

# Parker E. Ludwig

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## Education and training

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Indiana University, Indianapolis, IN	<b>2021-Present</b>
<b>Radiology Resident</b>	
UnityPoint Health/Central Iowa Health System, Des Moines, IA	<b>2020-2021</b>
<b>Transitional Year Resident</b>	
Creighton University School of Medicine, Omaha, NE	<b>2020</b>
<b>Doctor of Medicine</b>	
Brigham Young University, Provo, UT	<b>Bachelor of Music: 2016</b>
Major: <b>Organ Performance</b>	

## Professional Service

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<b>Peer reviewer for <i>Theranostics</i></b>	<b>2019-Present</b>
• Review articles concerning <i>in vitro</i> diagnostics and prognostics, image-guided therapy, biosensors, personalized and translational medicine, and biomedical research	
<b>Peer reviewer for <i>The British Journal of Radiology</i></b>	<b>2021-Present</b>
• Review articles related to radiology and the underpinning sciences	

## Organizations

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<b>Radiological Society of North America</b>	<b>2018-Present</b>
<b>American College of Radiology</b>	<b>2018-Present</b>
<b>American College of Physicians</b>	<b>2018-Present</b>
<b>The Guild of Carillonneurs in North America</b>	<b>2016-Present</b>
<b>American Guild of Organists</b>	<b>2008-Present</b>

## Presentations

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**Ludwig PE**, Huff TJ, Bremer K, Nandipati KC. (2020. August) **Volume variation with the current standard sleeve gastrectomy technique compared to technique employing pressure-sensitive gastric calibration tube: preliminary testing**. Poster presented virtually at the Society of American Gastrointestinal and Endoscopic Surgeons Annual Conference. Cleveland, OH.

Huff TJ, **Ludwig PE**, Bremer K, Nandipati KC. (2020. August) **Pressure-sensitive gastric calibration tube: development**. Poster presented virtually at the Society of American Gastrointestinal and Endoscopic Surgeons Annual Conference. Cleveland, OH.

Huff TJ, **Ludwig PE**, Nandipati KC, Fitzgibbons RJ, Stavas JM. (2020. August) **Crural thickness measurements between intraoperative and 3D printed anatomical models**. Poster presented virtually at the Society of American Gastrointestinal and Endoscopic Surgeons Annual Conference. Cleveland, OH.

Andersen D, **Ludwig P**, Janot A, Angle B. (2019. May) **Intravitreal Injections Among Medicare Part B Beneficiaries, 2012-2016**. Poster presented at the Association for Research in Vision and Ophthalmology Annual Meeting. Vancouver, Canada.

**Ludwig PE**, Huff TJ, Nandipati KC, Fitzgibbons RJ, Stavas JM. (2019. April) **3D printed anatomical models for preoperative planning of diaphragmatic and abdominal wall hernia repair**. Poster presented at the Midwest Student Biomedical Research Forum. Omaha, NE.

Pfleiderer N, Horneber E, Wessling D, **Ludwig P**, Huff T, Lambrecht J. (2018. October) **An ultra-sound education: a qualitative analysis of hands-on ultrasound training during preclinical medical education**. Poster presented at The American College of Physicians Abstract Competition. Omaha, NE.

**Ludwig PE**, Thankam FG, Patil AA, Agrawal DK. (2018. February) **Adult neural stem cell isolation from whole rat brain and neurosphere culture and differentiation**. Poster presentation at the Midwest Student Biomedical Research Forum. Omaha, NE

## Publications

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### Published peer-reviewed articles

