

NIGEL BOSCH

Curriculum Vitae

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School of Information Sciences

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Education

- 2017 PhD, Computer Science
University of Notre Dame, Notre Dame, IN 46556
- 2016 MS, Computer Science
University of Notre Dame, Notre Dame, IN 46556
- 2012 BS, Computer Science
Abilene Christian University, Abilene, TX 79699

Appointments

- 2019–Present Assistant Professor, School of Information Sciences
Assistant Professor, Department of Educational Psychology
Faculty Affiliate, National Center for Supercomputing Applications
Faculty Affiliate, Illinois Informatics
University of Illinois Urbana–Champaign
- 2020–Present Discovery Partners Institute (DPI) Affiliate
- 2017–2019 Postdoctoral Researcher
National Center for Supercomputing Applications
University of Illinois Urbana–Champaign
- 2012–2017 Graduate Research Assistant
Emotive Computing Lab, University of Notre Dame

Grants

- 2020–2023 Collaborative Research: Exploring Algorithmic Fairness and Potential Bias in K-12
Mathematics Adaptive Learning (\$987,015; collaborative total: \$1,500,000). National
Science Foundation EHR Core Research. PI.

- 2020–2022 Assessing Eye Movement Scanpaths in Source Code Comprehension (\$151,998). Sandia National Laboratories. Co-PI.
- 2020–2021 Supporting Self-regulated Learning in Online Education via Automatically Personalized Interventions (\$14,997). Technology Innovation in Educational Research and Design (TIER-ED, a University of Illinois initiative). PI.
- 2019–2022 Advancing Computational Grounded Theory for Audiovisual Data from STEM Classrooms (\$1,313,855). National Science Foundation EHR Core Research. Co-PI.
- 2018–2021 Underrepresented Student Learning in Online Introductory STEM College Courses (\$1,399,194). Institute of Education Sciences. Co-PI.
- 2018–2019 National Study of Learning Mindsets Early Career Fellowship (\$8000 + travel). Mindset Scholars Network and University of Texas at Austin Population Research Center.
- 2016 National Science Foundation Travel Award (\$1449). 24th ACM Conference on User Modeling, Adaptation and Personalization (UMAP).
- 2015 National Science Foundation Travel Award (\$2398). 17th ACM International Conference on Multimodal Interaction (ICMI).
- 2015 National Science Foundation Travel Award (\$1250). 20th ACM Conference on Intelligent User Interfaces (IUI 2015).
- 2015 National Science Foundation Travel Award (\$1000). 8th International Conference on Educational Data Mining (EDM 2015) and 17th International Conference on Artificial Intelligence in Education (AIED 2015).
- 2015 University of Notre Dame Professional Development and Graduate Student Union Conference Presentation Grant (\$2600). 8th International Conference on Educational Data Mining (EDM 2015) and 17th International Conference on Artificial Intelligence in Education (AIED 2015).
- 2013 National Science Foundation Travel Award (\$1300). Doctoral Consortium at 16th International Conference on Artificial Intelligence in Education (AIED 2013).

Awards

Publication Awards

AIED 2018 Best Student Paper Award: Jiang, Y., **Bosch, N.**, Baker, R. S., Paquette, L., Ocumpaugh, J., Andres, J. M. A. L., ... Biswas, G. (2018). Expert feature-engineering vs. deep neural networks: Which is better for sensor-free affect detection? In C. Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, ... B. du Boulay (Eds.), *Proceedings of the 19th International Conference on Artificial Intelligence in Education (AIED 2018)* (pp. 198–211). Springer.

UMAP 2017 Best Student Paper Award: Hutt, S., Mills, C., **Bosch, N.**, Krasich, K., Brockmole, J., & D’Mello, S. K. (2017). Out of the fr-"eye"-ing pan: Towards gaze-based models of attention during learning with technology in the classroom. In *Proceedings of the 2017 Conference on User Modeling, Adaptation, and Personalization (UMAP 2017)* (pp. 94–103). ACM.

EDM 2017 Best Student Paper Award: Stewart, A., **Bosch, N.**, & D’Mello, S. K. (2017). Generalizability of face-based mind wandering detection across task contexts. In X. Hu, T. Barnes, A. Hershkovitz, & L. Paquette (Eds.), *Proceedings of the 10th International Conference on Educational Data Mining (EDM 2017)* (pp. 88–95). International Educational Data Mining Society.

