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### High performance reconfigurable computing with cellular automata

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# Preface

*Al-hamdu Lillahi Rabbil 'Alamin*, finally the day has arrived when I can talk about my proud PhD journey, a journey that started in the early months of 1992. Then 16, the aim was simply to keep myself safe from the on-going turmoil in Kashmir, India. Leaving my parents, friends, and hometown behind, I spent the following decade in Delhi - the control center for billion plus people. The new city embraced me and was kind enough to equip me with the right mix of skills to face the real world. I thoroughly enjoyed my Delhi days where I completed the last two years of my senior school and four years of engineering from Jamia Milia Islamia, worked for two years, made some good friends, and met my to-be life partner.

During my fresher jobs in Delhi, my interest in computing dawned upon me, and I decided to pursue a masters programme in information technology from the University of Nottingham, UK. Upon graduation, I was eyeing to work for a fortune 500 company. However, policies applicable to non-EU nationals meant— *choose later start now*, get going with the professional world right away. With an opportunity to work as a lecturer at the University of Akureyri in Iceland, I headed north in early 2003. Soon my interest in academia and research became apparent and I was collaborating with Prof. Peter Sloot's research group here at the University of Amsterdam. In August 2006, I moved to Amsterdam and finally after two years of marriage, in December 2006, my wife and I started living together. This was the first time since the start of my journey back in 90's that I finally felt at home. Yes, this has been quite a journey.

Through this journey, many people have played an important role. I would like to thank Mr. A.U. Tak, then in 2001 the District Manager for the State Bank of India, for helping me get a higher education loan for my masters in the UK. Special thanks to Prof. Mark O'Brien, then in 2003 Dean, Faculty of Computer Science at the University of Akureyri, for introducing me to academia, and a mentor during my next four years as a University Lecturer. Thanks to other colleagues at the University of Akureyri for their encouragement and help, especially Dr. Thorsteinn Gunnarsson, then rector, for all the funding and support.

Heartfelt thanks to my promoter, Prof. Peter Sloot and my co-promoter, Dr. Alfons Hoekstra for the opportunity that has changed the course of my life. It has been a privilege working with you. Alfons, you have been a great supervisor and a source of constant support and encouragement.

Special thanks to my thesis committee members, Prof. Marian Bubak, Prof. Bastien Chopard, Prof. Chris Jesshope, Prof. Miriam Leeser and Prof. Robert Meijer for their valuable suggestions and feedback.

Thank you to all my SCS colleagues. It was a pleasure sharing office space with Eric, Gokhan, Qiu, and Hannan. Thank you guys for all our interesting discussions to keep life fun. Special thanks to Eric for sharing his Fortran LBM simulation code. Thanks Bui for the relaxing ping-pong sessions, Breannan for the stimulating tech talks and Edwin for our interesting FPGA related talks. Special thanks goes to our secretariat office, especially Erik Hitipeuw for all the vital guidance and help. It was such a pleasure working with the wonderfully international mix of people at SCS, awesome, thank you SCS!

Heartiest thanks to Dr. Andy Pimentel for connecting me to the world of FPGAs and the researchers at the Leiden Embedded Research Center. During my PhD I also had the privilege of visiting EPCC at the University of Edinburgh, for one-month fully funded *visiting academic programme* through the *FPGA High Performance Computing Alliance (FHPCA)*. Thanks to Dr. Andrew McCormick and Graham Smart from Alpha-data for introducing me to Dr. Rob Baxter at EPCC. Rob's invitation to EPCC's FHPCA in February 2008 was a brilliant experience. Throughout my FPGA related work, Andrew was a huge support. Cannot imagine working with FPGAs without his expertise and kind help.

I would like to thank all my friends for being there for me. Last but not the least, I would like to thank my family for all their support, love and encouragement. Sincere thanks to my parents for their life long struggle to see my siblings and me do well in life. Thank you to my Didi and kid brother, Mujtaba for their constant guidance and love, and to my little niece, Mariam for her antics and amusing talks that have very often brightened my days. Thanks to my in-laws and extended family members for all the encouragement and duas. Finally a big thanks to my wife, Asra, for standing by me and her constant love and support through this journey, and of course, for proof reading this thesis.

Syed Murtaza