

## **John Kuniholm's an Ordinary Man with an Extraordinary Story**

**By John M. Williams**

Durham, NC – To people who know him, Jonathan Kuniholm is an ordinary man who has done extraordinary things since returning home from the Iraqi war in 2005.

To his wife Dr. Michele Quinn, he is a husband, father, her closest friend, the man who always knows how to make her laugh, who dreams with her about where they will travel and what they're going to do to the house.

She says, he knows me so well, that "I can no longer surprise him with birthday presents. Strip away the job, the Marine Corps, the injury, the business, and so on, and he is my companion. We weather whatever comes together, and we always make it through okay."

To his six-year-old son Sam he is his adoring and indestructible father.

To his neighbor's child, Nora, who lives across the street from him, he is a hero and father of her friend Sam. When he walks Nora and Sam to school, she loves holding his prosthetic hand.

To his partners at Tackle Design ([www.tackledesign.org](http://www.tackledesign.org)) he is still self-driven and a more motivated leader than he was before to war in Iraq.

To the U.S. Marines he served with he is the embodiment of Semper Fidelis (Always Faithful) to his country, mission and men.

To his country, he is a war hero who lost part of his right arm while fighting in Iraq.

Kuniholm accepts his multiple roles with pride and modesty. However, he sees himself as an ordinary man to whom people have ascribed extraordinary feats.

He is 34-years-old and is a PhD candidate in biomedical engineering at Duke University and has master's degrees in mechanical engineering and industrial design from North Carolina State University. He has worked in the research and development of tools for robotic cardiac surgery for Cardioventions, a Johnson & Johnson company. A graduate of The North Carolina School of Science of Mathematics and Dartmouth College, he is an officer in the Marine Corps Reserve. And has served with distinction for 9 years.

Kuniholm was sent to Iraq in 2004. On New Year's Day 2005, Iraqi insurgents ambushed his patrol near the Euphrates River. They remotely detonated a device packed with shrapnel and explosives, and then started firing their weapons as the platoon took cover and returned fire. "I was wounded in the initial explosion, and my right arm was later amputated below the elbow," Kuniholm says.

Kuniholm said later that at the moment he realized he lost part of his arm he thought, "As my family and friends at home celebrated the start of another year, my life changed in a single

moment, and I began a new and unexpected journey. Gradually, I would discover that the disability I sustained because of my wounds would create opportunities as well as limitations.” That’s a lesson he is still learning every day.

“The words that flowed from my mouth when I felt the pain from the explosion’s results can’t be printed in Exceptional Parent Magazine,” says Kuniholm. When asked, what does it feel like to lose part of an arm? Kuniholm replies, “My immediate thought was to save as much of my elbow as I could under those horrific conditions.” He adds, “A loss of part of a hand can result in a 50% disability loss. Our hands are important and, we do not appreciate them.” He is discovering daily the challenges of having only one hand. A mature Kuniholm is cognizant of the larger physical and psychological challenges people, who have multiple body losses, confront. The tone in his voice as he speaks about them reveals admirable empathy. “Their losses, pain and challenges far, far exceed mine,” says Kuniholm who praises his wife Dr. Michele Quinn for her support and counsel during his rehabilitation.

His voice nearly cracks as he speaks of his friends in his platoon who were killed in combat. Lance Corporal Brian Parello lost his life, as would four other members of his platoon later that month: Sergeant Jesse Strong, Corporal Christopher Weaver, Corporal Jonathan Bowling, and Lance Corporal Karl Linn. A sober-minded Kuniholm says he considers himself lucky to be alive.

As part of his healing process, today, he has been fitted with three prostheses. The first is a myoelectric prosthesis, which uses the movements of muscles left in his arm to control motorized hand and wrist movements. The second is a body-powered prosthesis, with aircraft cables and rubber bands that allow me to shrug my shoulder or extend my arm to open a hook or a hand device. And the third is a shorter arm that holds a drawing pen or guitar pick.

One of the therapy goals for his prosthesis is to reassign dominance to his left hand. The prosthetic hand functions in the non-dominant capacity. He says that these hands have limitations. For example, “The prosthetic hand is a stabilizer in any two handed task, such as opening the door by turning handles up and down. However, pushing down is inconvenient. Round handles on doorknobs are difficult to turn. Even the myoelectric prosthesis that has a wrist rotator clutches out so there is not enough torque in it to turn the doorknob,” he said. He has other uses for his prosthesis such as dressing and flying his plane. On December 29, 2005 just before the anniversary of his injury, he took a flight test and regained his pilot's privileges. He is proud of his success to resume flying his plane. The inner satisfaction he receives from flying enriches his already blessed life. When his wife is finished with her medical residency they want to fly across the country.