AIED 2015 Best Paper Award: **Bosch, N.**, D’Mello, S., Baker, R., Ocumpaugh, J., & Shute, V. J. (2015). Temporal generalizability of face-based affect detection in noisy classroom environments. In C. Conati, N. T. Heffernan, A. Mitrovic, & M. Felisa Verdejo (Eds.), *Proceedings of the 17th International Conference on Artificial Intelligence in Education (AIED 2015)* (pp. 44–53). Springer.

EDM 2015 Best Student Paper Award: Kai, S., Paquette, L., Baker, R., **Bosch, N.**, D’Mello, S., Ocumpaugh, J., ... Ventura, M. (2015). Comparison of face-based and interaction-based affect detectors in physics playground. In C. Romero, M. Pechenizkiy, J. Boticario, & O. Santos (Eds.), *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)* (pp. 77–84). International Educational Data Mining Society.

IUI 2015 Honorable Mention for Best Paper Award: **Bosch, N.**, D’Mello, S., Baker, R., Ocumpaugh, J., Shute, V. J., Ventura, M., ... Zhao, W. (2015). Automatic detection of learning-centered affective states in the wild. In *Proceedings of the 2015 International Conference on Intelligent User Interfaces (IUI 2015)* (pp. 379–388). ACM.

ICSE 2014 ACM Distinguished Paper Award: Rodeghero, P., McMillan, C., McBurney, P. W., **Bosch, N.**, & D’Mello, S. (2014). Improving automated source code summarization via an eye-tracking study of programmers. In *Proceedings of the 36th International Conference on Software Engineering (ICSE 2014)* (pp. 390–401). ACM.

Other Awards

- Outstanding reviewer, IEEE Face & Gesture (FG) conference, 2019
- Outstanding SPIN (Students Pushing INnovation) mentor, summer 2018, academic year 2019–2020

Publications

Peer-reviewed Journal Publications

Fairbairn, C. E., & **Bosch, N.** (in press). A new generation of transdermal alcohol biosensing technology: Practical applications, machine learning analytics, and questions for future research. *Addiction*.

- Gurrieri, L., Fairbairn, C. E., Sayette, M. A., & **Bosch, N.** (in press). Alcohol narrows physical distance between strangers. *Proceedings of the National Academy of Sciences*.
- Hickman, L., Saef, R., Ng, V., Woo, S. E., Tay, L., & **Bosch, N.** (in press). Developing and evaluating language-based machine learning algorithms for inferring applicant personality in video interviews. *Human Resource Management Journal*.
- Bosch, N.** (in press). Identifying supportive student factors for mindset interventions: A two-model machine learning approach. *Computers & Education*.
- Bosch, N.**, & D'Mello, S. K. (in press). Automatic detection of mind wandering from video in the lab and in the classroom. *IEEE Transactions on Affective Computing*.
- Zhang, Y., Paquette, L., Baker, R. S., Ocumpaugh, J., **Bosch, N.**, Biswas, G., & Munshi, A. (in press). Can strategic behavior facilitate confusion resolution? The interplay between confusion and metacognitive strategies in Betty's Brain. *Journal of Learning Analytics*.
- Hickman, L., **Bosch, N.**, Ng, V., Saef, R., Tay, L., & Woo, S. E. (in press). Automated video interview personality assessments: Reliability, validity, and generalizability investigations. *Journal of Applied Psychology*.
- Fairbairn, C. E., Kang, D., & **Bosch, N.** (2020). Using machine learning for real-time BAC estimation from a new-generation transdermal biosensor in the laboratory. *Drug and Alcohol Dependence*, 216, 108205:1–108205:8.
- Hutt, S., Krasich, K., Mills, C., **Bosch, N.**, White, S., Brockmole, J. R., & D'Mello, S. K. (2019). Automated gaze-based mind wandering detection during computerized learning in classrooms. *User Modeling and User-Adapted Interaction*, 29(4), 821–867.
- Wammes, J. D., Ralph, B. C. W., Mills, C., **Bosch, N.**, Duncan, T. L., & Smilek, D. (2019). Disengagement during lectures: Media multitasking and mind wandering in university classrooms. *Computers & Education*, 132, 76–89.
- Bosch, N.**, & Paquette, L. (2018). Metrics for discrete student models: Chance levels, comparisons, and use cases. *Journal of Learning Analytics*, 5(2), 86–104.
- Monkaresi, H., **Bosch, N.**, Calvo, R. A., & D'Mello, S. K. (2017). Automated detection of engagement using video-based estimation of facial expressions and heart rate. *IEEE Transactions on Affective Computing*, 8(1), 15–28.
- Bosch, N.**, & D'Mello, S. (2017). The affective experience of novice computer programmers. *International Journal of Artificial Intelligence in Education*, 27(1), 181–206.
- Bosch, N.**, D'Mello, S. K., Ocumpaugh, J., Baker, R. S., & Shute, V. (2016). Using video to automatically detect learner affect in computer-enabled classrooms. *ACM Transactions on Interactive Intelligent Systems (TiiS)*, 6(2).

