

Nigel Bosch

Curriculum Vitae

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School of Information Sciences and Department of Educational Psychology
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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 (75%)
Assistant Professor, Department of Educational Psychology (25%)
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

Grants as Principal Investigator (PI)

- 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 (NSF DUE #2000638). 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.

Grants as Co-PI

- 2022–2025 FairFL-MC: A Metacognitive Calibration Intervention Powered by Fair and Private Machine Learning (\$850,000). National Science Foundation (NSF IIS #2202481). Co-PI.
- 2021–2026 Towards a Wearable Alcohol Biosensor: Examining the Accuracy of BAC Estimates from New-Generation Transdermal Technology using Large-Scale Human Testing and Machine Learning Algorithms (\$2,222,481). National Institutes of Health (NIH #R01AA028488). Co-I.
- 2020–2022 Assessing Eye Movement Scanpaths in Source Code Comprehension (\$151,998). Sandia National Laboratories. Co-PI.
- 2019–2022 Advancing Computational Grounded Theory for Audiovisual Data from STEM Classrooms (\$1,313,855). National Science Foundation (NSF DRL #1920796). Co-PI.
- 2018–2022 Underrepresented Student Learning in Online Introductory STEM College Courses (\$1,399,194). Institute of Education Sciences (IES #R305A180211). Co-PI.

Other Grants

- 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

- LAK 2022 Finalist for Best Short Paper Award (International Conference on Learning Analytics & Knowledge)
- EDM 2020 Finalist for Best Paper Award (International Conference on Educational Data Mining)

- AIED 2018 Best Student Paper Award (International Conference on Artificial Intelligence in Education)
- UMAP 2017 Best Student Paper Award (Conference on User Modeling, Adaptation, and Personalization)
- EDM 2017 Best Student Paper Award (International Conference on Educational Data Mining)
- AIED 2015 Best Paper Award (International Conference on Artificial Intelligence in Education)
- EDM 2015 Best Student Paper Award (International Conference on Educational Data Mining)
- IUI 2015 Finalist for Best Paper Award (International Conference on Intelligent User Interfaces)
- ICSE 2014 ACM Distinguished Paper Award (International Conference on Software Engineering)

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

- Ariss, T., Fairbairn, C. E., & **Bosch, N.** (in press). Examining new-generation transdermal alcohol biosensor performance across laboratory and field contexts. *Alcoholism: Clinical & Experimental Research*. DOI: [10.1111/acer.14977](https://doi.org/10.1111/acer.14977)
- Belitz, C., Ocumpaugh, J., Ritter, S., Baker, R. S., Fancsali, S. E., & **Bosch, N.** (in press). Constructing categories: Moving beyond protected classes in algorithmic fairness. *Journal of the Association for Information Science and Technology*. DOI: [10.1002/asi.24643](https://doi.org/10.1002/asi.24643)
- Jeng, A., **Bosch, N.**, & Perry, M. (in press). Sense of belonging predicts perceived helpfulness in online peer help-giving interactions. *The Internet and Higher Education*. DOI: [10.1016/j.iheduc.2022.100901](https://doi.org/10.1016/j.iheduc.2022.100901)
- Zhang, Y., Paquette, L., Baker, R. S., **Bosch, N.**, Ocumpaugh, J., & Biswas, G. (in press). How are feelings of difficulty and familiarity linked to learning behaviors and gains in a complex science learning task? *European Journal of Psychology of Education*. DOI: [10.1007/s10212-022-00616-x](https://doi.org/10.1007/s10212-022-00616-x)
- Bosch, N.** & D’Mello, S. K. (2022). Can computers outperform humans in detecting user zone-outs? Implications for intelligent interfaces. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 29(2), 1-33. DOI: [10.1145/3481889](https://doi.org/10.1145/3481889)
- Hickman, L., **Bosch, N.**, Ng, V., Saef, R., Tay, L., & Woo, S. E. (2022). Automated video interview personality assessments: Reliability, validity, and generalizability investigations. *Journal of Applied Psychology*, 107(8), 1323-1351. DOI: [10.1037/apl0000695](https://doi.org/10.1037/apl0000695)
- Zhang, Y., Paquette, L., **Bosch, N.**, Ocumpaugh, J., Biswas, G., Hutt, S., & Baker, R. S. (2022). The evolution of metacognitive strategy use in an open-ended learning environment: Do prior domain knowledge and motivation play a role? *Contemporary Educational Psychology*, 69, 102064:1-14. DOI: [10.1016/j.cedpsych.2022.102064](https://doi.org/10.1016/j.cedpsych.2022.102064)
- Bosch, N.** & Paquette, L. (2021). What’s next? Sequence length and impossible loops in state transition measurement. *Journal of Educational Data Mining*, 13(1), 1-23. DOI: [10.5281/zenodo.5048423](https://doi.org/10.5281/zenodo.5048423)

