

**BUSINESS
SPOTLIGHT**



Asteroids heading towards Earth are not just the stuff of films; it's real life. Ana Maria Tang and Philip Venturelli are intent on stopping them.



A 78-year-old man, Dean Wilcox, sits at his desk continuously working on his real estate business. He thinks back to when he was in his 40s and NASA engineers put the first human being on the moon. To him that memory forms part of the world he grew up in.

Christopher and Alex Tang, students at Travis Ranch Middle School and Valencia High School's International Baccalaureate program, think that the idea of a moon landing is as realistic as a fairy tale. Their world is centered around online networks such as Facebook where they communicate with their friends and play online games. Life in their universe is a dynamic, fast paced landscape of computerized social interaction and massive, multiplayer role-playing games. They have little time to contemplate the history of spaceflight or its future. They focus on the present, and enjoy the benefits of living in a world with a wireless connection.

Ana Maria Tang and Philip Venturelli have grown up with some knowledge of the distant past where NASA and the world struggled to make the mission to the moon a reality. In Philip and Ana Maria's world, satellites are a part of modern civilization. Space missions are a reality, the Weather Channel, the GPS constellation, the telecommunications systems that facilitate global shipping networks—these are all a part of the world we live in. These are things that exist and are necessary for modern society to maintain itself, yet they are presently conscious of the danger humankind faces.

To Christopher and Alex, the world may continue in its current state into the distant future. They don't see the potential threat that mankind has created from its thrust forward to the moon and subsequent lapse of control over space debris pollution.

In Ana Maria and Philip's work, they have come to understand the importance of spreading need for humanity to understand that the future of their world stands on fragile ground. In an instant, ships at sea could lose satellite communications or the ability to navigate, creating a rift in the global trade system. The Internet, which Christopher, Alex and so many others rely upon for information, could be breached by a catastrophic failure of telecommunications satellites and humankind would abruptly lose a significant measure of control over its world. Ana Maria and Philip feel from their study of the threat posed by space debris that these contingencies are in fact inevitable unless something is done to remove the deadly debris from near-Earth space.

Humanity has come to depend upon information and technology to the extent that if we lose our ability to communicate, we no longer have the ability to prosper. That is what Philip and Ana Maria have come to conclude, they have built a company around that very notion and are determined to do something pro-actively to address this threat. They are looking for support from people who have resources such as celebrities and music stars, investors, collaborators, business professionals, engineers and scientists. Our space deserves to be protected.

Philip and Ana Maria's discussion about the creation of their company called PACA Space Debris Removal, in Philip's words:

"After graduating from Caltech with a degree in Physics, I had a successful career in the defense industry, working for two of the world's leading companies; yet I wanted to change something and did not know specifically what. I had the wish to help living beings and needed your guidance. You came to visit me and I found that I admired what



you were doing to help others with their finances. As we were sitting outside discussing, we saw stars, satellites, and comets. You asked me how many there were. I said, probably a lot. You told me a story of how you were a little kid and you used to imagine the moon, and how there were people living in it. And in the stars there were different cities, and that some of the stars were the moon; the moon had a world in there, and there was a bunny there and there was nature. The more you started telling me about your story, your dreams about PACA and all these satellites going to the sky, and how astronauts had died, I started telling you that there was all of this space debris out there. And then you said: "Why don't we take care of it?"

Since then we have been invited by the IEEE to attend an Aerospace Conference where we presented a paper to NASA. NASA told us that they were very much aware of this problem but didn't have the funding to solve it at the moment. In one discussion I had with a NASA executive, he told me that there is a perception among the highest levels of government that NASA has not done enough about the space debris problem. Because this problem is a real concern for NASA, the agency has allocated \$150 million towards finding a solution. Our company, PACA Space Debris, has a unique patented technology capable of removing the debris that is 1-10cm size from low-Earth orbit. Debris of this size presents, according to NASA, the greatest threat to spacecraft today."

The Space Debris Situation as it Currently Stands:

As it stands right now, NASA does not have the technology to detect and track space debris smaller than 10 cm which represent the greatest threat, according to NASA, to spacecraft today. Nearly one million pieces of 1-10 cm sized space debris are present in low-Earth orbit. NASA can track the larger debris, but not the smaller.