Shute, V. J., D’Mello, S., Baker, R., Cho, K., **Bosch, N.**, Ocumpaugh, J., ... Almeda, V. (2015). Modeling how incoming knowledge, persistence, affective states, and in-game progress influence student learning from an educational game. *Computers & Education*, 86, 224–235.

Peer-reviewed Published Conference Proceedings

Belitz, C., Jiang, L., & **Bosch, N.** (in press). Automating procedurally fair feature selection in machine learning. *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society (AIES '21)*. New York, NY: ACM.

Jiang, L., & **Bosch, N.** (in press). Predictive sequential pattern mining via interpretable convolutional neural networks. *Proceedings of the 14th International Conference on Educational Data Mining (EDM 2021)*. International Educational Data Mining Society.

Hutt, S., Ocumpaugh, J., Andres, J. Ma. A. L., **Bosch, N.**, Paquette, L., Biswas, G., & Baker, R. S. (in press). Sharpest tool in the shed: Investigating SMART models of self-regulation and their impact on learning. *Proceedings of the 14th International Conference on Educational Data Mining (EDM 2021)*. International Educational Data Mining Society.

Bosch, N., Zhang, Y., Paquette, L., Baker, R. S., Ocumpaugh, J., & Biswas, G. (in press). Students’ verbalized metacognition during computerized learning. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21)*. New York, NY: ACM.

Williams-Dobosz, D., Azevedo, R. F. L., Jeng, A., Thakkar, V., Bhat, S., **Bosch, N.**, & Perry, M. (2021). A social network analysis of online engagement for college students traditionally underrepresented in STEM. *Proceedings of the 11th International Conference on Learning Analytics & Knowledge (LAK '21)*, 207–215. New York, NY: ACM.

Bosch, N., Crues, R. W., Shaik, N., & Paquette, L. (2020). “Hello, [REDACTED]”: Protecting student privacy in analyses of online discussion forums. *Proceedings of the 13th International Conference on Educational Data Mining (EDM 2020)* (pp. 39–49). International Educational Data Mining Society.

Hur, P., **Bosch, N.**, Paquette, L., & Mercier, E. (2020). Harbingers of collaboration? The role of early-class behaviors in predicting collaborative problem solving. *Proceedings of the 13th International Conference on Educational Data Mining (EDM 2020)* (pp.104–114). International Educational Data Mining Society.

Sanyal, D., **Bosch, N.**, & Paquette, L. (2020). Feature selection metrics: Similarities, differences, and characteristics of the selected models. *Proceedings of the 13th International Conference on Educational Data Mining (EDM 2020)* (pp. 212–223). International Educational Data Mining Society.

Valdiviejas, H., & **Bosch, N.** (2020). Using association rule mining to uncover rarely occurring relationships in two university online STEM courses: A comparative analysis. *Proceedings of the 13th International Conference on Educational Data Mining (EDM 2020)* (pp. 686–690). International Educational Data Mining Society.