1. **Ludwig PE**, Huff TJ, Bremer K, Nandipati KC. **Pressure-sensing gastric calibration tube for minimizing sleeve volume variation in sleeve gastrectomy compared to the current standard technique.** *Obesity Surgery*. 2020.
2. Huff TJ, **Ludwig PE**, Smith CJ, Cramer JA. **Neuroimaging findings of delayed post-hypoxic leukoencephalopathy after acute carbon monoxide poisoning.** *American Journal of Neuroradiology, Case of the Week*. 2020.
3. **Ludwig PE**, Huff TJ, Helvey JT, Cramer JA. **Neuroimaging findings of stroke-like migraine attacks after radiation therapy (SMART) syndrome.** *American Journal of Neuroradiology, Case of the Week*. 2020.
4. **Ludwig PE**, Huff TJ, Shanahan MM, Stavas JM. **Pregnancy success and outcomes after uterine fibroid embolization: updated review of published literature.** *The British Journal of Radiology*. 2019;93(1105).
5. Andersen DJ, **Ludwig PE**, Janot AC. **Intravitreal Injections among Medicare Part B Beneficiaries, 2012-2016.** *Journal of VitreoRetinal Diseases*. 2019;3(4).
6. Huff TJ, **Ludwig PE**, Salazar D, Cramer JA. **Fully automated intracranial ventricle segmentation on CT with 2D regional convolutional neural network to estimate ventricular volume.** *International Journal of Computer Assisted Radiology and Surgery*. 2019;10(X):1-10.
7. **Ludwig PE**, Freeman SC, Janot AC. **Novel stem cell and gene therapy in diabetic retinopathy, age related macular degeneration, and retinitis pigmentosa.** *International Journal of Retina and Vitreous*. 2019;5(1):7.
8. **Ludwig PE**, Patil AA. **Adult neural stem cell isolation from whole rat brain and neurosphere culture and differentiation.** *Bratislava Medical Journal*. 2019;120(1):19–25.
9. Huff TJ, **Ludwig PE**, Zuniga JM. **The potential for machine learning algorithms to improve and reduce the cost of 3-dimensional printing for surgical planning.** *Expert Review of Medical Devices*. 2018;15(5):349-356.
10. **Ludwig PE**, Huff TJ, Zuniga JM. **The potential role of bioengineering and three-dimensional printing in curing global corneal blindness.** *Journal of Tissue Engineering*. 2018;9(X):X.
11. **Ludwig PE**, Thankam FG, Patil AA, Chamczuk AJ, Agrawal DK. **Brain injury and neural stem cells.** *Neural Regeneration Research*. 2018;13(1):7-18.

12. **Ludwig PE**, Patil AA, Chamczuk AJ, Agrawal DK. **Hormonal therapy in traumatic spinal cord injury**. *American Journal of Translational Research*. 2017;9(9):3881-3895.

*Published StatPearls articles*

1. **Ludwig PE**, Sevensma K. **Anatomy, Head and Neck, Eye Cornea**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2018. <http://www.ncbi.nlm.nih.gov/books/NBK470340/>.
2. **Ludwig PE**, Czyz CN. **Anatomy, Head and Neck, Eye Muscles**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK470534/>.
3. **Ludwig PE**, Czyz CN. **Embryology, Eye, Malformations**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK482496/>.
4. **Ludwig PE**, Bhimji SS. **Histology, Glial Cells**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK441945/>.
5. **Ludwig PE**, Varacallo M. **Neuroanatomy, Central Nervous System (CNS)**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK442010/>.
6. **Ludwig PE**, Varacallo M. **Neuroanatomy, Neurons**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK441977/>.
7. **Ludwig PE**, Czyz CN. **Physiology, Eye**. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2017. <http://www.ncbi.nlm.nih.gov/books/NBK470322/>.

## Research and inventions

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**Developed light and sound source for gamma-frequency entrainment** 2019-2020  
 Solo inventor

- Created a device that employs a 110-220V alternating current power source through a standard lightbulb base, and produces light and sound stimuli at 40Hz
- Based on recently published research on the benefits of gamma entrainment using sensory stimulus (GENUS) in Alzheimer's mouse models
- Iterative design of multiple prototypes
- "Ambient Gamma Wave Frequency Light and Sound Source," U.S. Provisional Pat. Ser. No. 62857158, filed 04-June-2019.

**Developed pressure-sensitive gastric calibration tube** 2018-2020  
 Creighton University School of Medicine  
 In coordination with KC Nandipati, MBBS

- Made force-sensitive resistors
- Designed circuit and custom PCB incorporating Arduino Nano and Honeywell pressure sensors in multiple iterations

- Iterative design of multi-lumen tubes
- Designed and built balloons in various sizes and shapes
- Tested in explants
- “Pressure Sensitive Gastric Calibration Tube,” U.S. Provisional Pat. Ser. No. 62806933, filed 18-Feb-2019.

**3D printing anatomical models for surgical planning**

2018-2020

Creighton University School of Medicine, Departments of Radiology and Surgery,

University of Nebraska at Omaha, Department of Biomechanics

Under the supervision of RJ Fitzgibbons, MD; KC Nandipati, MBBS; JM Stavas, MD; and JM Zuniga, PhD

- Segmented 3D models from CT scans for diaphragmatic and abdominal wall hernias, and convert to STL for 3D printing
- Led coordination and communication between radiology and surgery departments and the 3D printing lab

**Estimating brain ventricle volumes with machine learning model**

2018-2020

University of Nebraska Medical Center, Department of Radiology

Under the supervision of JA Cramer, MD

- A 2D convolutional neural network performed fully-automated ventricular segmentation on CT images
- Used 300 normal head CTs
- Accurate volume congruence
- Respectable Dice scores

**In vitro neural stem cell isolation, culture, and differentiation**

2017

Creighton University School of Medicine, Department of Clinical and Translational Science

