plans for the sidewalk environment. The PROWAP System received national recognition in a profile in the December 2013 issue of Wired magazine. For more information about these services, please visit the products page at www.beneficialdesigns.com.



Airline Travel: Assistive Technology for Non-ambulatory Passengers

PVA Grant #3028

We are in year two of a two-year grant funded by the Paralyzed Veterans of America (PVA) in collaboration with Jessica Presperin Pedersen, MBA, OTR/L, ATP/SMS; RIC, Chicago, IL. This project will create design concepts and establish design parameters for assistive technologies for non-ambulatory airline passengers who use complex rehab wheelchair seating and mobility products. Specifically, this project is focused on issues related to boarding wheelchairs, aircraft seating, transfers, and protection of wheelchairs during travel. BD is performing IRB approved human subject testing of wheelchair users to evaluate existing boarding wheelchairs and aircraft seating to develop seating modifications and design specifications for improved comfort and safety of wheelchair users when traveling. If you use a wheelchair and have flown in a commercial aircraft, we are interested in your input. Please fill out the survey by going to the following SurveyMonkey website:
www.surveymonkey.com/r/wheelchairuserairtravelsurvey



Universal Design Guidelines for Fitness Equipment (UDFE)

NIH/NICHD SBIR Phase I Grant #1 R43 HD049236-01
RERC NIDRR Grant #H133E070029 & H133E120005
RERC NIDILRR Grant# 90RE5009-01-00

ASTM F3021, F3022, F2810, and F2811 Standards for UDFE Specifications and Test Methods are now published and available through www.astm.org. We are now in year five of a second five-year RERC RecTech with the University of Alabama at Birmingham and are currently focusing on universal

design criteria for specific equipment, such as bicycles and treadmills. This work is creating a set of internationally applicable ASTM Standards on universal design specifications for the manufacturers of accessible fitness equipment. A repeatability and reproducibility study of the color value contrast method in ASTM F3021 and F3022 was presented at the 2016 RESNA conference: www.resna.org/sites/default/files/conference/2016/outcomes/scnorbust.html. The RESNA Standards Committee on Inclusive Fitness was founded to develop disclosure guidelines, information, and/or formats to (1) disseminate information to the fitness industry that facilitates non-discriminatory access for people with disabilities and (2) develop an inclusive access mark to identify fitness facilities and equipment that meet access requirements for people with disabilities.



Development of Uniform Standards for Cognitive Accessibility

RERC NIDRR Grant #H133E090003 & H133E140054
The Coleman Institute for Cognitive Disabilities
RERC NIDILRR Grant #90RE5019-01-00

We are in year three of a second five-year RERC for Advancing Technologies to Enhance Independence for Adults with Cognitive Impairments (RERC-ATACI) through the University of Colorado. This project houses the RESNA Standards Committee on Cognitive Accessibility (CA), whose goal is to develop universal design standards to increase product usability, such as cell phones and other consumer products. This work was presented at the 2011 RESNA conference, and is available at:

www.resna.org/sites/default/files/legacy/conference/proceedings/2011/RESNA_ICTA/kringen-69737.pdf.

The ANSI/RESNA Standard for Cognitive Accessibility – Volume 1: Universal Criteria for Reporting the Cognitive Accessibility of Products and Technologies is now published and available on the RESNA Website. RESNA CA is collaborating on international standards with ISO/TC 173/WG 10 Assistive products for cognitive disabilities. RESNA CA meetings are open to all. For additional information, visit:

www.resna.org/standards/cognitive-technologies-ct/cognitive-accessibility-ca

www.facebook.com/CognitiveAccessibility

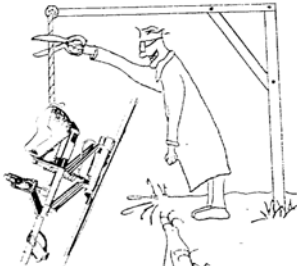
Wheelchair Standards

PVA & Beneficial Designs

As Secretary of the RESNA Standards Committee on Wheelchair (WCS), Peter is the US delegate to the ISO Wheelchair standards work. BD conducts experimental testing to develop new test procedures to keep up with the development of new technologies. Peter is typically the only wheelchair user representing the voice of veterans and other wheelchair users at ISO international meetings. This is important since the RESNA national standards committee typically adopts the ISO standards in some form.

Adaptive Ski Equipment Standards

Peter is the Secretary of the RESNA Standards Committee on Adaptive Sports Equipment (ASE) that develops specifications and test methods for adaptive ski equipment. A revision of the American National Standard, RESNA ASE-1 was published in 2016. The committee meets each year in conjunction with the Ski Spectacular event in Breckenridge, Colorado in December. For more information, visit:



www.resna.org/standards/adaptive-sports-equipment/adaptive-sports-equipment

AT Standards

RESNA & Beneficial Designs

As Vice-Chair of the RESNA Assistive Technology Standards Board (ATSB), Peter oversees the work of the RESNA Assistive Technology Standards (ATS) Committees. There are 12 ATS Committees that develop National ATS for the US, while harmonizing where possible with international standards, such as those developed through ISO. RESNA ATS are available for purchase through the RESNA store at: www.resna.org.

Wheelchair Testing & Design

We continue to provide PDAC and VA testing and design services on a consulting basis for the manual and powered wheelchair industry. For more information, contact mail@beneficialdesigns.com

Wheelchair Training Guides

PVA Research and Education Foundation

The 2nd Edition of the [Manual Wheelchair Training Guide](#) is now available. [The Powered Wheelchair Training Guide](#) and [A Guide to Wheelchair](#)

[Selection](#) provide wheelchair users and therapists with step-by-step instructions for selecting wheelchairs and negotiating various environments. These books are used as textbooks by professors teaching courses for future occupational and physical therapists. PaxPress, a division of Beneficial Designs, is distributing the books electronically through Amazon and Nook. Contact paxpress@beneficialdesigns.com for more information or see our website at: www.beneficialdesigns.com.