- Gliser, I., Mills, C., **Bosch, N.**, Smith, S., Smilek, D., & Wammes, J. D. (2020). The sound of inattention: Predicting mind wandering with automatically derived features of instructor speech. In I. I. Bittencourt, M. Cukurova, K. Muldner, R. Luckin, & E. Millán (Eds.), *Proceedings of the 21st International Conference on Artificial Intelligence in Education (AIED 2020)* (pp. 204–215). Springer.
- D’Angelo, C., Dyer, E., Krist, S., Rosenberg, J., & **Bosch, N.** (2020). Advancing computational grounded theory for audiovisual data from mathematics classrooms. *Proceedings of the 14th International Conference on Learning Sciences (ICLS 2020)* (pp. 2393–2394). International Society of the Learning Sciences.
- Dyer, E., D’Angelo, C., **Bosch, N.**, Krist, S., & Rosenberg, J. (2020). Analyzing learning with speech analytics and computer vision methods: Technologies, principles, and ethics. *Proceedings of the 14th International Conference on Learning Sciences (ICLS 2020)* (pp. 2651–2653). International Society of the Learning Sciences.
- Jay, V., Henricks, G. M., Anderson, C. J., Angrave, L., **Bosch, N.**, Williams-Dobosz, D., Shaik, N., Bhat, S., & Perry, M. (2020). Online discussion forum help-seeking behaviors of students underrepresented in STEM. *Proceedings of the 14th International Conference on Learning Sciences (ICLS 2020)* (pp. 809–810). International Society of the Learning Sciences.
- Zhang, Y., Paquette, L., Baker, R. S., Ocumpaugh, J., **Bosch, N.**, Munshi, A., & Biswas, G. (2020). The relationship between confusion and metacognitive strategies in Betty’s Brain. *Proceedings of the 10th International Conference on Learning Analytics and Knowledge (LAK20)* (pp. 276–284). ACM.
- Huang, E., Valdiviejas, H., & **Bosch, N.** (2019). I’m sure! Automatic detection of metacognition in online course discussion forums. *Proceedings of the 8th International Conference on Affective Computing and Intelligent Interaction (ACII 2019)* (pp. 241–247). IEEE.
- Mills, C., **Bosch, N.**, Krasich, K., & D’Mello, S. K. (2019). Reducing mind wandering during vicarious learning from an intelligent tutoring system. In S. Isotani, E. Millán, A. Ogan, P. Hastings, B. McLaren, & R. Luckin (Eds.), *Proceedings of the 20th International Conference on Artificial Intelligence in Education (AIED 2019)* (pp. 296–307). Springer.
- Bosch, N.**, Huang, E., Angrave, L., & Perry, M. (2019). Modeling improvement for underrepresented minorities in online STEM education. In *Proceedings of the 27th Conference on User Modeling, Adaptation and Personalization (UMAP 2019)* (pp. 327–335). ACM.
- Andres, A., Ocumpaugh, J., Baker, R. S., Slater, S., Paquette, L., Jiang, Y., **Bosch, N.**, Munshi, A., Moore, A. L., Biswas, G. (2019). Affect sequences and learning in Betty’s Brain. In C. Brooks, R. Ferguson, & H. U. Hoppe (Eds.), *Proceedings of the 9th International Learning Analytics & Knowledge Conference (LAK19)* (pp. 383–390). ACM.

- Bosch, N.**, Crues, R. W., & Shaik, N. (2018). Diverse learners, diverse motivations: Exploring the sentiment of learning objectives. In K. E. Boyer & M. V. Yudelson (Eds.), *Proceedings of the 11th International Conference on Educational Data Mining (EDM 2018)* (pp. 553–556). International Educational Data Mining Society.
- Crues, R. W., **Bosch, N.**, Anderson, C. J., Perry, M., Bhat, S., & Shaik, N. (2018). Who they are and what they want: Understanding the reasons for MOOC enrollment. In K. E. Boyer & M. V. Yudelson (Eds.), *Proceedings of the 11th International Conference on Educational Data Mining (EDM 2018)* (pp. 176–186). International Educational Data Mining Society.
- Crues, R. W., **Bosch, N.**, Perry, M., Angrave, L., Shaik, N., & Bhat, S. (2018). Refocusing the lens on engagement in MOOCs. In R. Luckin, K. R. Koedinger, & S. Klemmer (Eds.), *Proceedings of the 5th (2018) ACM Conference on Learning@Scale* (10 pages). ACM.
- Bosch, N.**, Mills, C., Wammes, J. D., & Smilek, D. (2018). Quantifying classroom instructor dynamics with computer vision. In C. Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, ... B. du Boulay (Eds.), *Proceedings of the 19th International Conference on Artificial Intelligence in Education (AIED 2018)* (pp. 30–42). Springer.
- Jiang, Y., **Bosch, N.**, Baker, R. S., Paquette, L., Ocumpaugh, J., Andres, J. M. A. L., ... Biswas, G. (2018). Expert feature-engineering vs. deep neural networks: Which is better for sensor-free affect detection? In C. Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, ... B. du Boulay (Eds.), *Proceedings of the 19th International Conference on Artificial Intelligence in Education (AIED 2018)* (pp. 198–211). Springer.
- Paquette, L., **Bosch, N.**, Mercier, E., Jung, J., Shehab, S., & Tong, Y. (2018). Matching data-driven models of group interactions to video analysis of collaborative problem solving on tablet computers. In J. Kay & R. Luckin (Eds.), *Proceedings of the 13th International Conference of the Learning Sciences (ICLS) 2018, Volume 1* (pp. 312–319). International Society of the Learning Sciences.
- Bosch, N.**, Crues, R. W., Henricks, G. M., Perry, M., Angrave, L., Shaik, N., ... Anderson, C. J. (2018). Modeling key differences in underrepresented students' interactions with an online STEM course. In *Proceedings of TechMindSociety '18*. ACM.
- Stewart, A., **Bosch, N.**, Chen, H., Donnelly, P. J., & D'Mello, S. K. (2017). Face forward: Detecting mind wandering from video during narrative film comprehension. In E. André, R. S. Baker, X. Hu, M. M. T. Rodrigo, & B. du Boulay (Eds.), *Proceedings of the 18th International Conference on Artificial Intelligence in Education (AIED 2017)* (pp. 359–370). Springer.
- Stewart, A., **Bosch, N.**, & D'Mello, S. K. (2017). Generalizability of face-based mind wandering detection across task contexts. In X. Hu, T. Barnes, A. Hershkovitz, & L. Paquette (Eds.), *Proceedings of the 10th International Conference on Educational Data Mining (EDM 2017)* (pp. 88–95). International Educational Data Mining Society.

