

by Malachi Rosenfeld

From
Jupiter
to the
MOON





The Jupiter High School Moonbuggy Team started with five students working on a single moonbuggy. This year, the team's seven members built and raced two moonbuggies.

I never thought I would join a moonbuggy team. In fact, I didn't even know what a moonbuggy team *was* until my engineering teacher, Mr. Zachariah, started showing our class videos of the NASA Great Moonbuggy Race. During the videos, he would ask if any of us would like to join a team to compete in the race. Many students, of course, had silly comments to make about a "moonbuggy team," and even I was skeptical of the idea at first. As I watched the videos of teams building and racing their moonbuggies, I thought it looked both fun and challenging. I wanted to join, but I was too shy to say so.

Mr. Zachariah must have noticed my interest, because one day after he'd shown us yet another Moonbuggy Race video, he talked to me after class. He asked me directly to consider joining the team. In order to compete in the race, teams needed to build a moonbuggy no more than four feet wide and that could fold to fit into a four-foot cube. It would have to be light enough that the team's two drivers—a boy and a girl—could carry it unassisted for 20 feet. The team still needed a girl to help design, build, and drive the moonbuggy.

That night, I consulted with my parents, who agreed that this was a great opportunity. The next day, I joined the team.

Innovation on Wheels

We began our big adventure in December with meetings at school where my teammates Eric, Derek, Matt, Alex, and I began discussing the mechanics of our moonbuggy. We agreed that since we were limited on both funding and supplies, we would build our moonbuggy with a *Junkyard Wars* approach, using whatever materials we could find and guided by our team motto: Build with Innovation and Ingenuity.

We collected scrap metal, old bikes, and anything else from junkyards or curbside garbage that we thought we could possibly use. Of course, some things just can't be salvaged from a junkyard. In order to purchase the few supplies we needed that could not be salvaged, we sold refreshments at school, and we were fortunate to find sponsors to donate materials or money

to buy materials we needed to build our moonbuggy. Of the five students on our team, four had parents who were engineers or worked for engineering companies, so when we encountered problems, we also had experts who could offer practical, useful knowledge.

After five or six formal meetings in which we sketched designs and developed prototypes of different mechanisms, it was time to bring our ideas to life. We met at our teammate Eric's house. His father has a shop where he welds, which was exactly what we would need to do to construct our moonbuggy. Starting in February, we got together every Saturday and a few extra times in between to build and test our moonbuggy for the race in April. We knew from the many videos that Mr. Zachariah had shown us that we would encounter obstacles such as rocks and speed bumps and even tires on the course, so we built a mock course around Eric's house with rocks, speed bumps made of gravel, and old tires.

When I first rode the moonbuggy, I was leery of its stability. I was very afraid it would tip over. Going over an obstacle during one test run, we broke the weld on the axle that held the pedals in place, but it never tipped over. We had come up with a successful, stable design, and I felt safe driving it. Navigating the course was physically exhausting, but actually riding this vehicle that we had built from scratch was one of the best feelings I have ever had.

Two days before the race, the whole team was a little



NASA MARSHALL SPACEFLIGHT CENTER

nervous as we strapped the moonbuggy—now collapsed to fit inside the required four-foot cube—to the top of a minivan for the 14-hour drive from Jupiter, Florida, to the NASA Marshall Spaceflight Center in Huntsville, Alabama.

The Finish Line

On race day, since early time slots are given to returning teams, we were one of the last teams to race. As we waited, we saw the teams who finished the race, as well as many whose moonbuggies could not make it to the end of the race. It had been in the back of our minds throughout this whole project that not every team finishes the race. We reminded each other once more, “We don’t have to win; we just want to make it to the finish line.”

When it was our turn, we first went to have our moonbuggy checked to make sure it fit into a 4x4x4 box, and we had to get the moonbuggy weighed. (Although there is no weight limit, lighter moonbuggies can win additional awards.) Then Matt and I carried the moonbuggy the required 20 feet and unfolded it.

Matt and I had practiced unfolding and refolding the buggy many times to develop an efficient routine. Now was the moment for which we had practiced so long and hard. We unfolded the buggy and sat down with our hands up in the air, indicating that we were ready. We received one of our best times ever for unfolding the moonbuggy: seven seconds. This was important because those seconds would be added to our race time and would therefore be a factor in determining where we placed. And then we pedaled to the starting line.

We had practiced on grass, so the hard cement course was much faster and easier than we were used to. Going into the race, we were concerned about one sharp turn, known as Lunatic Curve,

where many teams had flipped or run off the course. Once we had passed that curve, we knew there was no stopping us. When we finished, I was out of breath but not tired, hyped up by adrenaline. We not only finished the race, but placed in the top three.

The next day, teams got to race again to try to improve their scores. Our moonbuggy had held up really well, so while some teams made adjustments or repairs, we just had to race again. Knowing that we were actually contenders this time, I was more nervous than the day before. On our second run, we improved our time by a couple of seconds. Our goal had been just to cross the finish line, but in the end, the Jupiter High School Moonbuggy Team took home third place, the Featherweight Award, and the Rookie Award, for the first-year team with the fastest time.

When I joined the team, I was the only girl, and our team built only one moonbuggy. Now our school has seven members split into two teams that work together on two moonbuggies. I am truly proud to be part of this. I look forward to the odd looks I receive when I tell people I’m on the Jupiter High School Moonbuggy Team, because that means I get to explain to them exactly what we do. **i**



Malachi Rosenfield is a junior at Jupiter High School in Florida, where she is an honor student and plays French horn in the school band. Malachi also volunteers at the Maltz Jupiter Theatre and is a member of the theatre’s youth touring company.

For more information, see <https://www.nasa.gov/roverchallenge/home/index.html>