

STATEMENT OF PURPOSE

I Kushagra Agarwal, work at Tata Consultancy Services in the Robotics Innovations Lab as a Research Engineer, aim to pursue Master's in Computer Science Program at your prestigious University.

Having learned to code in ninth standard and handled computers from a young age, I chose to pursue my Bachelor's in Computer Engineering after finishing school. I have always aced the subject with flying colors, both in school and during my undergraduate degree. My curiosity and a never-ending appetite for knowledge saw me exploring diverse areas of the limitless field, including App development, Web development, Databases, Cloud Computing, Artificial Intelligence and many more, through myriad projects, competitions, internships and courses. I even worked on something truly unique and innovative for my final year project with my peers, which was developing a chatbot application to assist Homeopathic practitioners with better diagnosis and drug recommendations to the patient. Moreover, we also published a paper based on this project which familiarized me with the way of writing for research purposes.

Learning to build websites and mobile applications alongside the coursework immensely aided during my internship; it was a lot of fun, but I was seeking for something more intriguing. Having attended numerous workshops, events, and academic courses on Artificial Intelligence and Machine Learning, demonstrating its applications in every domain, piqued my interest in the field. I took several courses on ML, Statistics and Data Analytics and created projects including a Heart Disease Prediction System and a Recommendation System utilizing models like Regression, SVM and Decision Trees. During my final year, I also mastered the fundamentals of deep learning and built a project for object detection using YOLO neural network which has really assisted me in my career.

To my delight, the profile I built over the years presented me with an opportunity to work for the India's largest IT Company as a full-time professional after my Bachelor's ended. Working as a Research Engineer in the Robotics Innovations lab at TCS, my job here is to study and build end-to-end pipelines that incorporate everything from object detection to object acquisition. I have been gaining hands-on experience in Computer Vision and Deep Learning technologies while being involved with developing Robotic Vision. Thus, in the lab

I am employing sensors like Ensenso S10 and Kinect, and even applying Image Processing concepts and various rendering techniques to create 3D models of the real world objects that will be fed to the Deep Learning models to accomplish machine perception. Besides this, I have been working on the Robot Operating System to interact with the smart machines, and have been regularly conducting research on the most favorable environment to capture and render 3D models. I am also estimating 6D poses, creating meshes, generating photorealistic synthetic data, implementing object recognition, and so forth. When I see an actual robot executing its job through the program to which I contributed, I become inspired and feel like I have accomplished something. This experience has been quite unique and enriching which has broadened my perspective and helped my thought process to evolve. Being an inquisitive person who enjoys broadening his work horizons by constantly seeking for possibilities to bring greater ideas and features to his work, a job, no matter how rewarding it is, could never stop me from craving for more.

This mindset that I have shown throughout my academic and professional career hopefully explains why I am so keen to pursue a Master's in Computer Science after gaining one year of work experience, which was necessary to make sure that I can absorb my graduate studies to the fullest. After learning about the use of Artificial Intelligence in the field of Robotics, I am keen to explore its other applications and expand my domain knowledge. After achieving the level of expertise I am currently intending to attain; by enrolling in relevant courses in your Master's program, I aspire to work as a Data Scientist, AI Engineer or Computer Vision Engineer in a tier-1 IT company in the United States that has plenty of resources and exciting projects.

Hoping to have proven myself as an eligible candidate, I have come to seek help from your esteemed university for writing the next chapter in the book of my career, I thus request a place in your vibrant academia.

Letter of Recommendation

To whomsoever it may concern,

I take pleasure in writing this letter in favor of my staff, Kushagra Agarwal, who has been working in our organization in the Robotics Innovations Lab as a Research Engineer since July-2022.

Tata Consultancy Services is an Indian multinational information technology services and consulting company. The Robotics Innovations Lab in which Kushagra is working is responsible for conducting research on smart machines and building industrial software in the field of robotics in order to make smart machines more efficient and reduce human labor.

Kushagra works on computer vision tasks, where he codes various deep learning models for robotic vision that enable smart machines to obtain machine perception. He conducts independent research, by studying research papers and other material to find optimal solutions. He is good at logic building, as he thoroughly understands concepts before implementation. With a sound understanding of artificial intelligence, programming languages, system architecture, and APIs and pipelines, he works efficiently on variety of tools and technologies that we use in our projects. Being ambitious, he is naturally driven by a curiosity to learn. As a crucial part of the project, he has created perfect 3D models and lifelike synthetic dataset of various objects and has gained laurels.

Kushagra is a well-rounded personality: be it holding subject expertise and domain knowledge, taking leadership or initiative, or being adaptable and versatile, he has it all. He has the rare emotional maturity that is important in a workplace, especially in dealing with stressful situations, which is commendable.

With all these virtues, I am sure Kushagra will make a great candidate for the graduate program at your prestigious University. I strongly believe that he can add value to his environment through his earnestness, enthusiasm, diligence, and passion for learning. So, I strongly endorse him for the program. I am available to answer any further questions that you may have of him.