Under the supervision of DK Agrawal, PhD; and FG Thankam, PhD

- Developed effective protocol for isolating and culturing neural stem cells from adult rat brains
- Induced differentiation into astrocytic and neuronal lineages
- Confirmed with immunofluorescence

**Investigation of alpaca digestive system**

2012, 2014-2016

Brigham Young University, Department of Plant and Wildlife Sciences

Under the supervision of TF Robinson, PhD

- Assisted with second chamber fistulations
- Prepared various feed samples
- Analyzed digested feed samples
- Analyzed urine, blood, and fecal samples using mass spectrometry and ELISA

## Additional employment history

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<b>President and Owner</b> SKAPPA, LLC	<b>2020-Present</b>
<ul style="list-style-type: none"> <li>Provide fetal 3D printing services to independent 3D/4D prenatal ultrasound facilities.</li> </ul>	
<b>Organist</b> St. Paul Lutheran Church, Treynor, IA	<b>2020</b>
<ul style="list-style-type: none"> <li>Played the organ for traditional Sunday morning services</li> <li>Accompanied a variety of hymns and liturgy</li> </ul>	
<b>Yamaguchi Scholar, Summer Research Fellow</b> Creighton University School of Medicine, Department of Clinical and Translational Science	<b>2017</b>
<ul style="list-style-type: none"> <li>Conducted bench research with neural stem cells from rats</li> <li>Performed a variety of lab techniques including immunofluorescence; tissue fixation, preparation, and staining; cell isolation, culture, and differentiation; manual and automated cell counting protocols; and migration assays</li> </ul>	
<b>University Carillonneur</b> Brigham Young University	<b>2010-2012, 2014-2016</b>
<ul style="list-style-type: none"> <li>Performed daily, 30-minute recitals on the 52-bell carillon</li> <li>Gave tours of the tower when requested to educate the community about the instrument and its history</li> </ul>	
<b>Organ teacher and church organist</b>	<b>2008-2016</b>
<ul style="list-style-type: none"> <li>Taught private organ lessons for the Brigham Young University Organ Department</li> <li>Played for Baptist, Presbyterian, Roman Catholic, Methodist, and Episcopal services</li> </ul>	
<b>Medical records</b> Intermountain ENT Center	<b>2010</b>
<ul style="list-style-type: none"> <li>Scanned and organized patient charts</li> </ul>	

## Leadership

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<b>Co-president, Radiology Interest Group,</b> Creighton University School of Medicine	<b>2019-2020</b>
<ul style="list-style-type: none"> <li>Planned and conducted meetings designed to introduce medical students to radiology, explore careers in the field, and outline the application and preparation process</li> </ul>	
<b>Co-president, Ultrasound Interest Group,</b> Creighton University School of Medicine	<b>2019-2020</b>
<ul style="list-style-type: none"> <li>Planned and conducted point-of-care ultrasound training sessions for first- and second-year medical students</li> </ul>	

- Taught about the basics of ultrasound technique, types of probes, image orientation, and cardiac, lung, abdominal, and vascular imaging
- Facilitated hands-on sessions with small groups of students

**Organ workshop coordinator in various communities** **2014-2016**

- Coordinated and taught at multiple single-day organ workshops
- Hundreds of attendees in total

**Supervisor, Friday's Kids Respite, Orem** **2015-2016**

- Assigned volunteers to children
- Oversaw all activities

## Community Service

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Church Organist, Salt Lake City, Provo, Orem, Omaha, Des Moines	<b>2008-Present</b>
• Play weekly for services and community events of the Church of Jesus Christ of Latter-day Saints	
Church Auxiliary Pianist, Salt Lake City, Provo, Madagascar, Omaha	<b>2008-Present</b>
• Play for church services	
Food Packet Preparation, Des Moines	<b>2021</b>
• Prepared packets of food for <i>Meals from the Heartland</i>	
Flood Relief, Pacific Junction	<b>2019</b>
• Performed demolition and restoration work on flooded home	
Flood Relief, Glenwood	<b>2019</b>
• Stocked flood relief site and helped victims locate the supplies they needed	
Magis Clinic, Omaha	<b>2017-2019</b>
• Volunteered in Acute Care and Mental Health clinics	
HS MACA Eye Presentation and Dissection, Omaha	<b>2018</b>
• Taught middle school students about the function and structure of the human eye in conjunction with The Health Sciences Multicultural and Community Affairs Department (HS-MACA)	
• Led the students through a cow eye dissection	
Carillon Lessons, Omaha	<b>2018</b>
• Provided free lessons to motivated students	
Brush Up Nebraska, Omaha	<b>2017</b>
• Painted houses for individuals selected by the program based on need	
One Sight Vision Clinic, Omaha	<b>2017</b>
• Helped local ophthalmologists perform vision screenings for elementary and middle school children	
Tutoring Refugees, Omaha	<b>2017</b>
• Met with 3 <sup>rd</sup> grade and 5 <sup>th</sup> grade brothers from Myanmar to help with math and English	
YES Mentoring, Omaha	<b>2016-2017</b>
• Met with a youth requesting a role model/mentor	
Utah Valley Regional Medical Center, Radiology	<b>2014-2016</b>