His experiences with prosthetics and his background in biomedical engineering have motivated him to become knowledgeable about the trials amputees are forced to reckon with. He says, “As the level of amputation increases the difficulty increases. Elbows are huge and shoulders are huge in terms of capability. Upper extremity prosthetics has failed people at the trans humeral and above level. For the most part, those individuals choose not to wear any prosthesis at all unless there is a cosmetic one because they are not very useful devices.”

He continues, “Any of us who have physical challenges in life quickly adapt. We figure out what the constraints are. We chose either to ignore them and move on or modify our behavior. There are activities that we will not do as much anymore.” For example, he does not play the guitar much anymore. Therefore, he believes prosthetics need to be more flexible if he is to play the guitar with his right hand.

He describes his surgery on his elbow this way. “The doctors did a free flap transplant of my left latissimus muscle to provide skin coverage to save my elbow. Otherwise my arm would have been amputated. Had they used existing tissue, they would have saved my elbow joint but there would not have been an effective limb below it.”

Rehabilitation at Walter Reed Medical Hospital was slow and painful. His pain was eased considerably by the presence of Quinn and Sam. Kuniholm recalls that when his son saw him with half an arm, he did not notice his dad’s arm was missing. “It was much later when I had a lot of tubes connected to me that he noticed my right arm was shorter than my left that he started asking questions about the tubes and why I needed them. He also started asking questions about my arm and why it was bandaged,” he said. Sam accepts his dad’s amputation as though it was always there. Still Kuniholm believes as Sam grows older he will ask questions about how the loss happened, and he will be told.

Michele has often been asked how she feels about Jonathan’s loss of his arm, and she says bravely and proudly, “Many people expect me to be angry, but I have never felt anger about it. I feel fortunate that he is alive, especially given that a young Marine (Brian Parello) died in that attack, and, early on I reached acceptance. There was no point in grieving – the only thing to do was move forward with what we were given, and so we did, and we have ever since.”

Having spent months at Walter Reed Medical Hospital recuperating he says this of his fellow patients. “There are some patients who face problems at Walter Reed that present a whole series of prosthetic challenges of their own because the prosthetics elbow joints can no longer occupy the space that the residual real joints continue to occupy so they have to have external hinges.”

Michele has seen a change in Jonathan since he returned from Iraq, and it’s a change she speaks of with deep feeling. “As to how it has changed him: Well, it certainly gave his career a focus. He is more motivated to address the suffering of others through his work – he’s more community-minded. I’ve said before that Jon took a tremendous pile of lemons and turned it into lemonade, and someday that will help make the lives of a lot of people better.”

His Future

Kuniholm lives in many worlds. He has always been a proud Marine. As for the war, he is a true Marine. He was asked to serve in Iraq and he went. He does not say whether he believes the Iraq War is worth the price he and tens of thousands of people have paid either through wounds, limb losses or death. He says his commandant made it clear that if he wanted to stay in the Marine Corps he could. However, for personal reasons he has decided to retire.

More than 20,000 U.S. soldiers have been wounded in Iraq and more than 2,650 killed. The Pentagon reports that more than 460 soldiers fighting in Iraq and Afghanistan have lost limbs

and require prosthetics. Technological advances have reduced many wounds that would have been fatal in earlier wars. As a result, the survival rate among Americans injured in Iraq is higher than in any previous war—but many of the wounds are more severe. Accessible technologies (AT) are helping these veterans return to their lives and in many cases offering them new careers.

AT is being incorporated in the rehab process at centers such as Walter Reed Army Medical Center, to ensure returning veterans are able to use computers both for work and to stay connected to their support network of friends, family and peers. Having an injury or disability shouldn't mean that you can't find employment. And fortunately, the technology available today means it doesn't have to.