Sincerely,

Rajesh Sinha
Chief Scientist
Head of Smart Machines Research & Innovation
Tata Consultancy Services
Email: rajesh.sinha@tcs.com
Mobile: +91 8130368880



Bharati Vidyapeeth
(Deemed to be University),
Pune (India)

College of Engineering, Pune



Chancellor

Prof. Dr. Shivajirao Kadam

M.Sc., Ph. D.

Pro-Chancellor

Dr. Vishwajeet Kadam

B.E., M.B.A., Ph. D.

Vice Chancellor

Dr. M.M. Salunkhe

M.Sc., Ph.D.

Principal

Dr. Anand Bhalerao

M.E., Ph.D.

- Accredited to Grade 'A*' by NAAC (Third Cycle-2017)
- Programmes Accredited by NBA
- Institute under TEQIP - II (1.1 Programme)
- 83rd Ranking at National level by NIRF
- 6th Ranking at National Level by AICTE InterShala
- AICTE - CII Survey- Platinum Category

Ref. No. : BVDUCOE /

Date : / /

Letter of Recommendation

To The Admissions Committee,

I am pleased to offer the following letter of recommendation in support of Kushagra Agarwal, who has applied for admission to the Master's in Computer Science program at your esteemed University. I can call Kushagra Agarwal an outstanding student just by looking at his perfect ten scores and the 'O' (stands for 'outstanding') grades he earned in all five subjects I taught him during his undergraduate years at Bharati Vidyapeeth University. I have directly been interacting with him since his second year of engineering when I started taking his classes on 'Principles of Data Structures' (III semester), 'Project Stage I', 'Industrial Training', and 'Seminar' (VII semester), and 'Project Stage II' (VIII semester). His active participation in the classroom, projects, seminars, and other co-curricular activities was noticeable from the beginning. And his consistency as a high-level performer became apparent over time. It was his diligence that led to his stellar scores every time.

Kushagra preferred diving deep into the core of a given subject, dissecting and understanding it at a fundamental level before moving on to the broader topics. He is incredibly gifted in working with data structures and has proved his competence by completing numerous challenging assignments and practical labs in the field. Being punctual he always turned in all his assignments on time. While learning coursework and simultaneously working on several challenging projects, he developed keen analytical and problem-solving abilities and gained a thorough knowledge of the domain. He is a bright, talented, and self-assured individual who relies on effort and is never afraid to try new things in order to achieve his objectives.

Kushagra coupled his subject expertise with his practical communication skills to deliver many praise-worthy presentations. One of his best works was the project titled, 'A Novel Medical Chatbot Utilizing BBCR Repertory for Assisting Homeopathic Practitioners in Prescribing Medicinal Remedies'. It was a multidisciplinary project sponsored by Homeopathic Practitioners. Kushagra led the team on this project, regularly updated the HOD with the project's progress, and liaised with the homeopathic practitioners. His technical contributions to the project included creating the backend and the database. Overall, this was quite the academic and managerial achievement on his part.

Additionally, I want to shine a light on his endeavours beyond the curriculum. Throughout his undergraduate years, he remained an active member of the Institution Innovation Council (IIC). He helped organize workshops and attended many seminars related to innovative ideas, start-ups, and patents under my direct supervision, since I am the IPR Cell Coordinator of the IIC.

Kushagra is punctual, quickly grasps concepts, has empathic communication skills, and is a consummate performer with perfect scores on record. Moreover, I am sure he will profoundly contribute to the student body. In my opinion, he deserves a seat in your program. Hence, I recommend him for admission to your institute.

Best Regards,

Dr. Sunita Dhotre

Assistant Professor

Department of Computer Engineering

Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune



Bharati Vidyapeeth
(Deemed to be University),
Pune (India)

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Date : / /

Letter of Recommendation

Dear Admissions Representative,

With great elation, I am writing this letter of recommendation to support Mr. Kushagra Agarwal's candidature for a Master's in Computer Science program at your University. Being the Head of the Computer Science Engineering Department at Bharati Vidyapeeth University, I have had the opportunity to teach Kushagra the course Database Management Systems in the fifth semester of his undergraduate studies. Determined by this association, I found him to be an earnest student with an array of academic and individual capacities. Thus, I am delighted to be called upon to comment on his performance and personality.

At the outset, I would like to highlight that Kushagra is a technically-keen student who demonstrated a high-level of involvement in class, as he remained at the forefront of all the activities, driven by his zeal for learning and participatory attitude. During these engagements, I could also notice that he was a benevolent person and a keen listener, which were qualities that facilitated him to work effortlessly in a team. Besides, he confidently voiced his opinions, worked assiduously on undertaken tasks, and depicted exceptional sincerity, all of which not only adorned his class participation but also made him come across as a multi-skilled individual.