- Transported and positioned patients for CT scans each week

Friday's Kids Respite, Orem 2014-2016

- Watched and entertained special-needs children on Friday and Saturday nights weekly to give their parents a chance to run errands

Church Mission, Madagascar 2012-2014

- Taught English weekly to people in the cities of Toamasina, Antananarivo, Manandona, and Fianarantsoa
- Helped local farmers plant beans, rice and potatoes in rural areas around Manandona and Antsirabe
- Oversaw the work of a dozen missionaries in one city, and two dozen in another
- Worked with the individual missionaries to provide guidance on lesson planning and teaching
- Conducted regular meetings
- Trained new missionaries one-on-one for three months each
- Taught Malagasy grammar, vocabulary, and pronunciation
- Provided insight into local customs and laws
- Offered recommendations on effective teaching techniques

Friday's Kids Respite, Salem 2012

- Watched and entertained special-needs children on Friday nights to give their parents a chance to run errands

## Awards

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**Carillonneur Member Recognition** 2016

The Guild of Carillonneurs in North America (GCNA) Congress, Yale University

- The highest level of membership conferred by the GCNA
- Involves two stages of judged performances, and significant manuscript preparation

**1<sup>st</sup> place, Regional Competition for Young Organists** 2011

American Guild of Organists

- Regional competition for organists under the age of 22

**High School Student Award,** 2010

**John R. Rodland National Memorial Competition in Organ Playing**

- National scholarship competition open to organists pursuing a degree in Organ Performance

**3<sup>rd</sup> Place, Regional Competition for Young Organists** 2009

American Guild of Organists

- Regional competition for organists under the age of 22

## Hobbies, Interests, and Additional Skills

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Play the organ and carillon

- Notable recitals:
  - **Noon Organ Recitals.** The Tabernacle at Temple Square. Salt Lake City: December 24, 2017; July 3, 2016; June 5, 2016; February 28, 2016; February 21, 2016; February 13, 2016.
  - **Holiday Celebration Recital.** Henningson Memorial Campanile, University of Nebraska. Omaha: December 14, 2019; December 16, 2017.
  - **Summer Carillon Recital Series.** Christ Church Cranbrook. Bloomfield Hills: August 6, 2017.
  - **Summer Carillon Series.** Kirk in the Hills. Bloomfield Hills: August 6, 2017.
  - **2017 Summer Recital Series.** Millennium Carillon, Naperville Park District. Naperville: August 1, 2017.
  - **Carillon Concert Series.** Theodore C. Butz Carillon, Chicago Botanic Garden. Glencoe: July 31, 2017.
  - **The Bells of Summer, 52<sup>nd</sup> Season.** Rockefeller Memorial Chapel, The University of Chicago. Chicago: July 30, 2017.
  - **Eighth Annual Carillon Summer Recital Series.** The Carl M. Williams Carillon, The University of Denver. Denver: July 23, 2017.
  - **Courtyard Carillon Concert.** First-Plymouth Church. Lincoln: May 20, 2017.
  - **America's Freedom Festival Carillon Concert.** The BYU Centennial Carillon, Brigham Young University. Provo: June 24, 2016.
  - **The Guild of Carillonneurs in North America Congress.** The Yale Memorial Carillon, Yale University. New Haven: June 17, 2016.
  - **Senior Recital.** The Tabernacle at Temple Square. Salt Lake City: March 29, 2016
  - **Utah Valley American Guild of Organists Super Saturday Recital.** Madsen Recital Hall, Brigham Young University. Provo: April 21, 2012.
  - **Sophomore Recital.** First Baptist Church. Salt Lake City: November 11, 2011.

Fluent in Malagasy

- Proficient in Teny Merina, Betsileo, and Betsimisaraka (3 different dialects)

Computer and electronics experience

- Image Segmentation
- 3D printing and anatomical modeling
- Computer-aided design (CAD)
- Various projects with Arduino and Raspberry Pi boards and other microcontroller units
- Custom PCB design and population
- Ruby, Python, C++, Markdown, HTML and CSS

Familiar with the processes of applying for provisional and non-provisional patents

Fly a paramotor or powered paraglider