ACKNOWLEDGEMENT

I am profusely thankful to my guide Prof. (Dr.) S. R. Kajale, Director, Shri Guru Govind Singhji, Institute of Engineering & Technology, Nanded, for his invaluable guidance throughout the complete work. It is because of his unflinching support and timely guidance that I could complete this study successfully. Here, I would like to make a special mention of the fact that I was granted easy access to his rarely available personal hours during his completely tied-up and at most busy schedule. I must quote that studentship under him was most memorable and ever-encouraging period of my life.

I can not forget the persistent and valuable support of Prof. (Dr.) B.B. Ahuja, Dy. Director, College of Engineering, Pune right from perceiving the idea till the concluding stage of the total work. I am eternally grateful to him. I shall mention my sincere thanks with a wish of remaining in his oblige.

Thanks to the thesis committee member, Prof. (Dr.) A. D. Sahasrabudhe, Chairman of the committee & Director, College of Engineering, Pune and Prof. (Dr.) S. N. Sapali, Professor Mechanical Engineering Department, College of Engineering, Pune for all of the time they invested in meeting with me and for precious guidance at all possible stages.

Above all, I would like to express my special thanks to Prof. (Dr.) S. K. Basu and Prof. (Dr.) P. K. Mishra, both professor emeritus College of Engineering, Pune for their continuous support and guidance towards completion of this work. I am also thankful to Prof. (Dr.) G.V. Parishwad, Prof. & Head, Department of Mechanical Engineering, College Of Engineering, Pune, for his help and support.

Consistent support of all the faculty colleagues from Mechanical Engineering Department, COE, Pune, specially Prof. Vikrant K. Haribhakta need to be mentioned for supporting at the crucial stages of the work. Active help of my student friends Mr. Tushar Ahire, Mr. Sanjay Padavi, Mr. Sudhir Kamble, Ms. Swati Yedekar, Mr. Sagar Parmar, Ms. Priyanka Zambre, Ms. Amrita Ashtaputre of Mechanical Engineering Department, College of Engineering, Pune is equally credited. My sincere thanks are must to the incomparable supporting hand of Mr. Sunil Patil, Mr. Sachin Karade and Mr. Saurabh Deo, Post Graduate students of College of Engineering, Pune.

I am equally grateful to technical assistance of Mr. Alok Mukherjee, Scientist F, R&DE, Dighi, Pune, Dr. V. Kumar, Dy. Director of AR&DE, Pashan, Mr. Harshad
Nemade, Managing Director, Suntech Lundriani Machine Tools Pvt. Ltd., and Mr. A. S. Dhami, Sparkler Ceramics Pvt. Ltd., Pune for their generous help in the process of experimentations and manufacturing.

I express my sincere thanks to the entire teaching and non-teaching staff members of the Mechanical Engineering Department, and Production Engineering Department, of College of Engineering, Pune.

I would also like to thank all of my friends, who are too numerous to list, in particular Mr. Satish D. Babar, Mr. Chandrakant Y. Gaikwad, Mr. Vijay Gaikwad, and ever-enthusiastic Mr. Sanjay Bhambre who always gave me their support and encouragement to complete this thesis.

Especially, I also want to thank my teachers of Camp Education Society’s School and Junior College, who have been the most instrumental throughout those years, for my academic and moral advancements. All have been wonderful and have contributed to my education and getting this far. Furthermore, I would like to acknowledge the ever encouraging suggestions and discussions with Bhadant Vimalkirti Gunasiri, Nagpur and Prof. (Dr.) V. V. Chabukswar, Nowrosjee Wadia College of Science, Pune.

My labmates & undergraduate students in the centralized Robotics and Automation lab, COEP, specially, Anupam, Nikhil, Akshay, Pushkar, Archana for active help in my research and making this work possible.

Last but not least, I would like to thank my wife Aparna for her careful and encouraging consent along with my daughters Vishakha and Sanmitraa for their team of three for understanding, wholehearted support and their acquiescence during the busy days of this work. Thanks to the similar compliances of my brothers Prabhullachandra, Nitin and my sisters in law Vaishali, Minakshi and my lovable niece Shravasti and Mrunmai.

Sincere thanks most of all to the greatest teachers in my life – my parents Mr. & Mrs. Nirmala Suresh Ohol, for always encouraging me in my thirst for knowledge, particularly when I was young, impressionable, and immature. Because of them I started academic and real life school a way ahead of my classmates, and helped me stay ahead through most of crucial stages of the career and life. They both were the driving force behind my development in my teen years and onward. You taught me the value of hard work and you allowed me the freedom to mature independently.