BUSHRA FERDOUSI

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FIELD OF INTEREST

Database, Graphics Programming, Visualization, Machine Learning

EMPLOYMENT

Lecturer(Limited Term) | ***Management Information Systems*** Aug. 2024 – Present
Purdue University, Mitchell E. Daniels, Jr. School of Business West Lafayette, IN, USA

EDUCATION

Ph.D. in Technology | ***Computer Graphics and Technology*** Aug. 2018 – May. 2024
Purdue University West Lafayette, IN, USA

Dissertation: *Graphics Application of Emergent Behavior of Nature-inspired Models.*

Committee: Tim McGraw(Chair), David M Whittinghill, Esteban Garcia, and Nandhini Giri

Master of Science | ***Computer Science and Engineering*** Jun. 2014 – Nov. 2015
United International University Dhaka, Bangladesh

Thesis title: *Cough Detection Using Speech Analysis.*

Advisor: Mohammad Nurul Huda

Bachelor of Science | ***Computer Science and Engineering*** Jun. 2009 – Dec. 2013
Ahsanullah University of Science and Technology Dhaka, Bangladesh

Project title: *Result Processing System of Ahsanullah University of Science and Technology.*

TEACHING EXPERIENCE

Graduate Teaching Assistant | ***Computer Science, Computer Graphics and Technology*** Aug. 2018 – Present
Purdue University West Lafayette, IN, USA

- Courses: Information Systems(CS 348), Introduction To Relational Database Systems (CS 448), Programming in C (CS 240), and Introduction to 3D Spatial Visualization Schedule (TECH 199)

RESEARCH EXPERIENCE

Graduate Research Assistant | ***Computer Science*** May. 2021 – Jul. 2021
Purdue University West Lafayette, IN, USA

- Project: Image processing on Microscopic Images.

INDUSTRY EXPERIENCE

Junior Software Engineer | ***Software Comp.*** Oct. 2013 – Mar. 2014
NNS Solution Dhaka, Bangladesh

- Software: Eastern Bank Limited(EBL) Dispatch Management System.

PROJECTS AND RESEARCH

Interactive Differential Growth with Vector Field | ***Python*** Fall 2023
Purdue University

In this research, software is employed to explore the utilization of vector fields and differential growth techniques for pattern formation tasks. The primary objective is to assess whether users can effectively utilize the software for pattern creation. The study also aims to gather users opinions on the software's usability. To measure this effectiveness, patterns created by users are collected as images, along with data on Activity Log file, Task Duration, Image Quality Assessment, and Post-task Survey responses.

Emergent Behavior of Multiple Physarum Species with Reaction Diffusion Texture | ***OpenGL, C++*** Fall 2022
Purdue University

This research integrates two nature-inspired techniques, Physarum and Reaction Diffusion Texture, with the objective of observing the emergence of patterns such as spots, islands, and seamless patterns. The study involves manipulating the features of both techniques within multiple Physarum species to understand how their combined effects contribute to the formation of complex patterns.

Physarum Model Implementation | ***OpenGL, C++*** Fall 2021
Purdue University

This research work explores emergent behavior in artificial life simulations inspired by the slime mold Physarum polycephalum. The simulation involves dividing the protoplasm agents into multiple groups and introducing rules encouraging conflict between them. The study observes complex patterns and behaviors arising from these interactions. Influenced by parameters such as sensor distance and speed, the simulations produce a variety of patterns, including reticular, labyrinthine, and more diverse formations.

Image Processing on Microscopic Images | ***OpenCV, Python*** Summer 2021
Purdue University

This project applies two approaches of OpenCV for stitching multiple microscopic and natural images. The approaches involve key features such as keypoint detection, feature matching, perspective warping, remove noisy images, etc., to achieve seamless image stitching.

Visible Human Clipping | ***OpenGL, C++*** Spring 2020
Purdue University

The Visible Human Clipping is research-focused software that specializes in the volume rendering of the *Voxel-Man dataset*. This dataset comprises a three-dimensional image dataset of the human body. The software employs a 3D texture-based ray-casting approach to render the human body, enabling users to interactively clip the body and obtain an internal view.

Animated Short Story | ***Maya*** Fall 2018
Purdue University

In this project, two storyboards and animations, each lasting at least 30 seconds, were created to convey a positive and negative dialogue. The animations were developed using various features of the Maya software, utilizing rendering and animation techniques.

Cough Detection Using Speech Analysis | ***Machine Learning, MATLAB*** Fall 2014
United International University

This research addresses cough detection, a common issue associated with the common cold, affecting speech patterns. Two sets of representative features derived from speech recordings in normal and cough states. Three different machine learning classification algorithms: Support Vector Machine (SVM), Bayesian Classifier, and Neural Network, to analyze speech recordings and the research conclude Bayesian Classifier is the most effective classifies for the dataset to detect cough state.

Conference Publications

Interactive Differential Growth with Vector Field Jan. 2024
Work-in-progress

Red versus blue: Slime mold civil war Dec. 2021
SIGGRAPH-ASIA

McGraw, T., & Ferdousi, B. (2021). Red versus blue: Slime mold civil war. In SIGGRAPH Asia 2021 Posters (pp. 1-2).

Cough Detection Using Speech Analysis Dec. 2015
18th International Conference on Computer and Information Technology (ICCIT)

Ferdousi, B., Ferdous, S. M., Abdullah-Al-Mamun, K., & Huda, M. N. (2015, December). Cough detection using speech analysis. In 2015 18th International Conference on Computer and Information Technology (ICCIT) (pp. 60-64). IEEE.

Journals Publication

A Survey of Artificial Life and Nature-inspired Techniques in Computer Graphics and Visualization Aug. 2023
International Journal of Image Graphics and Signal Procession $(IJIGSP)$

Ferdousi, B., & McGraw, T. (2024). A Survey of Artificial Life and Nature-inspired Techniques in Computer Graphics and Visualization. International Journal of Image, Graphics and Signal Processing(IJIGSP), 16(1), 113. DOI:10.5815/ijigsp.2024.01.01

Scholarship

Polytechnic Institute Graduate Student Scholarship Fall 2022 - Spring 2023
Merit based grant for students academic performance.

Community Involvement

Cultural Secretary Aug. 2021 – Jun. 2022
Bangladesh Student Association, Purdue University

Volunteer Caricaturists Apr. 2018 , Apr. 2019, Jun. 2018
Purdue Spring Fest, Taste of Tippecanoe

Skills

Languages: English, Bengali(Native)
Programming: Python , MATLAB, OpenGL, C++, LaTeX
Misc.: Academic research, teaching, video making tutorial
Cartoon: Comic script, character design, caricature, storyboard

References

Dr. Tim McGraw
Associate Professor, Department of Computer Graphics Technology, Purdue University
Email: tmcgraw@purdue.edu, Phone: 765-494-0483
Affiliation: Dr. Tim McGraw is my academic advisor for my Ph.D. program.

Dr. Esteban Garcia Bravo
Associate Professor, Department of Computer Graphics Technology, Purdue University
Email: garcia0@purdue.edu, Phone: 765-631-6370
Affiliation: Dr. Esteban Garcia Bravo is my Ph.D. committee member and course instructor.

Dr. Hisham R. Benotman
Assistant Professor of Practice, Department of Computer Science, Purdue University
Email: hbenotma@purdue.edu
Affiliation: I have served as a GTA for Dr. Hisham R. Benotman's course for more than seven semesters.