

David N. Saucier, M.S.

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Mission Statement

To put Mississippi on the map through significant research performed within the Athlete Engineering program, while facilitating the growth of students and colleagues through mentoring and training to achieve a higher standard of excellence in their work.

Education

Mississippi State University, Mississippi State, MS

M.S. in Computer Engineering

2020

- Thesis: Application of Soft Robotic Sensors to Predict Foot and Ankle Kinematic Measurements
- Overall GPA: 3.87/4.00

Mississippi State University, Mississippi State, MS

B.S. in Computer Engineering

2018

- Jack Hatcher Engineering Entrepreneurship Certificate
- Overall GPA: 3.88/4.00

Work Experience

Research Engineer I, Mississippi State University, Mississippi State, MS

2020-Present

- Human Factors & Athlete Engineering Department
 - Manage communication within multidisciplinary team consisting of Industrial, Mechanical, Electrical, and Computer Engineering, Fashion Design, Kinesiology, and Athletics
 - Work with industry partners to develop and validate emerging wearable technologies
 - Mentor undergraduate and graduate students in writing, research, prototype development, and task management
 - Provide consultation to MSU athletics teams on wearable technology use and data reporting
 - Develop workshops focused on code development and best practices in research
 - Manage resources for Athlete Engineering Working Group grant writing pipeline
- Human Performance Lab (HPL) Manager
 - Conduct data collection studies in HPL using state-of-the-art motion capture system and novel wearable electronics
 - Facilitate human subjects study design and experiment protocol development
 - Organize lab equipment, manage inventory, and optimize and clean workspace according to 5S principles
 - Train students and other researchers on how to use motion capture, force plates, and electromyography systems

Co-op Student, ADTRAN, Inc., Huntsville, AL
ADTRAN, Inc.

2016-2017

- Wrote and automated WebGUI tests in Javascript
- Assisted with set up and configuration of physical testbed for new product
- Wrote debugging tools for ADTRAN developers (C++, BASH, Make, Python)
- Debugged legacy code (C++) and fixed tests for legacy code (Python)
- Communicated daily between co-workers inside and outside of team
- Participated in Agile Development with Scrum framework using JIRA tracking
- Used Jenkins, tox, pytest, and Docker for managing Continuous Integration pipeline

Research Experience

Graduate Research – Mississippi State University, Mississippi State, MS

Athlete Engineering/Human Performance Lab

2018–2020

- Participated in interdisciplinary activities involving Computer Engineering, Industrial Engineering, and Kinesiology
- Conducted human-subjects research studies collecting data with optical motion capture and a stretch sensor wearable device
- Implemented and automated data preprocessing and analysis scripts to produce study results
- Published four papers through research efforts made during graduate school

Undergraduate Research – Mississippi State University, Mississippi State, MS

Sensor Analysis and Intelligence Laboratory (SAIL)

2017–2018

- Investigated and tested different wearable sensors for ankle angle and force measurements
- Created test fixtures and evaluate different methods for capturing data from wearable sensors
- Designed microprocessor-based system to display and record sensor data

Service

University Service

- Building Relationships that Intentionally Develop Generations of Excellent Scholars (BRIDGES) Mentor, 2020 – Current

Professional Memberships

- Member, Tau Beta Pi, 2017 – Present
- Member, Phi Kappa Phi, 2016 – 2017
- Member, Institute of Electrical and Electronics Engineers (IEEE), 2014 – Present

Community Service

- Pinelake Baptist Church; Starkville, MS, 2016 – 2018
 - Youth Group Volunteer/Small Group Leader
 - Youth Group Worship Band—Drummer
 - Sunday Morning Worship Band—Drummer
- New Horizons Christian Fellowship; Starkville, MS, 2018 – Present
 - Sunday Morning Worship Band—Drummer

- Sunday Morning Worship Band—Audio/Visual Team Member
- College/Young Adults Small Group Leader

Publications, Papers, Articles, Presentations, and Intellectual Property

Published & Accepted Refereed Journal Articles (*denotes student authors)