- Khan, S., Suendermann-Oeft, D., Evanini, K., Williamson, D. M., Paris, S., Qian, Y., Huang, Y., **Bosch, N.**, D’Mello, S. K., Loukina, A., & Davis, L. (2017). MAP: Multimodal assessment platform for interactive communication competency. In S. Shehata & J. P.-L. Tan (Eds.), *Practitioner Track Proceedings of the 7th International Learning Analytics & Knowledge Conference (LAK17)* (pp. 6–12). SoLAR.
- Hutt, S., Mills, C., **Bosch, N.**, Krasich, K., Brockmole, J., & D’Mello, S. K. (2017). Out of the fr-"eye"-ing pan: Towards gaze-based models of attention during learning with technology in the classroom. In *Proceedings of the 2017 Conference on User Modeling, Adaptation, and Personalization (UMAP 2017)* (pp. 94–103). ACM.
- D’Mello, S. K., Mills, C., Bixler, R., & **Bosch, N.** (2017). Zone out no more: Mitigating mind wandering during computerized reading. In X. Hu, T. Barnes, A. Hershkovitz, & L. Paquette (Eds.), *Proceedings of the 10th International Conference on Educational Data Mining (EDM 2017)* (pp. 8–15). International Educational Data Mining Society.
- D’Mello, S. K., Kopp, K., Bixler, R., & **Bosch, N.** (2016). Attending to attention: Detecting and combating mind wandering during computerized reading. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 1661–1669). ACM.
- Bosch, N.**, D’Mello, S. K., Baker, R. S., Ocumpaugh, J., Shute, V., Ventura, M., ... Zhao, W. (2016). Detecting student emotions in computer-enabled classrooms. In *Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI 2016)* (pp. 4125–4129). AAAI Press.
- Bosch, N.** (2016). Detecting student engagement: Human versus machine. In *Proceedings of the 2016 Conference on User Modeling, Adaptation, and Personalization (UMAP 2016)* (pp. 317–320). ACM.
- Dillon, J., **Bosch, N.**, Chetlur, M., Wanigasekara, N., Ambrose, G. A., Sengupta, B., & D’Mello, S. K. (2016). Student emotion, co-occurrence, and dropout in a MOOC context. In T. Barnes, M. Chi, & M. Feng (Eds.), *Proceedings of the 9th International Conference on Educational Data Mining (EDM 2016)* (pp. 353–357). International Educational Data Mining Society.
- Stewart, A., **Bosch, N.**, Chen, H., Donnelly, P. J., & D’Mello, S. K. (2016). Where’s your mind at? Video-based mind wandering detection during film viewing. In *Proceedings of the 2016 Conference on User Modeling, Adaptation, and Personalization (UMAP 2016)* (pp. 295–296). ACM.
- Bosch, N.**, Chen, H., Baker, R., Shute, V., & D’Mello, S. (2015). Accuracy vs. availability heuristic in multimodal affect detection in the wild. In *Proceedings of the 17th International Conference on Multimodal Interaction (ICMI 2015)* (pp. 267–274). ACM.
- Bosch, N.**, D’Mello, S., Baker, R., Ocumpaugh, J., Shute, V. J., Ventura, M., ... Zhao, W. (2015). Automatic detection of learning-centered affective states in the wild. In *Proceedings of the 2015 International Conference on Intelligent User Interfaces (IUI 2015)* (pp. 379–388). ACM.