Canoe Seating System

NIH/NICHHD SBIR Phase II Grant #2 R44 HD36944-02A1

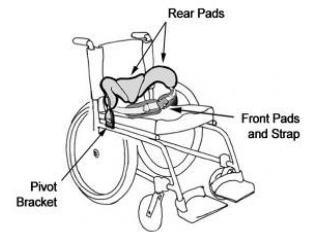
The Universal Design Canoe Seat is now commercially available. The seat replaces or attaches to the existing bench seat in a canoe. It provides adjustable pelvic, back, and lateral supports to improve balance and comfort. For more information, visit Creating Ability: www.creatingability.com.



HipGrip

NIH/NICHHD SBIR Phase II Grant #2R44 HD36156-02A2

The HipGrip is a dynamic, spring-loaded pelvic support device for people who have difficulty maintaining pelvic positioning in their wheelchair. The HipGrip allows the user to lean forward and provides variable resistance to assist the user back into an upright position. The HipGrip was being manufactured and distributed worldwide by Bodypoint. For more information, Google HipGrip.



FlexRim®

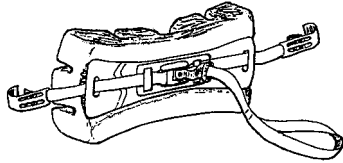
NIH/NICHHD SBIR Phase II Grant #2 R44 HD36533-02A2

The FlexRim® is a compliant handrim that replaces the rigid interface between the wheelchair wheel and the handrim, reducing the gripping force and the impact forces. The FlexRim is manufactured by Spinergy and has been commercially available since September of 2007. For more product information, visit Spinergy: www.spinergy.com or Max Mobility: www.max-mobility.com.

PaxBac

NIH/NICHD SBIR Phase II Grant #2 R44 HD29983-02

The PaxBac is a lightweight back support that provides lumbar/ sacral back support on wheelchairs with sling upholstery. It will soon be manufactured by BES Rehabilitation, Ltd.



Expert Witness Services and Forensic Testing of Mobility Devices

As an expert on mobility devices, Peter Axelson has been able to help represent many claims based on evidence found in testing. Peter has been an expert witness throughout the United States and continues to support and represent both plaintiffs and defendants. To discuss a specific case or to learn more about Beneficial Designs' expert witness services please contact:

peter@beneficialdesigns.com.

Special Thanks & Acknowledgments

❖ **Past Consultants: Jaime McGuire**, Marketing and Project Manager, graduated from law school, earning recognition by National Jurist as a Law Student of the Year, and is now working with a family law firm.

Funding Agencies and other Acronyms:

DOT	Department of Transportation
ISO	International Organization for Standardization
NICHD	National Institute of Child Health and Human Development
NIDILRR	National Institute on Disability, Independent Living, and Rehabilitation Research
NIDRR	National Institute on Disability and Rehabilitation Research
NIH	National Institutes of Health
NVRTP	Nevada Recreational Trails Program
PTBA	Professional TrailBuilders Association
PVA	Paralyzed Veterans of America Research and Education Program
RERC	Rehabilitation Engineering Research Centers
RESNA	Rehabilitation Engineering and Assistive Technology Society of North America
RIC	Rehab Institute of Chicago
SBIR	Small Business Innovation Research
USDA	United States Department of Agriculture

Beneficial Designs Staff



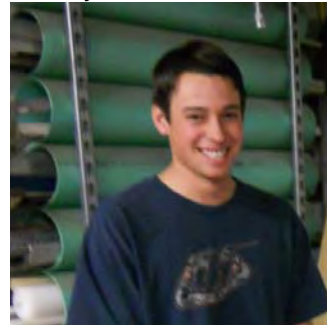
Peter & Ria Axelson



Bill Blythe



Seanna Kringen



Stephen Pieters



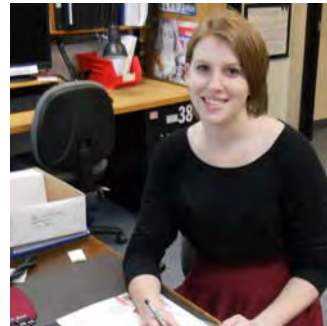
Sam Schnorbus



Paul Schnorbus



Stephanie Schnorbus



Allison Ansel



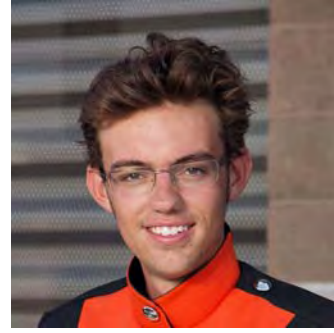
Maegan McKean



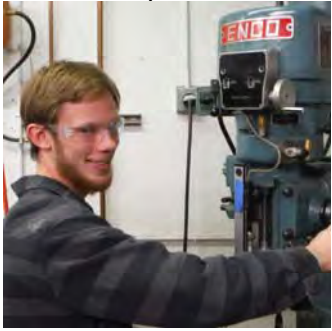
Paola Vazquez



Sharon Vazquez



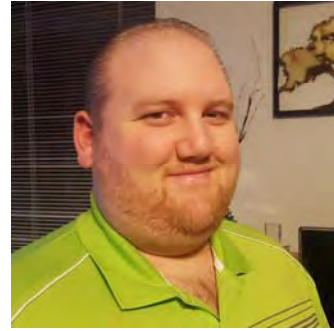
Cameron Tolbert



Emery Schreckengost



Debbie Hester



Kyle Hollingshead