# University of Rhode Island Researchers Use Impulse C to FPGA to Help Amputees Sit, Stand and Climb Stairs with “Smart” Artificial Legs

Impulse Accelerated Technologies

*Student Team led by Professor Helen Huang and Professor Qing Yang Prototypes Neural Machine Interface (NMI) to a Computerized Leg that Anticipates Intended Movement*

URI and Impulse Accelerated Technologies (one of the project sponsors) publicized results from student research to improve the live-ability of artificial legs. In this research, students created a neurally controlled artificial leg that enabled users to command it wordlessly for common challenges.

It is everyone’s hope that electronically enhanced artificial legs can return as much “normal” mobility to amputees as possible. The challenges are extensive. In this focused effort, student Xiaorong Zhang under the guidance of Professor Qing Yang and Professor Helen Huang, used commonly available programmable computer chips called FPGAs (field programmable gate arrays) to improve three distinct types of mobility challenges. In their prototype they were able to help amputees silently command the leg for sitting, standing and stair climbing.

“We strongly encourage student creative efforts to improve lives through technology.” Explained Brian Durwood, CEO of Impulse Accelerated Technologies. He continued, “projects such as the one at URI are great repurposing of sophisticated C to FPGA techniques for humanitarian purposes.”

With the help of Impulse C, students built a working prototype of an FPGA-based neural-machine interface that collects neural signals from the user's muscles to identify the user's intended leg movement. This prototype has been tested in real-time on both able-bodied and amputee subjects for accurately recognizing locomotion modes such as level-ground walking, stair ascent/descent, sitting and standing.

“We appreciate corporate support from sponsors such as Impulse, who provided the C to FPGA compilation software.” Said Professor Yang. Their tools helped us adapt sophisticated C algorithms to the programmable FPGA hardware with less effort and time.”

Corporations interested in learning more about this project can go to the school site [1]. Engineers interested in trying the Impulse C to FPGA compiler should send requests to info@ImpulseC.com [2]

About University of Rhode Island
URI welcomes industry collaboration on projects which advance science and

engineering. Researchers at The University of Rhode Island continue to have a major impact on issues that affect the region, the nation, and the world.
www.URI.edu [3]

About Impulse Accelerated Technologies
Impulse C is the leading software for moving microprocessor based algorithms to FPGA from Xilinx or Altera, for acceleration or consolidation into System on Chip designs. Impulse users range from NASA to Honda to Wall Street, all of them seeking faster, more compact solutions for computation challenges.
www.ImpulseAccelerated.com [4]

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**Links:**
[1] http://www.ele.uri.edu/linc
[2] mailto:info@ImpulseC.com
[3] http://www.URI.edu
[4] http://www.ImpulseAccelerated.com