- Kai, S., Paquette, L., Baker, R., **Bosch, N.**, D’Mello, S., Ocumpaugh, J., ... Ventura, M. (2015). Comparison of face-based and interaction-based affect detectors in physics playground. In C. Romero, M. Pechenizkiy, J. Boticario, & O. Santos (Eds.), *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)* (pp. 77–84). International Educational Data Mining Society.
- Mills, C., D’Mello, S., **Bosch, N.**, & Olney, A. (2015). Mind wandering during learning with an intelligent tutoring system. In C. Conati, N. T. Heffernan, A. Mitrovic, & M. Felisa Verdejo (Eds.), *Proceedings of the 17th International Conference on Artificial Intelligence in Education (AIED 2015)* (pp. 267–276). Springer.
- Bosch, N.** (2015). Multimodal affect detection in the wild: Accuracy, availability, and generalizability. In *Proceedings of the 17th International Conference on Multimodal Interaction (ICMI 2015 doctoral consortium)* (pp. 645–649). ACM.
- Bosch, N.**, D’Mello, S., Baker, R., Ocumpaugh, J., & Shute, V. J. (2015). Temporal generalizability of face-based affect detection in noisy classroom environments. In C. Conati, N. T. Heffernan, A. Mitrovic, & M. Felisa Verdejo (Eds.), *Proceedings of the 17th International Conference on Artificial Intelligence in Education (AIED 2015)* (pp. 44–53). Springer.
- Chen, Y., **Bosch, N.**, & D’Mello, S. (2015). Video-based affect detection in noninteractive learning environments. In C. Romero, M. Pechenizkiy, J. Boticario, & O. Santos (Eds.), *Proceedings of the 8th International Conference on Educational Data Mining (EDM 2015)* (pp. 440–443). International Educational Data Mining Society.
- Rodeghero, P., McMillan, C., McBurney, P. W., **Bosch, N.**, & D’Mello, S. (2014). Improving automated source code summarization via an eye-tracking study of programmers. In *Proceedings of the 36th International Conference on Software Engineering (ICSE 2014)* (pp. 390–401). ACM.
- Bosch, N.**, & D’Mello, S. (2014). It takes two: Momentary co-occurrence of affective states during computerized learning. In S. Trausan-Matu, K. E. Boyer, M. Crosby, & K. Panourgia (Eds.), *Proceedings of the 12th International Conference on Intelligent Tutoring Systems (ITS 2014)* (pp. 638–639). Springer International Publishing.
- Bosch, N.**, Chen, Y., & D’Mello, S. (2014). It’s written on your face: Detecting affective states from facial expressions while learning computer programming. In S. Trausan-Matu, K. E. Boyer, M. Crosby, & K. Panourgia (Eds.), *Proceedings of the 12th International Conference on Intelligent Tutoring Systems (ITS 2014)* (pp. 39–44). Springer International Publishing.
- Mills, C., **Bosch, N.**, Graesser, A., & D’Mello, S. (2014). To quit or not to quit: Predicting future behavioral disengagement from reading patterns. In S. Trausan-Matu, K. E. Boyer, M. Crosby, & K. Panourgia (Eds.), *Proceedings of the 12th International Conference on Intelligent Tutoring Systems (ITS 2014)* (pp. 19–28). Springer International Publishing.

- Bosch, N., & D’Mello, S.** (2013). Programming with your heart on your sleeve: Analyzing the affective states of computer programming students. In H. C. Lane, K. Yacef, J. Mostow, & P. Pavlik (Eds.), *Proceedings of the 16th International Conference on Artificial Intelligence in Education (AIED 2013)* (pp. 908–911). Springer.
- Bosch, N., D’Mello, S., & Mills, C.** (2013). What emotions do novices experience during their first computer programming learning session? In H. C. Lane, K. Yacef, J. Mostow, & P. Pavlik (Eds.), *Proceedings of the 16th International Conference on Artificial Intelligence in Education (AIED 2013)* (pp. 11–20). Springer.
- Mills, C., D’Mello, S., Lehman, B., **Bosch, N.**, Strain, A., & Graesser, A. (2013). What makes learning fun? Exploring the influence of choice and difficulty on mind wandering and engagement during learning. In H. C. Lane, K. Yacef, J. Mostow, & P. Pavlik (Eds.), *Proceedings of the 16th International Conference on Artificial Intelligence in Education (AIED 2013)* (pp. 71–80). Springer.