- Bosch, N.** (2021). Identifying supportive student factors for mindset interventions: A two-model machine learning approach. *Computers & Education*, 167, 104190:1-15. DOI: [10.1016/j.compedu.2021.104190](https://doi.org/10.1016/j.compedu.2021.104190)
- Bosch, N.** (2021). AutoML feature engineering for student modeling yields high accuracy, but limited interpretability. *Journal of Educational Data Mining*, 13(2), 55-79. DOI: [10.5281/zenodo.5275314](https://doi.org/10.5281/zenodo.5275314)
- Bosch, N.** & D’Mello, S. K. (2021). Automatic detection of mind wandering from video in the lab and in the classroom. *IEEE Transactions on Affective Computing*, 12(4), 974-988. DOI: [10.1109/TAFFC.2019.2908837](https://doi.org/10.1109/TAFFC.2019.2908837)
- Fairbairn, C. E. & **Bosch, N.** (2021). A new generation of transdermal alcohol biosensing technology: Practical applications, machine learning analytics, and questions for future research. *Addiction*, 116(10), 2912-2920. DOI: [10.1111/add.15523](https://doi.org/10.1111/add.15523)
- Gurrieri, L., Fairbairn, C. E., Sayette, M. A., & **Bosch, N.** (2021). Alcohol narrows physical distance between strangers. *Proceedings of the National Academy of Sciences*, 118(20), e2101937118:1-3. DOI: [10.1073/pnas.2101937118](https://doi.org/10.1073/pnas.2101937118)
- Hickman, L., Saef, R., Ng, V., Woo, S. E., Tay, L., & **Bosch, N.** (2021). Developing and evaluating language-based machine learning algorithms for inferring applicant personality in video interviews. *Human Resource Management Journal*. DOI: [10.1111/1748-8583.12356](https://doi.org/10.1111/1748-8583.12356)
- Williams-Dobosz, D., Jeng, A., Azevedo, R. F. L., **Bosch, N.**, Ray, C., & Perry, M. (2021). Ask for help: Online help-seeking and help-giving as indicators of cognitive and social presence for students underrepresented in chemistry. *Journal of Chemical Education*, 98(12), 3693-3703. DOI: [10.1021/acs.jchemed.1c00839](https://doi.org/10.1021/acs.jchemed.1c00839)
- Zhang, Y., Paquette, L., Baker, R. S., Ocumpaugh, J., **Bosch, N.**, Biswas, G., & Munshi, A. (2021). Can strategic behavior facilitate confusion resolution? The interplay between confusion and metacognitive strategies in Betty’s Brain. *Journal of Learning Analytics*, 8(3), 28-44. DOI: [10.18608/jla.2021.7161](https://doi.org/10.18608/jla.2021.7161)
- 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. DOI: [10.1016/j.drugalcdep.2020.108205](https://doi.org/10.1016/j.drugalcdep.2020.108205)
- 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. DOI: [10.1007/s11257-019-09228-5](https://doi.org/10.1007/s11257-019-09228-5)
- 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. DOI: [10.1016/j.compedu.2018.12.007](https://doi.org/10.1016/j.compedu.2018.12.007)
- Bosch, N.** & Paquette, L. (2018). Metrics for discrete student models: Chance levels, comparisons, and use cases. *Journal of Learning Analytics*, 5(2), 86-104. DOI: [10.18608/jla.2018.52.6](https://doi.org/10.18608/jla.2018.52.6)
- Bosch, N.** & D’Mello, S. K. (2017). The affective experience of novice computer programmers. *International Journal of Artificial Intelligence in Education*, 27(1), 181-206. DOI: [10.1007/s40593-015-0069-5](https://doi.org/10.1007/s40593-015-0069-5)

