On a Wednesday evening in November, Maria Sanchez sits quietly weeping inside a private room on the first floor of the University of Houston M.D. Anderson library.

"My baby just held a cell phone with his left hand," she allows, as the tears continue to stream.

Might not seem tear-worthy to most, but her baby is 8-year-old Rafael. Likely born with a form of symbrachydactyly, Rafael’s fingers never formed in utero, leaving him with only a tiny fist-like hand.

Now in this UH library room surrounded by family and friends, Rafael is grabbing cell phones, playing online games and waving with his newly-printed 3D hand. The hand is a gift to Rafael from UH students, 19-year-old...
Jalal Yazji majoring in mechanical engineering at the UH Cullen College of Engineering (also a member of the Honors College and PROMES) and 20-year-old Daniel Bahrt majoring in mechanical engineering technology in the UH College of Technology.

Yazji and Bahrt have made it their mission to make prosthetics for people in need, even founding the first e-NABLE chapter in Texas, right here on the UH campus. The Enable Community Foundation creates 3D-printed hands and arms for those in need. They publish prosthetic blueprints online and the local chapters create them on 3D printers and put them together for their clients.

It’s not the first time Yazji and Bahrt have seen a mother tear up while a child squeals with joy. In less than two months after they formed UH e-NABLE, they had received three requests, now all filled.

**Searching for help**

Until this special night, when Yazji and Bahrt fitted Rafael with his new hand, there wasn't much to be done for Rafael’s condition, but still Maria tried.

They were turned down for a prosthetic hand several times. She's still not sure why. It may be because the goal of conventional treatment is to help a child be as independent and confident as possible and Rafael's always had that down pat.

"He does everything everyone else does, only he just has to try twice as hard," Sanchez said. "That's what I've always taught him and it's normal to him."

That could be a huge hurdle to some, but not to Rafael. He possesses a bouncy nature, confident smile and a sense of not slowing down? traits you'd want to see in any carefree 8 year old.

**Empathy first**

When Rafael’s stepdad, Daniel Ramirez, joined the family he wanted to make sure everyone really understood just how tough things were for the boy, though Rafael didn't often show it.

"Daniel sat us down one day and said, 'Ok, today everyone tapes their left hand shut, so we can see what Rafael actually goes through on a daily basis',? said Sanchez. '?It was impossible, none of us could believe how hard it was.?'

The experiment and his compassion were truly stunning, one of those rare family moments frozen in time, where years later you can still recall the exact instant your respect grew for certain family members? in this case, Daniel and Rafael.

**Across town**

At about the same time the family was adjusting in Humble, about 45 miles east at Klein High School, Yazji was about to discover his passion for engineering.

By the time he was a senior he chose a year-long prosthetic project for his engineering and design class.

"I didn't know anything, so I did online research and found a design online, but our assignment was to design something, so we redesigned the whole thing,? Jalal said of he and his high school friends. The original designer of the online model was so impressed by the high schoolers? effort that he introduced Yazji to the Enable Community Foundation.

**A partnership is born**

Once in college it seemed that making prosthetics became a fait accompli. During his freshman year at UH Yazji
lived in Cougar Village Two where he met his suite mate, Bahrt. While Yazji was building models in high school, Bahrt was learning CAD software.

“One night we were just having a casual dinner and Jalal said he made a prosthetic model, said Bahrt. “Really? I’d love to see this!” Then he showed it to me and I was like, “This is really cool and I see you messed up a few things,” he said, giggling.

So a creative collaboration was born. Before long, Yazji had a breakthrough idea to form a UH chapter of e-NABLE. They recruited dorm friends to round out the club and Kenneth Garcia, administrator for the Cullen College of Engineering and PROMES advisor, became the chapter advisor.

Life in Humble

On any given weekend you might find Rafael hanging out with his best friend, 9-year-old Amir, or scores of cousins and friends, partaking in the pure joys of childhood. On the surface all seemed well, but some stress cracks were about to show.

One day during gym class, Rafael asked to speak privately with his Lakeland Elementary School gym teacher Tracy Wong. On the playground Wong says Rafael broke down, crying because he couldn’t hold the rope to partipate in the simple exercise of jump rope.

“I try to do the jump rope, said Rafael. “And we tie the ropes to my hand with rubber bands and it kind of hurts,” he said.

Wong felt heartbroken. That night at dinner, unable to put it out of her mind, she shared the story with her husband and her own 9-year-old-son, Tristen, who had never met Rafael. Tristen immediately got on the computer and started looking for a way to help.

His remarkable compassion and computer skills (sometimes only reserved for kids) led Tristen to the UH e-NABLE chapter and Yazji.

No one was more stunned with Tristen’s discovery than Rafael.

“She told me her son had found it and I was like, “Whoa, really nice!?” said Rafael.

For Rafael’s mom, it was beyond nice.

“When she called me and told me about Tristen’s discovery, I couldn’t help but cry,” she said. “It was so touching for someone to see a problem with him that I see on a daily basis as a mother she knew how I felt. And for her to go home feeling bad and keep discussing it. The whole thing is amazing.”

Everyone welcome

Although UH e-NABLE turns no one away, they seem to deal mostly with children. Their hands are inexpensive to make and cater to a young crowd.

To appeal to children, the hands all have names like the Cyborg Beast or the Raptor.

“Kids will outgrow the gift we give them and they will come back to us and we will build them another one. That’s the beautiful thing about e-NABLE,” said Yazji.

Bahrt agreed. “That’s actually our whole mission because kids are constantly growing. If you buy them a $10,000 prosthetic, they’re going to need a new one in another six-to-eight months, so a temporary fix is best for kids. That’s why we deal mostly with kids.”
Plus, the kids get to pick the colors.

“Our biggest problem is always finding a place to print the prosthetic, since we don’t have our own 3D printer," said Yazji. "CougarByte has been extremely generous to us by allowing us to use their printer to print Rafael’s Raptor." The chapter has set up a GoFundMe account to collect enough money to buy its own printer.

Each of the components is printed then the team members assemble it, a process that includes trimming and sanding the pieces. Each finger has three pieces, or about 30 components per hand. If everything fits together, assembly can take an hour. The team uses elastic cord and fishing line to connect the hand, and medical-grade foam padding to provide comfort inside.

Waving goodbye

As Yazji and Bahrt were finishing the assembly of Rafael’s hand, with the help of Ramirez, who was watching intently to make sure he can fix it if it breaks, Rafael was sharing thoughts on the most important thing he wants to do with his new hand.

“I want to hold a bottle and open it without having to press it on my stomach. My favorite drinks like water, Coke, Big Blue, or sparkly water," he said.

Rafael will make you remember it’s the little things in life that we overlook that can pose the biggest hurdles.

He’ll teach you more lessons, too, if you listen to why he picked the colors for his made-to-order hand.

“I picked white, gray and baby blue because they’re actually my favorite colors. Baby blue, the sky; white, God and gray, sharks," said Rafael.

The really important things all 8-year-olds should be thinking about.

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