Book Chapters

- Paquette, L., & **Bosch, N.** (2020). The invisible breadcrumbs of digital learning: How learner actions inform us of their experience. In M. Montebello (Ed.), *Handbook of Research on Digital Learning* (pp. 302–316). IGI Global
- D’Mello, S. K., **Bosch, N.**, & Chen, H. (2018). Multimodal, multisensory affect detection. In S. Oviatt, B. Schuller, P. Cohen, D. Sonntag, G. Potamianos, & A. Krüger (Eds.), *The Handbook of Multimodal-Multisensor Interfaces, Volume 2: Signal Processing, Architectures, and Detection of Emotion and Cognition* (pp. 167–202). ACM Books/Morgan Claypool.

Peer-reviewed Workshop Papers

- Bosch, N., & Paquette, L.** (2017). Unsupervised deep autoencoders for feature extraction with educational data. In *Deep Learning with Educational Data Workshop at the 10th International Conference on Educational Data Mining*.
- Bosch, N., & D’Mello, S.** (2014). Co-occurring affective states in automated computer programming education. In E. Walker & C. K. Looi (Eds.), *Proceedings of the Workshop on AI-supported Education for Computer Science (AIEDCS) at the 12th International Conference on Intelligent Tutoring Systems* (pp. 21–30).
- Bosch, N., & D’Mello, S.** (2013). Sequential patterns of affective states of novice programmers. In E. Walker & C. K. Looi (Eds.), *Proceedings of the First Workshop on AI-supported Education for Computer Science (AIEDCS 2013)* (pp. 1–10).

Teaching and Mentorship

Teaching and Tutoring Activities

- University of Illinois Urbana–Champaign
 - Instructor, *Data, Statistical Models, and Information* (IS 542/507) – Fall 2019, Spring 2020, Fall 2020
 - Instructor, *Machine Learning Team Projects* (IS 590ML/557) – Spring 2019, Fall 2019, Spring 2021
 - Instructor, *Foundations of Information Processing* (IS 452) – Spring 2019
 - Instructor, *Data Mining* (IS 590DT2/577) – Fall 2018, Fall 2020
 - Co-instructor, *Machine Learning Team Projects* (IS 590ML) – Fall 2018
 - Information Sciences independent study advisor (IS592/589) – Fall 2019 (1), Spring 2020 (3), Fall 2020 (1)
 - Educational Psychology independent study advisor (EPSY 595) – Fall 2020 (1)
 - Informatics independent study advisor (INFO 597) – Fall 2020 (1)
 - Informatics individual undergraduate research (INFO 199/399) – Fall 2020 (1)
 - Guest Lecturer, *Research Design for Information Sciences* (IS204)
 - Guest Lecturer, *Advanced Topics: Machine Learning & Social Computing* (IS 590MSC)
 - Guest Lecturer, *Introduction to Educational Data Mining* (CI 507EDM)
 - Guest Lecturer, *Qualitative Analysis of Video Data* (CI 507AVD)
- Teachers Ranked as Excellent (University of Illinois teaching award) – Fall 2018, Fall 2019, Spring 2020, Fall 2020
- Learning Analytics Learning Network tutorial event organizer/presenter – October 2020

Doctoral Advising

- Clara Belitz – Information Sciences
- Lan Jiang – Information Sciences
- Destiny Williams-Dobosz – Educational Psychology (Secondary co-advisor with Michelle Perry)
- Hannah Valdiviejas – Educational Psychology (Secondary co-advisor with Michelle Perry)
- Paul Hur – Information Sciences (Secondary co-advisor with Michael Twidale)

Master's Students Mentored

- University of Illinois Urbana–Champaign
 - Lan Jiang, MS in Information Management (2019–2020, First employment: PhD student at UIUC)
 - Jinlin Zeng, MS in Information Management (2018–2019)