- 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. DOI: [10.1109/TAFFC.2016.2515084](https://doi.org/10.1109/TAFFC.2016.2515084)
- 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), 17:1-17:26. DOI: [10.1145/2946837](https://doi.org/10.1145/2946837)
- Shute, V. J., D’Mello, S. K., Baker, R., Cho, K., **Bosch, N.**, Ocumpaugh, J., Ventura, M., & 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. DOI: [10.1016/j.compedu.2015.08.001](https://doi.org/10.1016/j.compedu.2015.08.001)

Peer-reviewed Published Conference Proceedings

- Hur, P., Machaka, N., Krist, C., & **Bosch, N.** (in press). Informing expert feature engineering through automated approaches: Implications for coding qualitative classroom video data. *Proceedings of the 13th International Conference on Learning Analytics & Knowledge (LAK '23)*.
- Denny, P., Becker, B. A., **Bosch, N.**, Prather, J., Reeves, B., & Whalley, J. (2022). Novice reflections during the transition to a new programming language. *Proceedings of the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE)*, pp. 948-954. DOI: [10.1145/3478431.3499314](https://doi.org/10.1145/3478431.3499314)
- Hur, P., Lee, H., Bhat, S., & **Bosch, N.** (2022). Using machine learning explainability methods to personalize interventions for students. *Proceedings of the 15th International Conference on Educational Data Mining (EDM 2022)*, pp. 438-445. DOI: [10.5281/zenodo.6853181](https://doi.org/10.5281/zenodo.6853181)
- Hur, P. & **Bosch, N.** (2022). Tracking individuals in classroom videos via post-processing OpenPose data. *Proceedings of the 12th International Conference on Learning Analytics & Knowledge (LAK '22)*, pp. 465-471. DOI: [10.1145/3506860.3506888](https://doi.org/10.1145/3506860.3506888)
- Jiang, L. & **Bosch, N.** (2022). Mining and assessing anomalies in students’ online learning activities with self-supervised machine learning. *Proceedings of the 15th International Conference on Educational Data Mining (EDM 2022)*, pp. 549-554. DOI: [10.5281/zenodo.6852948](https://doi.org/10.5281/zenodo.6852948)
- Prather, J., Margulieux, L., Whalley, J., Denny, P., Reeves, B. N., Becker, B. A., Singh, P., Powell, G., & **Bosch, N.** (2022). Getting by with help from my friends: Group study in introductory programming understood as socially shared regulation. *Proceedings of the 18th ACM Conference on International Computing Education Research (ICER 2022)*, pp. 164–176. DOI: [10.1145/3501385.3543970](https://doi.org/10.1145/3501385.3543970)
- Stinar, F. & **Bosch, N.** (2022). Algorithmic unfairness mitigation in student models: When fairer methods lead to unintended results. *Proceedings of the 15th International Conference on Educational Data Mining (EDM 2022)*, pp. 606-611. DOI: [10.5281/zenodo.6853135](https://doi.org/10.5281/zenodo.6853135)
- Belitz, C., Jiang, L., & **Bosch, N.** (2021). Automating procedurally fair feature selection in machine learning. *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society (AIES '21)*, pp. 379-389. DOI: [10.1145/3461702.3462585](https://doi.org/10.1145/3461702.3462585)
- Bosch, N.**, Zhang, Y., Paquette, L., Baker, R. S., Ocumpaugh, J., & Biswas, G. (2021). Students’ verbalized metacognition during computerized learning. *Proceedings of the 2021 CHI*

Conference on Human Factors in Computing Systems (CHI '21), pp. 680:1-680:12. DOI: [10.1145/3411764.3445809](https://doi.org/10.1145/3411764.3445809)

