Motivation Letter

Kianosh Arian

Since the early days that I began working with computers, I was passionate about finding ways to make daily activities easier and more efficient using technology. This interest led me to study computer science at university, and later, during the last two years of my bachelor's degree when I started working part-time in the software engineering industry, I saw a parallel between these two parts of my life. I saw constant evolution in practices and technologies used in the Software Engineering industry (CI/CD, code review, testing, etc.) and a need for equipping developers with tools that help them navigate this industry more effectively. While in the academic scene, the advancements in machine learning methods, processing power, and big data had made it possible to research and create new tools and methods that can be beneficial to different industries. Therefore, I decided to dedicate my efforts to studying the fundamentals of computer science and the software development workflow to **research new methods and tools that can help developers make faster and better code and increase the quality of their software**.

Going a little back in time, I first discovered my passion for research while I was helping my supervisor, Dr. Fattaneh Taghiyareh, prepare her keynote speech for the International Conference on Web Research (ICWR). In this project, I read and summarized papers on subjects such as Agent Based Simulation, User Modeling and classification and discovered that I really enjoy studying the latest scientific works of experts. My bachelor's thesis, "An Eye Tracking Study on the Effect of Short-Form Videos (SFVs) on Student Attention", was the next step in my research journey. This project taught me how to do professional scientific research and collaborate with other researchers in the field, and resulted in a work that I am very proud of. This project also led to my first paper that will soon be published by the IST-2024 conference.

In the summer of my third year of university, I did an internship at Teamyab and started working as a developer in the company afterwards. During this experience, I learned to work with the newest methods and tools used in the development workflow and got to experience the career of a modern software engineer. However, while I found programming very engaging, it was not satisfying the passion that I experienced while doing research in the university, so I decided to move into the R&D section of the company. After nearly a year of programming, I changed my role technical product manager and started researching and utilizing AI tools localized for the Persian language, such as fine-tuned LLMs, speech to text, and OCR tools for the business.

My journey through academic research and gaining hands-on developer experience helped me find a new purpose for my passion of using technology to solve real-world problems. It led to my current field of research, which is to **enhance the Software Engineering process by creating new technologies and tools that aid developers create higher quality code and have greater efficiency in this matter**. To pursue this goal, I started studying the fundamentals of computer science deeply, while at the same time becoming familiar with the latest works in this field. I studied the current state of LLMs in code generation and their limitations, automated ways for code review and documentation generation, and the multi agent use of LLMs for software

engineering assistants. While this emerging field is very exciting, I believe it is important to approach it carefully. We need to ensure that the new technologies introduced to this field are secure, ethical, within the boundaries of law, and focused on helping people and society and not damaging them.

My research goal for graduate studies is to address the challenges within the software engineering process and use my knowledge of the latest technological tools to create intelligent developer tools that enhance the security, quality, readability, and efficiency of the software. I plan to achieve this goal by using methods such as few-shot learning and fine tuning language models, mining software repositories and extracting relevant data, and creating multi-agent systems and assistants that can understand the source code and provide relevant feedback for different aspects of the software. Additionally, I always make an effort to be aware of the newest methods and tools so I can integrate them into my research.

My experience in the industry has given me a good understanding on the development workflow and the issues that might arise in software engineering process while equipping me with problem solving and planning skills required in doing professional work. Additionally, my research assistantship experience in the University of Tehran made me familiar with the researching process and taught me how to study existing works and think critically about them. I am excited to pursue software engineering in my graduate studies and get to work with the best professionals in this field and learn new things from them that help me and my career propel forward.