**Letter of Recommendation**

I have been working with Vishal Devnale since he joined our group in 2014 at John Deere Technology Center India as a Graduate Engineer Trainee. He joined our project when developing with AUTOSAR was relatively new to John Deere. The project was crucial and complicated due to the impact on all product lines of John Deere by replacing the propriety operating system of next generation ECUs. We did not have much experience with AUTOSAR at that time and only a few that could be considered experts. I have guided Vishal in every phase of embedded software development from requirements gathering to validating software.

During our migration to 32-bit platforms and AUTOSAR, Vishal has demonstrated excellent analytical and debugging skills as he addressed several critical issues of varying complexity by doing thorough examinations with minimal help and support. These examinations not only require deep understanding and scrutiny of module design and implementation, but also requires understanding the behavior of AUTOSAR tools. On several occasions, with his detailed analysis and ability to define multiple use cases, he has helped the team in identifying root cause of several issues in tools and AUTOSAR modules provided by third-party vendors. He understands electronic hardware design and helped the team identify and resolve defects, improving the design of next generation ECU prototype boards.

While developing input and output hardware abstraction modules and complex device drivers, he showed his excellent communication and listening skills. He acted as a liaison between third-party vendors and product lines at John Deere. He successfully gathered requirements from multiple product lines and understood the limitations of AUTOSAR modules provided by silicon manufacturers and third-party vendors. The architecture and implementation of modules, recommended by him, were of very high quality and widely accepted by all the stakeholders. He developed numerous device drivers for ECUs, solved many software and hardware issues, explored different AUTOSAR modules and became a proficientembedded engineer with excellent skillsin developing and debugging using the C language. His detailed study of AUTOSAR modules made him grow as one of the experts at John Deere. He has developed hard real-time device drivers while adhering to AUTOSAR standards. I noticed that each successful assignment propelled him to demand more challenging work.

Vishal has proposed new workflows to align our team’s deliverables to our enterprise AUTOSAR workflow and improved reusability of deliverables. He identifies the limiting factor in our software development process - the critical determinant of quality. He focuses his energies to quickly address the limiting factors with the help of senior team members. He proposes and implements tools to automate repetitive tasks and makes time for innovation.

His proactive participation in technical discussions and brainstorming sessions demonstrate his belief in sharing knowledge openly. I have trained him on important topics like SAE J1939, virtual simulation of AUTOSAR software and hard real-time operating systems. After understanding the fundamentals of technical topics, he disseminates knowledge to his colleagues and conducts trainings in his department. I helped him in defining content for the Vector India Conference 2016. This helped him to develop a mindset of tailoring presentations to the audience.

Vishal and I had resolved many software issues. He possesses the ability to process and analyze complex problems. He has a knack for understanding complex systems by breaking them down into pieces, identifying their purpose and analyzing them thoroughly. His spirit for constant improvement and thinking deeply differentiates him from the others. He conducts himself professionally, communicates well, and possesses a well-rounded engineering skill set. It is therefore with great pleasure that I offer my endorsement of Vishal Devnale for graduate studies at your esteemed institution to enable him to pursue his goal of doing research.

Regards,

Bradley Thorvilson

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