- Hutt, S., Ocumpaugh, J., Andres, J. M. A. L., Munshi, A., **Bosch, N.**, Baker, R. S., Zhang, Y., Paquette, L., Slater, S., & Biswas, G. (2021). Who's stopping you? Using microanalysis to explore the impact of science anxiety on self-regulated learning operations. *Proceedings of the Annual Meeting of the Cognitive Science Society*, pp. 1409-1415.
- Hutt, S., Ocumpaugh, J., Andres, J. M. A. L., **Bosch, N.**, Paquette, L., Biswas, G., & Baker, R. S. (2021). Investigating SMART models of self-regulation and their impact on learning. *Proceedings of the 14th International Conference on Educational Data Mining (EDM 2021)*, pp. 580-587.
- Jiang, L. & **Bosch, N.** (2021). Predictive sequential pattern mining via interpretable convolutional neural networks. *Proceedings of the 14th International Conference on Educational Data Mining (EDM 2021)*, pp. 761-766.
- 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)*, pp. 207-215. DOI: [10.1145/3448139.3448159](https://doi.org/10.1145/3448139.3448159)
- 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.
- D'Angelo, C., Dyer, E., Krist, C., 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.
- Dyer, E., D'Angelo, C., **Bosch, N.**, Krist, C., & 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.
- 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. DOI: [10.1007/978-3-030-52237-7_17](https://doi.org/10.1007/978-3-030-52237-7_17)
- Hoang, L., Boyce, R. D., **Bosch, N.**, Stottlemeyer, B. A., Brochhausen, M., & Schneider, J. (2020). Automatically classifying the evidence type of drug-drug interaction research papers as a step toward computer supported evidence curation. *Proceedings of the American Medical Informatics Association (AMIA) Annual Meeting*, pp. 554-562.
- 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.
- 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.

- 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.
- 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.
- 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. DOI: [10.1145/3375462.3375518](https://doi.org/10.1145/3375462.3375518)
- 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 Conference on Learning Analytics & Knowledge (LAK19)*, pp. 383-390. DOI: [10.1145/3303772.3303807](https://doi.org/10.1145/3303772.3303807)
- Bosch, N.**, Huang, E., Angrave, L., & Perry, M. (2019). Modeling improvement for underrepresented minorities in online STEM education. *Proceedings of the 27th Conference on User Modeling, Adaptation and Personalization (UMAP 2019)*, pp. 327-335. DOI: [10.1145/3320435.3320463](https://doi.org/10.1145/3320435.3320463)
- 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. DOI: [10.1109/ACII.2019.8925506](https://doi.org/10.1109/ACII.2019.8925506)
- 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. DOI: [10.1007/978-3-030-23204-7_25](https://doi.org/10.1007/978-3-030-23204-7_25)
- 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. McLaren, & B. du Boulay (Eds.), *Proceedings of the 19th International Conference on Artificial Intelligence in Education (AIED 2018)*, pp. 30-42. DOI: [10.1007/978-3-319-93843-1_3](https://doi.org/10.1007/978-3-319-93843-1_3)
- Bosch, N.**, Crues, R. W., Henricks, G. M., Perry, M., Angrave, L., Shaik, N., Bhat, S., & Anderson, C. J. (2018). Modeling key differences in underrepresented students' interactions with an online STEM course. *Proceedings of TechMindSociety '18*, pp. 6:1-6:6. DOI: [10.1145/3183654.3183681](https://doi.org/10.1145/3183654.3183681)
- 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.
- 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. 177-186.
- Crues, R. W., **Bosch, N.**, Perry, M., Angrave, L., Shaik, N., & Bhat, S. (2018). Refocusing the lens on engagement in MOOCs. In R. Luckin, S. Klemmer, & K. R. Koedinger (Eds.),

- Proceedings of the 5th ACM Conference on Learning@Scale (L@S 2018)*, pp. 11:1-11:10. DOI: [10.1145/3231644.3231658](https://doi.org/10.1145/3231644.3231658)
- Jiang, Y., **Bosch, N.**, Baker, R. S., Paquette, L., Ocumpaugh, J., Andres, J. M. A. L., Moore, A. L., & Biswas, G. (2018). Expert feature-engineering vs. deep neural networks: Which is better for sensor-free affect detection? In C. P. Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, B. McLaren, & B. du Boulay (Eds.), *Proceedings of the 19th International Conference on Artificial Intelligence in Education (AIED 2018)*, pp. 198-211. DOI: [10.1007/978-3-319-93843-1_15](https://doi.org/10.1007/978-3-319-93843-1_15)
- 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.
- 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.
- 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. *Proceedings of the 2017 Conference on User Modeling, Adaptation, and Personalization (UMAP 2017)*, pp. 94-103. DOI: [10.1145/3079628.3079669](https://doi.org/10.1145/3079628.3079669)
- 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. Tan (Eds.), *Practitioner Track Proceedings of the 7th International Conference on Learning Analytics & Knowledge (LAK17)*, pp. 6-12.
- 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.
- 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. DOI: [10.1007/978-3-319-61425-0_30](https://doi.org/10.1007/978-3-319-61425-0_30)
- Bosch, N.** (2016). Detecting student engagement: Human versus machine. *Proceedings of the 2016 Conference on User Modeling, Adaptation, and Personalization (UMAP 2016)*, pp. 317-320. DOI: [10.1145/2930238.2930371](https://doi.org/10.1145/2930238.2930371)
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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. DOI: [10.1007/978-3-319-07221-0_3](https://doi.org/10.1007/978-3-319-07221-0_3)