Undergraduate Students Mentored

- University of Illinois Urbana–Champaign

- HaeJin Lee (2021)
- Alistair Nunn (2020–2021)
- Zihan Xiong (2020–2021)
- Debopam Sanyal (2019–2020, SPIN—*Students Pushing INnovation* intern, First employment: Graduate student at UIUC)
- Lauren Gregory (2019)
- Dean Lin (2018–2019, SPIN—*Students Pushing INnovation* intern)
- Eddie Huang (2018–2019, First employment: Graduate student at UIUC)
- Zhuoyue Wang (2018–2019, First employment: Graduate student at UC Berkeley)
- University of Notre Dame
 - Yuxuan Chen (2013–2016, First employment: Graduate student at Columbia University)
 - Huili Chen (2015–2016, First employment: Graduate student at Massachusetts Institute of Technology)
 - Jianan Wang (2016)
 - Jacob Beiter (2016)
 - Timothy Pusateri (2015)

High School Students Mentored

- Connor Sullivan (2016)
- Gustavo Van Overberghe (2013–2014)

Professional Activities

Professional Memberships (Past and Current)

- American Educational Research Association (AERA) Division C
- Association for the Advancement of Affective Computing (AAAC)
- Association for Computing Machinery (ACM)
- International Artificial Intelligence in Education Society
- International Educational Data Mining Society
- International Society of the Learning Sciences (ISLS)

Journal Reviews

- ACM Transactions on Human–Robot Interaction (THRI)
- ACM Transactions on Knowledge Discovery from Data (TKDD)
- Behavior Research Methods (BRM)
- British Journal of Educational Technology (BJET)
- Computers & Education
- Future Generation Computer Systems

- IEEE Access
- IEEE Transactions on Affective Computing (TAFFC)
- IEEE Transactions on Learning Technologies (TLT)
- Image and Vision Computing (IMAVIS)
- Information Sciences
- International Journal of Artificial Intelligence in Education (IJAIED)
- International Journal of Human–Computer Interaction (IJHCI)
- Learning and Individual Differences
- PLoS ONE
- Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
- Psychometrika

Conference Reviews

- AAAI Conference on Artificial Intelligence, 2016, 2021
- ACM CHI Conference on Human Factors in Computing Systems, 2017–2021
- ACM International Conference on Multimodal Interaction (ICMI), 2014–2020
- IEEE Conference on Automatic Face and Gesture Recognition (FG), 2018–2020
- IEEE Winter Conference on Applications of Computer Vision (WACV), 2020
- International Conference of the Learning Sciences (ICLS), 2018
- International Conference on Affective Computing and Intelligent Interaction (ACII), 2015, 2017, 2019
- International Conference on Artificial Intelligence in Education (AIED), 2017–2021
- International Conference on Educational Data Mining (EDM), 2014, 2015, 2017–2021

Conference Chairing

- Industry Track Co-chair, Educational Data Mining (EDM) Conference, 2020

Workshop Organization

- Co-chair/organizer, *Fairness, Accountability, and Transparency in Educational Data* workshop held at the Educational Data Mining 2020 conference (<https://fatedm.inria.fr/>)

Workshop and Symposium Reviews

- AAAI Workshop on AI Education, 2021
- APA Technology, Mind, and Society (TMS), 2019
- EDMGAMES Workshop at the Educational Data Mining Conference, 2019
- EuroCSS Workshop on Biases in Social Computing Data and Technology, 2018
- IJCAI Workshop on Artificial Intelligence in Affective Computing, 2017
- International Workshop on Empathetic Computing, 2014, 2015

- Society of Research on Educational Effectiveness Spring Conference (SREE), 2019, 2020

Grant/Fellowship Proposals Reviews and Panels

- NSF Information & Intelligent Systems Division, 2020
- UIUC Campus Research Board (3), 2020
- Technology Innovation in Educational Research and Design (TIER-ED) Pilot Projects (2), 2019
- Technology Innovation in Educational Research and Design (TIER-ED) Student Fellows (1), 2020

Service and Outreach

- STEM For All Video Showcase Presenter (TERC), 2020
- MS/IM Program Committee, School of Information Sciences, UIUC, 2019–2021
- Research Advisory Committee, School of Information Sciences, UIUC, 2019–2021
- Admissions Committee, School of Information Sciences, UIUC, 2019
- Illinois Science Olympiad State Tournament Judge, 2017–2019
- Northern Indiana Regional Science and Engineering Fair Judge, 2015, 2016
- University of Notre Dame Computer Science Graduate Student Board, 2014–2015, 2015–2016
- Notre Dame National Robotics Week Presenter, 2013