An introspective person, he says of his future, "I now have two professional goals that are intertwined. First, as an academic, I hope to make some improvements to the most advanced prosthetics we currently have. Everyone is very impressed with what these prostheses can do for people, but they represent 20-year-old technology that hasn't been significantly improved in two decades. Second, I am working with my business partners and others to develop designs for prosthetic devices that a user or prosthetic could download at no cost, modify and use to build a solution to their specific problem. One such common problem is the lack of any prosthesis at all—a need felt by amputees in Sierra Leone and elsewhere in the world" He has a web site that depicts his desire to improve prosthetics. It is [www.openprosthetics.org](http://www.openprosthetics.org).

Kuniholm is also interested in the benefits of Assistive Technology products to himself. His AT experience includes experimentation with Dragon Naturally Speaking. However, the open lab environment where he works is not convenient to use voice recognition. His typing is easier because he uses a small 12" laptop with a small keyboard so he can type with one hand. He uses a child's keyboard, however he would redesign the keyboard to make it easier to use. He wanted to get back to CAD (computer-aided-design). For CAD work, he has a Space Ball, which is a 3-D orientation device that he can easily use with his left hand. The Space Ball is indispensable for one-handed CAD work, because orienting the CAD model on the screen typically requires a combination of mouse movements and keystrokes. While the Space Ball is used with the non-dominant hand by two-handed users, for a one-handed user it is easier to switch between the mouse and Space ball, making orientation a dominant-handed task. As for drawing he uses a Cintiq Tablet.

Assistive technology picks up where his prostheses leave off. As an engineer, drawing is an essential professional skill for him. Kuniholm says that while he was recovering at Walter Reed, a prosthetic specialist, Advanced Arm Dynamics, at Walter Reed worked with him on using a keyboard. They had customized work done on a prosthetic terminal device by TRS in Colorado. Advanced Arm Dynamics designed a shorter prosthesis to minimize the error in his elbow movements and a holder to hold the stylus with the Cintiq tablet device with an undo key that allows him to erase a stroke and try again without affecting the rest of his drawing. "Because the lines need to be smooth and straight, you are trained to do those movements from the elbows and not to use your wrist or fingers," he says. An innovator, he duck taped a pencil to his stump for drawing and that worked better than drawing with his left hand. The setup works even better. However, it takes him longer to work when he is producing, finer more detailed strokes.

Assistive technology is playing an enormous role in helping to mitigate the effects of his injury—from prostheses that help to simulate the functions of his lost hand and arm, to Windows-enabled assistive computer technology that has made it possible for him to resume his career.

Ever the optimist and unable to rest on his backside, Kuniholm is driven to meet life's challenges. He says with strong pride, he has always been a problem solver, and that helped him cope during his recovery. As soon as he had to start going through life with only one hand, it became a kind of game to see how many things he could do one-handed. His wife is a medical resident, who works nearly 80 hours a week, so he spends a lot of his time taking care of Sam and doing things around the house. "One of the first things I did after I got my prosthesis was to install a ceiling fan we bought Sam for his birthday. It looks like an airplane propeller, and when Sam saw it sitting in the living room, he asked why I hadn't put it up. I couldn't think of a good answer to that. It took us the better part of a day to install it, but we got it done," he says with an ironic tone of frustration and triumph.

Michele has seen him frustrated on so many levels because the tasks that used to be simple and thoughtless are now difficult and time-consuming. She says he gets frustrated that people stare at him, and sometimes make comments out loud as if he can't hear – or for lack of caring that he can hear. Through all this, however, he has maintained determination to make the best of it. She says, "He has never wallowed in self-pity. He has never shied away from any challenge. I am not sure how it's possible for a one-armed man and a 60-year-old to install a ceiling fan in a 9-foot ceiling – I just know that I see that fan up there every day. Most people with two hands would be overwhelmed by completely refurbishing the interior of an airplane, but he did that, too. I don't know how else to communicate it – he amazes me every day."

In school he was a biomedical engineer, and he has since decided to refocus his research on prosthetic technology. The majority of this technology is designed by people who don't use it, and like other current technology, prosthetics are subject to the same "one size fits most" economics as mass-market consumer goods. Yet, the commercial market for arm prosthetics is quite small, and each person's needs are unique. People have different capabilities and different needs.

"I wanted to serve my country, and I have done that as a Marine. Now, I'm looking toward the service I can offer to people with disabilities in the larger global community. To borrow a thought from the Provost of Duke University, I want to place technology and "knowledge at the service of society."

Jonathan's story is a tale of courage and inspiration that embodies the spirit of this country and honors those who have served for our country.