Rodeghero, P., McMillan, C., McBurney, P. W., **Bosch, N.**, & D’Mello, S. K. (2014). Improving automated source code summarization via an eye-tracking study of programmers. *Proceedings of the 36th International Conference on Software Engineering (ICSE 2014)*, pp. 390–401. DOI: [10.1145/2568225.2568247](https://doi.org/10.1145/2568225.2568247)

Bosch, N., D’Mello, S. K., & 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. DOI: [10.1007/978-3-642-39112-5_2](https://doi.org/10.1007/978-3-642-39112-5_2)

Bosch, N. & D’Mello, S. K. (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. DOI: [10.1007/978-3-642-39112-5_143](https://doi.org/10.1007/978-3-642-39112-5_143)

Mills, C., D’Mello, S. K., 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. DOI: [10.1007/978-3-642-39112-5_8](https://doi.org/10.1007/978-3-642-39112-5_8)

Book Chapters

Hutt, S., Baker, R. S., Ocumpaugh, J., Munshi, A., Andres, J. M. A. L., Karumbaiah, S., Slater, S., Biswas, G., Paquette, L., **Bosch, N.**, & van Velsen, M. (2022). Quick Red Fox: An app supporting a new paradigm in qualitative research on AIED for STEM. *Artificial Intelligence in STEM Education*, pp. 319-332.

Paquette, L. & **Bosch, N.** (2020). The invisible breadcrumbs of digital learning: How learner actions inform us of their experience. *Handbook of Research on Digital Learning*, pp. 302-316. DOI: [10.4018/978-1-5225-9304-1.ch019](https://doi.org/10.4018/978-1-5225-9304-1.ch019)

D’Mello, S. K., **Bosch, N.**, & Chen, H. (2018). Multimodal-multisensor affect detection. *The Handbook of Multimodal-Multisensor Interfaces, Volume 2: Signal Processing, Architectures, and Detection of Emotion and Cognition*, pp. 167-202. DOI: [10.1145/3107990.3107998](https://doi.org/10.1145/3107990.3107998)

Peer-reviewed Workshop Papers

Lee, H., Hur, P., Bhat, S., & **Bosch, N.** (2021). Promoting self-regulated learning in online learning by triggering tailored interventions. In R. S. Baker, C. Mills, & U. Boser (Eds.), *CEUR Workshop Proceedings: Joint Workshops at the International Conference on Educational Data Mining*, 1-8.

Bosch, N. & Paquette, L. (2017). Unsupervised deep autoencoders for feature extraction with educational data. *Deep Learning with Educational Data Workshop at the 10th International Conference on Educational Data Mining*.

Bosch, N. & D’Mello, S. K. (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. K. (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.

Invited Talks/Seminars

- *Privacy and Big Data in Postsecondary Education*. Building a Multidimensional Future: A Conversation on Big Data and Educational Measurement, National Council on Measurement in Education Annual Meeting. June 1, 2021.
- *Learning about Learning from Unstructured Classroom Data*. AAAI Spring Symposium on Artificial Intelligence for K–12 Education. March 22, 2021.
- *Hyperparameter Tuning in Machine Learning for Student Models*. Learning Analytics Learning Network. October 20, 2020.