1. *Turner, A., *Carroll, W., *Arachchige S.N.K.K., **Saucier, D.**, Burch V, R.F., Ball, J.E., Smith, B.K., Freeman, C.E., Knight, A.C., Chander, H. Closing the Wearable Gap - Part VIII: A Validation Study for a Smart Knee Brace to Capture Knee Joint Kinematics. *Biomechanics*.
2. Freeman, C., Burch, R., Strawderman, L., Black, C., **Saucier, D.**, Rickert, J., Wilson, J., Bealor, S. A., Ratledge, M., Fava, S., Smith, B., Waggoner, C., Taylor, C., Nichols, A., Skaggs, G., & Callans, T. (2021). Preliminary Evaluation of Filtration Efficiency and Differential Pressure ASTM F3502 Testing Methods of Non-Medical Masks Using a Face Filtration Mount. *International Journal of Environmental Research and Public Health*, 18(8), 4124. <https://doi.org/10.3390/ijerph18084124>
3. *Davarzani, S., *Helzer, D., *Rivera, J., **Saucier, D.**, Jo, E., V, R. F. B., Chander, H., Strawderman, L., Ball, J. E., Smith, B. K., Luczak, T., Ogden, L., Crane, C., Bollwinkel, D., Bollwinkel, D., Burgos, B., & Petway, A. (2020). Validity and Reliability of Strive™ Sense3 for Muscle Activity Monitoring During the Squat Exercise. *International Journal of Kinesiology and Sports Science*, 8(4), 1–18. <https://doi.org/10.7575/aiac.ijkss.v.8n.4p.1>
4. *Talegaonkar, P., **Saucier, D.**, *Carroll, W., *Peranich, P., *Parker, E., *Middleton, C., *Davarzani, S., *Turner, A., *Persons, K., Casey, L., Burch V, R. F., Ball, J. E., Chander, H., Knight, A., Luczak, T., Smith, B. K., & Prabhu, R. K. (2020). Closing the Wearable Gap-Part VII: A Retrospective of Stretch Sensor Tool Kit Development for Benchmark Testing. *Electronics*, 9(9), 1457. <https://doi.org/10.3390/electronics9091457>
5. Chander, H., Burch, R. F., *Talegaonkar, P., ***Saucier, D.**, Luczak, T., Ball, J. E., *Turner, A., *Kodithuwakku Arachchige, S. N. K., *Carroll, W., Smith, B. K., Knight, A., & Prabhu, R. K. (2020). Wearable stretch sensors for human movement monitoring and fall detection in ergonomics. *International Journal of Environmental Research and Public Health*, 17(10), 3554. <https://doi.org/10.3390/ijerph17103554>
6. *Davarzani, S., ***Saucier, D.**, *Peranich, P., *Carroll, W., *Turner, A., *Parker, E., *Middleton, C., *Nguyen, P., *Robertson, P., Smith, B., Ball, J., Burch, R., Chander, H., Knight, A., Prabhu, R., & Luczak, T. (2020). Closing the Wearable Gap—Part VI: Human Gait Recognition Using Deep Learning Methodologies. *Electronics*, 9(5), 796. <https://doi.org/10.3390/electronics9050796>
7. ***Saucier, D.**, *Davarzani, S., *Turner, A., *Luczak, T., *Nguyen, P., *Carroll, W., Burch V, R. F. B., Ball, J. E., Smith, B. K., Chander, H., Knight, A., & Prabhu, R. K. (2019). Closing the Wearable Gap—Part IV: 3D Motion Capture Cameras Versus Soft Robotic Sensors Comparison of Gait Movement Assessment. *Electronics*, 8(12), 1382. <https://doi.org/10.3390/electronics8121382>

8. Chander, H., *Stewart, E., ***Saucier, D.**, *Nguyen, P., *Luczak, T., Ball, J. E., Knight, A. C., Smith, B. K., V, R. F. B., & Prabhu, R. K. (2019). Closing the Wearable Gap—Part III: Use of Stretch Sensors in Detecting Ankle Joint Kinematics During Unexpected and Expected Slip and Trip Perturbations. *Electronics*, 8(10), 1083.
<https://doi.org/10.3390/electronics8101083>
9. **Saucier, D.***, Luczak, T.*, Nguyen, P.*, Davarzani, S.*, Peranich, P.*, Ball, J. E., Burch, R. F., Smith, B. K., Chander, H., Knight, A., & Prabhu, R. K. (2019). Closing the Wearable Gap—Part II: Sensor Orientation and Placement for Foot and Ankle Joint Kinematic Measurements. *Sensors* (Basel, Switzerland), 19(16). <https://doi.org/10.3390/s19163509>
10. Luczak, T.*, **Saucier, D.***, Burch V., R. F., Ball, J. E., Chander, H., Knight, A., Wei, P.*, & Iftekhar, T.* (2018). Closing the Wearable Gap: Mobile Systems for Kinematic Signal Monitoring of the Foot and Ankle. *Electronics*, 7(7), 117.
<https://doi.org/10.3390/electronics7070117>
11. *Sewell, D.; *Franklin, T.; *Jennings, J.; *Smith, L.; ***Saucier, D.**; Ball, J.E.; Archibald, C. (2017). Martian Minibots: Senior Design at Mississippi State University and the NASA Robotic Mining Competition. *Trans. on Techniques in STEM Education*, 3(1), October - December 2017.