The Frequency at Which the Space Debris is Increasing:

Every time there is a collision, such as the 2007 Chinese Anti-Missile Test and the 2009 Iridium 33 collision, this results in a 40% increase in debris population. The growth rate of the smaller, 1-10cm sized debris is expected to be far greater.

Consequences of Not Taking Any Action to Remove Space Debris:

More collisions will occur, not only among new launches and working satellites, but among the debris fragments which make up an overwhelming majority of the objects in space. This will precipitate more collisions, and soon enough we will have a situation similar to an asteroid belt around the Earth, and nothing can go in or out of orbit. This kind of chain reaction could potentially occur within the next 50 to 100 years.

The Solution and its Financial Cost:

The only solution to this problem is to actively remove debris from orbit.

At this point if we develop the right technology it is possible for us to recover. With our technology, PACA Space Debris Cleanup, we can bring down a cloud of debris in a few months. This

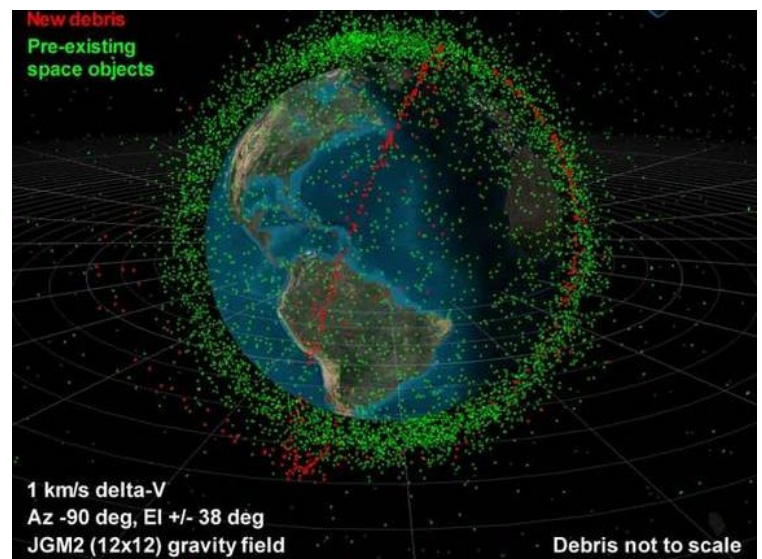
could be a hundred or more pieces of debris. Cost of a single PACA Space Debris system is the same as the price of a new satellite launch.

Amount of Debris Presently in Near-Earth Space

There are the better part of a million 1-10cm sized pieces of debris in space. We can't detect them because we don't yet have the technology to do that, but we can estimate their population. PACA technology would enable us to detect and track the 1-10cm sized pieces of debris so that we will know at all times where they are and can then proceed to surgically remove them from orbit.

PACA's Solution to the 1-10cm Space Debris Problem

The PACA team has developed a patented technology capable of removing the 1-10cm space debris that, according to NASA, pose the greatest threat to operational spacecraft today. For more information, please visit the PACA Space Debris website where you will find videos, pictures, and articles with the latest news on Space Debris and PACA's exciting adventure in solving this global environmental problem.





PACA SPACE DEBRIS REMOVAL 1-10cm



Ana Maria Tang is a skilled executive manager. She launched and lead multiple successful companies. Her core background is in accounting and business management. She founded PACA Space Debris Removal with

the vision of addressing the humanitarian side of satellite launch. Her foresight matches with worldwide leading experts in that unless a solution is found to the space debris problem, humanity is bound for cataclysmic losses of infrastructure, damaging economies, governments, and populations across the globe for decades to come.



Philip Venturelli is a cutting-edge systems engineer.

He developed applications in space airborne electro-optic sensor and sensor-target disciplines. Prior NASA collaborations include NASA Code M at the Johnson Space Center

where Philip was awarded a coveted flight to run experiments on the KC-135 aircraft, and Goddard Space Center where he collaborated in the development of NASA's GMAT Mission Analysis Software. His engineering model for laser removal of 1-10cm space debris was peer-reviewed and published at the IEEE Aerospace Conference in 2011. Philip holds a B.S. in Physics from Caltech and a Masters in Computer Vision from UCLA.

The PACA Space Debris Website www.pacaspacedebris.com