Teaching and Mentorship

Teaching and Tutoring Activities

- University of Illinois Urbana–Champaign
 - Instructor, *Concepts of Machine Learning* (IS 390CML) – Spring 2022, Fall 2022
 - Instructor, *Data, Statistical Models, and Information* (IS 542/507) – Fall 2019, Spring 2020, Fall 2020, Fall 2021
 - 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 (IS 592/589) – Fall 2019 (1), Spring 2020 (3), Fall 2020 (1), Spring 2021 (2), Summer 2021 (1), Spring 2022 (2), Summer 2022 (4)
 - Information Sciences undergraduate independent study advisor (IS 389) – Spring 2022 (1)
 - Educational Psychology independent study advisor (EPSY 595) – Fall 2020 (1), Summer 2021 (1), Spring 2022 (1), Fall 2022 (1)
 - Informatics independent study advisor (INFO 597) – Fall 2020 (1)
 - Informatics individual undergraduate research (INFO 199/399) – Fall 2020 (1), Spring 2021 (1), Spring 2022 (1)
 - Guest Lecturer, *AI Applications in Education* (CS 498)
 - Guest Lecturer, *Research Design for Information Sciences* (IS 204)
 - 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, Fall 2021
- Learning Analytics Learning Network tutorial event organizer/presenter – October 2020

Doctoral Advising

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

Master's Students Mentored

- University of Illinois Urbana–Champaign
 - Sree Balasubramanian, MS in Information Management, 2022
 - Rohan Salvi, MS in Information Management, 2022
 - Vel Wu, MS in Information Management, 2020, First employment: Data engineer at Groundhog Technologies
 - Aditya Kadrekar, MS in Information Management, 2020, First employment: Data scientist at Cargill, Inc.
 - Lan Jiang, MS in Information Management (2019–2020, First employment: PhD student at UIUC)
 - Tre Tomaszewski, MS in Bioinformatics (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, First employment: Graduate student at UIUC)
 - Alistair Nunn (2020–2021)
 - Zihan (Crescent) Xiong (2020–2022, First employment: Graduate student at UPenn)
 - 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)
- Addiction
- American Educational Research Journal (AERJ)
- 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)
- International Journal of STEM Education
- Journal of Educational Data Mining (JEDM)
- Journal of Educational Psychology
- Journal of Learning Analytics (JLA)
- Learning and Individual Differences
- Pattern Recognition
- PLoS ONE
- Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
- Psychometrika
- The Internet and Higher Education

Conference Reviews (Senior Program Committee)

- ACM International Conference on Multimodal Interaction (ICMI)
- International Conference on Artificial Intelligence in Education (AIED)

Conference Reviews (Program Committee)

- AAAI Conference on Artificial Intelligence
- ACM CHI Conference on Human Factors in Computing Systems
- ACM Conference on Fairness, Accountability, and Transparency (FAccT)
- IEEE Conference on Automatic Face and Gesture Recognition (FG)
- IEEE Winter Conference on Applications of Computer Vision (WACV)
- International Conference of the Learning Sciences (ICLS)
- International Conference on Affective Computing and Intelligent Interaction (ACII)
- International Conference on Educational Data Mining (EDM)
- International Learning Analytics and Knowledge (LAK) Conference

Conference Chairing

- Program Committee Co-chair, Educational Data Mining (EDM) Conference, 2022
- 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
- APA Technology, Mind, and Society (TMS)
- EDMGAMES Workshop at the Educational Data Mining Conference
- EuroCSS Workshop on Biases in Social Computing Data and Technology
- IJCAI Workshop on Artificial Intelligence in Affective Computing
- International Workshop on Empathetic Computing
- Society of Research on Educational Effectiveness Spring Conference (SREE)

Grant/Fellowship Proposals Reviews and Panels

- Ad-hoc reviewer, National Institutes of Health (NIH)
- Ad-hoc reviewer, Natural Sciences and Engineering Research Council of Canada (NSERC)
- Panelist, Institute of Education Sciences (IES)
- Panelist, National Science Foundation (NSF) Division of Graduate Education
- Panelist, NSF Information & Intelligent Systems Division
- Ad-hoc reviewer, UIUC Technology Innovation in Educational Research and Design (TIER-ED) Pilot Projects

- Ad-hoc reviewer, UIUC Technology Innovation in Educational Research and Design (TIER-ED) Student Fellows
- Ad-hoc reviewer, UIUC Campus Research Board

Service and Outreach

- STEM For All Video Showcase Presenter (TERC), 2020, 2021, 2022
- Doctoral Studies Committee, School of Information Sciences, UIUC, 2022–2023
- MS/IM Program Committee, School of Information Sciences, UIUC, 2019–2022
- Research Advisory Committee, School of Information Sciences, UIUC, 2019–2023
- 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