Journal Articles in Review (*denotes student authors)

1. **Saucier, D.**, *Davarzani, S., Strawderman, L., Burch V., R.F., Chander, H., Freeman, C., Ogden, L., Petway, A., Duvall, A., Crane, C., Piroli, A. External Load and Muscle Activation Monitoring of NCAA Division I Basketball Team Using Smart Compression Shorts. *Sensors*.
2. Freeman, C., **Saucier, D.**, Black., C., Burch V., R.F., Rickert, J., Wilson, J., Stull, J., Strawderman, L., Seitz, H. Quantifying Mask Leakage and Effectiveness for Public Health Messaging. *Science*.
3. Stannard, C., Freeman, C., Strawderman, L., Moore, M., Newhauser, W., Burch, R., Black, C., **Saucier, D.** Development of the Mask Fit Instrument (MFI) and comparison of commercially available masks on 3D-printed NIOSH headforms. *Textile Research Journal*.
4. *Carroll W., *Turner, A., *Talegoankar, P., *Parker, E., *Middleton, C., *Peranich, P., **Saucier, D.**, Burch, R. F., Ball, J., Smith, B., Chander, H., Knight, A., Freeman, C. Closing the Wearable Gap: Part IX --- Validation of an Improved Ankle Motion Capture Wearable. *IEEE Access*.
5. Skaggs, G., Piroli, A., Freeman, C., Setiz, H., Strawderman, L., **Saucier, D.**, Taylor, C., Rickert, J., Stannard, C., Newhauser, W., Stull, J. Don't Be THAT Guy! – A COVID-19 Safety Culture Case Study for Super Bowl Champion Buccaneers. *Nature Communications*.

Published Refereed Conference Articles (*denotes student authors)

1. *Peranich, P., *Carroll, W. O., *Middleton, C., *Parker, E., *Prabhakar, S., *Talegaonkar, P., *Davarzani, S., **Saucier, D.**, *Persons, K., Ball, J. E., Burch, R., Chander, H., Knight, A., &

Smith, B. (2021). Low-voltage capacitive measurement methodology for dielectric elastomers. In B. M. Cullum, E. S. McLamore, & D. Kiehl (Eds.), *Smart Biomedical and Physiological Sensor Technology XVIII*. SPIE. <https://doi.org/10.1117/12.2587797>

2. *Parker, E., Freeman, C., Persons, K., Burch, R., Ball, J. E., **Saucier, D.**, *Middleton, C., *Peranich, P., Chander, H., Knight, A., Smith, B., *Davarzani, S., *Prabhakar, S., *Talegaonkar, P., & *Turner, A. (2021). Deterioration of textile vs. Electronic components over time in athletic wearable devices. In B. M. Cullum, E. S. McLamore, & D. Kiehl (Eds.), *Smart Biomedical and Physiological Sensor Technology XVIII*. SPIE. <https://doi.org/10.1117/12.2587975>

Professional & Conference Presentations/Videos (*denotes student authors)

1. Burch, R.F., *Talegaonkar, P., **Saucier, D.**, *Carroll, W., *Parker, E., *Middleton, C., *Turner, A., *Peranich, P., *Persons, K. (2021). Design Optimization of Soft Robotic Sensor-based Sock Prototype to Measure Foot and Ankle Kinematics. Montreal: Industrial and Systems Engineering Annual Conference & Expo.
2. *Middleton, C., **Saucier, D.**, *Osborne, S., *Lowell, R., *Robertson, P., Burch, R.F., Chander, H., Smith, J. Effects of the Tsunami Bar, a Flexible Barbell, on Performance of the Squat Exercise. Montreal: Industrial and Systems Engineering Annual Conference & Expo.
3. *Davarzani, S., **Saucier, D.**, Burch, R.F., Chander, H., Ogden, L., Strawderman, L., Ball, J. Exploratory Analysis of Internal and External Load for an NCAA Division I Men's Basketball Season. Montreal: Industrial and Systems Engineering Annual Conference & Expo.
4. *Parker, E. M., Freeman, C., *Carroll, W., *Persons, K., *Middleton, C., **Saucier, D.**, Ball, J., Burch, R.F. The Consideration of Textiles in Athletic Wearable Devices. Montreal: Industrial and Systems Engineering Annual Conference & Expo.
5. *Talegaonkar, P., **Saucier, D.**, *Carroll, W., *Turner, A., *Davarzani, S., *Middleton, C., *Parker, E.M., *Prabhakar, S. Validation of Gait Analysis on a Treadmill Using Soft Robotic Sensors and Two Dimensional Video. Montreal: Industrial and Systems Engineering Annual Conference & Expo.
6. **Saucier, D.**, *Davarzani, S., *Helzer, D., *Rivera, J., Jo, E., Burch, R.F., Chander, H., Strawderman, L. Validity and Reliability of Strive Sense3 for Muscle Activity Monitoring During the Squat Exercise. Montreal: Industrial and Systems Engineering Annual Conference & Expo.

Published Patents

1. Burch, R. F., Luczak, T., **Saucier, D.**, Ball, J., & Chander, H. Wearable Flexible Sensor Motion Capture System. U.S. Patent Publication No. 20200008745, published January 9, 2020. Patent Pending.

Research Projects

1. Project Title: Testing, Validation, and Analysis of Strive Activity Monitoring System for Lab- and Field-Based Applications
Sponsor: Strive Tech, Inc.
Role: PI (Investigators: R.F. Burch)
Amount: \$14,422.00; Responsibility: 10%; Dates: 3/1/2021 – 2/28/2022