

Implementing DHS algorithms using Artix-7

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Abstract

DHS stands for Domestic Heating System. An algorithm for a low cost DHS was proposed and implemented using microcontrollers as part of an earlier research. This research presents the implementation of an efficient algorithm using the Artix-7 development board. Artix-7 is one of the latest families of Field Programmable Gate Arrays (FPGAs) by Xilinx. Devices in this family feature up to 500 I/O pins, more than 200 logic cells, and more than 700 DSP slices. Components of the DHS were implemented in VHDL, synthesized, simulated and tested using the Xilinx IDE. Important results have been reported and discussed. Suggestions for future work are also given as part of this paper.

Keywords

Artix-7, FPGA, VHDL and Xilinx.

Acknowledgements

To be added

Biographies

Hafiz Usama Hashmat is currently enrolled for a Ph.D. degree in Mechanical Engineering at The University of Lahore, Lahore, Pakistan. He completed his M.S. Engineering degree in March 2013 from the University of Engineering and Technology Lahore. He completed his B.S. Engineering degree in 2008 from University of Engineering and Technology Lahore. His areas of current interest include automation, electronics and robotics.

Hafiz Usama Hashmat has been teaching Electrical, Electronics and Mechanical Engineering subjects since January 2011. His first appointment was at North East China International Electric Power Corporation (NEIE), Lahore as Project Engineer in June 2008. He worked for two years in Electrical Power Projects in the Northern areas of Pakistan. His first appointment in teaching was at the Electrical Engineering department, National University of Computer and Emerging Sciences, FAST-NU, Lahore campus in January 2011. His teaching experience includes nine months at National University of Computer and Emerging Sciences, FAST-NU, Lahore and more than seven years at The University of Lahore. He has been an Assistant professor in Faculty of Engineering and Technology at The University of Lahore, since June 2013. He has taught different courses and supervised undergraduate students during his teaching.

Abdul Rauf is currently enrolled for an M.S. degree in Electrical Engineering at the King Fahd University of Petroleum and Minerals. He completed his B.S. from National University of Computer and Emerging Sciences, Lahore, Pakistan in 2014. He also served as Research Officer and Assistant Editor of FAST-NU Research Journal at the National University of Computer and Emerging Sciences, Lahore, Pakistan. His research interests include home automation and industrial automation using FPGA and Arduino microcontrollers.

Umar Muhammad Ali is currently enrolled for an M.S. degree in Electrical Engineering at the Georgia Institute of Technology, North Avenue, Atlanta, GA, USA. He completed his B.S. from the University of Engineering and Technology in 2014. He has also worked for Mentor Graphics, Pakistan, from 2014-2018.

Abdurrahman Mubeen Ali completed his M.S. degree in Electrical Engineering from the National University of Computer and Emerging Sciences, Lahore, Pakistan, in 2018. He completed his B.S. from the same university in 2010. He has worked with Technosoft Inc as a software engineer. Currently he is an iOS engineer at Zameen.com.

Dr. Anjum Ali completed his Ph.D. degree in August 1988 from the University of Alabama, Huntsville, Alabama, U.S.A. He has been teaching Electrical and Computer Engineering subjects since March 1978. His first teaching appointment, as a lecturer of Electrical Engineering, was at the University of Engineering and Technology (UET), Lahore, Pakistan, after winning gold medals in each of the last three years of his undergraduate engineering education. His teaching experience includes twelve years at Mercer University, Macon, Georgia, USA, and about nine years at three different universities in Saudi Arabia. He has also worked, as an associate professor, at the Lahore University of Management Sciences (LUMS), Lahore, Pakistan, from 1996 to 1998. He served as the chairman of the Electronics Engineering and Instrumentation Department at the Hail Community College (now University of Hail), Hail, Saudi Arabia, from February 2000 to June 2002. During his stay there, he developed a four-year degree program in Electrical Engineering for the University of Hail.

Dr. Anjum Ali returned to Pakistan in July 2002, and joined Al-Khawarizmi Institute of Computer Science (KICS) at the University of Engineering and Technology, Lahore, as a professor in December 2002. During his stay at KICS, he initiated many research and development projects and won research grants. He has been a professor of Electrical Engineering at the National University of Computer and Emerging Sciences, (FAST-NU), Lahore, since May 2005.

Dr. Anjum Ali has taught many EE, CE and CS courses and supervised numerous graduate as well as undergraduate students during his 40 years of teaching career. He has over 30 conference and journal publications. He is also the founding editor of the FAST-NU Research Journal. His areas of current research interest include embedded control systems and computer architecture.

After retirement from FAST-NU, Dr. Anjum Ali is currently setting up a research and development company in Atlanta, GA, USA.