Speaking of his academics, Kushagra's innate intellect, unswerving concentration during the lectures, and curiosity to get to the bottom of concepts enabled him to acquire profound technical knowledge of the subject I taught him. Besides, his learning practices were such that he always paid precedence to the subject fundamentals first, which allowed him to build a sturdy understanding over time. Owing to such rock-solid comprehensions, he aced his examinations and achieved a perfect 10-pointer grade, which was exemplary. In addition, he exhibited a stellar performance in other scholarly activities like his on-time assignment submissions, insightful topic presentations, and consistent attendance of lab sessions. I remember his presentation wherein he articulated the different database indexing techniques with great profundity and technical acumen that it impressed me greatly.

Furthermore, being a student who effectively balanced his studies and non-academic participation, Kushagra was equally avid on the co-curricular front. As someone holding a tremendous passion for technology, he was a salient member of the University's Computer Club, ACES (Association of Computer Engineering Students). As a part of this club, he not only organized a plethora of coding events, technical workshops, and hackathons, but also participated in them actively. In one of the hackathons, I remember when Kushagra, with two of his peers, came up with a solution to manage problems of budgeting among youth, where they created a prototype named "Wisey," which was an AI-based recommender system. This won them the first position, a cash prize, and abundant appreciation from the entire department. Our college chose his team to represent us at the Smart India Hackathon, which is a national event. He always tried to keep himself abreast of others in terms of technical knowledge and find ways to use latest technology to help in improving existing solutions. Lastly, Kushagra's sense of social responsibility was also evident from his involvement in the National Service Scheme Club at the University, as part of which he regularly conducted educational campaigns on social issues, hygiene awareness programs, and cleaning drives, which was commendable.

In all, I affirm that Kushagra's versatility, brilliant academic record, and massive potential make him a likely-looking candidate to take up higher studies. His time at our institute has been a testament to his dedication and passion for Computer Science, keeping up which would allow him to excel and bring laurels to your University. Thus, he has my unqualified recommendation for a Master's program.

Dr. Bindu Garg

Head of the Department, Computer Science Engineering

Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune

Kushagra Agarwal

Email Id: kushagraagarwal214@gmail.com | Phone: (+91) 9557552464 | Portfolio: <https://kushagra214.github.io>

ACADEMIC QUALIFICATION

Bharati Vidyapeeth University College of Engineering, Pune

July 2018 – July 2022

B. Tech. in Computer Engineering

CGPA - 9.58/10.00

PROFESSIONAL EXPERIENCES

Tata Consultancy Services, New Delhi

July 2022 – present

Research Engineer (Robotics Innovations Lab)

- Building Computer Vision pipelines, 3D modelling, Synthetic data generation, R-CNN, and 6D pose estimation
- Tools and Technologies - ROS 2, Python, CUDA, OpenCV, MeshLab, Open3D, Blender, Keras, TensorFlow

DistrictD, New Delhi

March 2021 – June 2021

Software Development Intern

- Coded automation scripts, updated modules, and improved UI and database performance
- Tools and Technologies – Node.js, React.js, Express.js, PostgreSQL, Sequelize, JIRA, GitLab, VS Code

RESEARCH PUBLICATIONS

- Published a paper in the *International Journal of Research and Analytical Reviews* on a novel medical chatbot utilizing BCCR Repertory for assisting Homeopathic practitioners in prescribing medicinal remedies.

ACADEMIC PROJECTS

HealthyHeart — Heart Disease Prediction System

HealthyHeart uses SVM and GridSearchCV to forecast the possibility of heart disease based on a set of parameters.

Flicker — Vehicle Detection System

Used the YOLO v3 darknet framework to detect vehicles and draw bounding boxes on them while displaying the confidence score in the input video captured via CCTV cameras.

Let's Walk — Personalized Fitness App

Let's Walk is an Android application that uses the phone's gyroscope sensor to track your daily steps, distance travelled, and calories burned. It uses the JobScheduler Activity to save battery while operating in the background.

TECHNICAL SKILLS

Technologies: Artificial Intelligence, Machine Learning, Computer Vision, Data Analysis and Cloud Computing

Languages: C, C++, Java, Python, SQL, MongoDB, HTML, JavaScript and Node.js

Software / Tools: TensorFlow, Scikit-learn, OpenCV, MATLAB, Jupyter Notebook, Tableau, Flutter, Git and Linux

CERTIFICATIONS

- Microsoft Certified: Azure Fundamentals
- Algorithmic Toolbox – University of California San Diego (Coursera)
- SQL for Data Science – University of California, Davis (Coursera)
- Data Analysis with Python - IBM Skills Network
- Machine Learning with Python – CognitiveClass.ai
- Advanced Computer Vision with TensorFlow – DeepLearning.AI

EXTRA-CURRICULAR

- Won the 2021 College Hackathon for developing a prototype of a budget management recommendation system
- Technical team leader at my College's Google Developer Student Club (2020-2021)
- Volunteered at National Security Service Club in my College, where I promoted the importance of education and hygiene in rural areas, participated in cleaning drives and spent time teaching underprivileged children
- Served as a Head boy and Discipline In-charge during school days
- Personal hobbies include playing table tennis, learning French, and working out