Date : January 24 2019

**To Whom It May Concern**

I am writing to you in support of Ms. Shivika Bisen and her desire to pursue a graduate degree at your university. I have known her since her sophomore year at VIT University when I taught her the course **‘Artificial Neural Networks’**. Being a professor in the School of Computing Sciences and Engineering, this was the first instance I had taught these elective courses for the Biomedical Engineering program and with a different purview. During the course of teaching Artificial Neural Networks, I implemented activities-based learning. Shivika was one of the few students who could apply theory to practice, very quickly. There were seminars/presentations by the students as a part of assignments, during which I noticed Shivika’s superior communication and presentation skills. She could explain a complex concept in the most interesting and simple way.

When I was her Research Supervisor in her Final year project, I came to know her personality even closely. She has an exceptional ability in “**Application Research**”. Her approach to learning is to come up with innovative solutions to real-world problems. Shivika’s project is one of the most outstanding research work that I have been involved with. Title of the project is- An Improved Segmentation Technique Based on Delaunay Triangulations for Breast Infiltration/Tumor Detection from Mammograms. This research is published in an International Journal of Engineering and Technology [http://www.enggjournals.com/ijet//abstract.html?file=13-05-03-133](http://www.enggjournals.com/ijet/abstract.html?file=13-05-03-133). And it has got an impressive number of citations. Students from all over the world have approached me regarding carrying her research forward. The project developed an advanced MATLAB algorithm for **unsupervised machine learning**for **Clinical Decision Support System.** **K means** c**luster analysis**and**advanced watershed algorithm**were usedfor **machine vision** and **pattern recognition**. **GUI**– **Graphical User Interface**was created to achieve this computer-aided diagnosis with specificity and sensitivity level of 97% and 99% respectively.

Shivika’s investigative abilities amazed me as her Professor. When we started the research, she volunteered at the Ministry of Health and Family Welfare, Government of India to understand the problems existing in ground reality on the topic of research i.e. breast cancer automated detection. She is a student who has a genuine interest in learning and mastering her subject of study. And when it comes to accomplishing a task, she is a go-getter. For an instance, to meet the objective of our research, advanced level of MATLAB programming was required which was beyond her curriculum of Bachelor’s coursework, the team struggled to achieve this, she tackled the situation with positive temperament. Her broad knowledge base is impressive. Due to her interdisciplinary understanding, she came up with an innovative source code and she steered the critical situation to a favourable one. Shivika has an inherent thirst for knowledge, which arises in the form of immense curiosity on the mention of any new concept. Most importantly, she has an open mind and never hesitates to experiment or question. Students like her are what make the career of professors rewarding. I am witness to her quick and effortless power of grasping complex information.

Moreover, I found Shivika to be a very driven person, who wears many hats. Of many students that I came across, she possesses a unique ability where she is able to achieve exceptional level of academic goals along with different extracurricular activities, where in she excelled too. She took up the role of Event coordinator for various events in the International Technical Fest- “GraVITas”, of the VIT University. I was the Faculty advisor for an Event associated with her. I distinctly remember her handling the given tasks and team members resourcefully. In my opinion she can accomplish most tasks single-handedly by taking initiatives, however, she thoroughly enjoys working in a team and has the ability to build and work with a team and inspire them to achieve outstanding results. She is good at developing healthy discussions and to finally create a consensus among team members that have helped her go beyond the responsibilities she takes up. There was an instance when one of her teammates was in a difference of opinion with the other team-mates; she swooped in with a calm attitude to resolve the conflict with a win-win approach. Her quick decision making, confidence and maturity were admirable.

In terms of an academic relation, she was a student who is meticulous in her student-professor interactions and continued staying in touch and maintaining strong ties. She would often come seeking advice or guidance on future prospects that she is undertaking. I believe this attribute will propel Shivika in both academic and industrial circles. I am glad about the opportunity of recommending her to a premier school like yours because I believe the two would be a perfect match. She is one of the most competent and dedicated students I have associated with. With her problem-solving abilities, discipline, perseverance and motivation, she would make an ideal candidate for a Master of Science program with suitable financial assistance.