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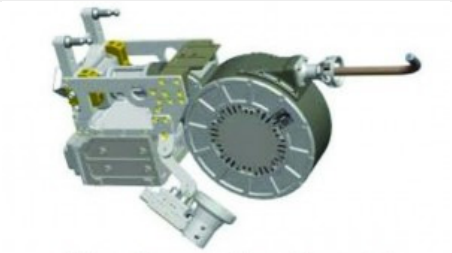
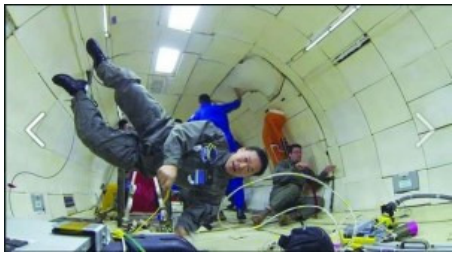


Visual Inspection Poseable Invertebrate Robot Tool (VIPIR)



ORANJESTAD — Though NASA retired its Space Shuttle, it is still active on many projects, and Aruba's native son, Dr. Edward Cheung, is very much in the vanguard of developing applications and equipment to facilitate the human presence in space.

A graduate of Colegio Arubano and Worcester Polytechnic, Dr. Cheung obtained his PhD in Robotic Engineering at Yale with a scholarship from Phillips Labs and NASA. He was immediately recruited into the space program, working out of Goddard Space Center in Maryland.

In 1992, he joined the team of the Hubble Space Telescope project. He catapulted his team and home island into the news in 2002 with their innovative ARUBA Box, resolving a crippling cooling failure on the NICMOS instrument on HST, which threatened the entire project. The simple system was devised by Dr. Cheung and his team, and they selected the description of ASCS/NCS Relay Unit Breaker Assembly, or ARUBA Box, as the name, in honor of their team leader. Through the final mission to HST in May of 2009, Dr. Cheung was the Principal Engineer of the HST Maintenance Project. The challenges of repairing the space telescope, expanding its capabilities, and devising equipment to increase its life span, has provided Dr. Cheung and his people ample opportunity and challenges requiring innovative thinking, stretching their problem solving capabilities to the limit.

Dr. Cheung agrees that this has allowed him to develop a team that now addresses new challenges for NASA, and has prompted the development of the Robotic Refueling Mission, or RRM. Their ambitious purpose is to establish a reliable system of repairing and refueling existing satellites, which will save untold expense in replacing them when they run out of fuel. It sounds simple, but such tasks, when performed in space and zero gravity, are never simple.

Another principal purpose will also be troubleshooting when something goes wrong with a satellite launch, which happens more than one would think. "Sometimes they find when the satellite arms should open, they get stuck, and all it may take is a bit of jostling to resolve the matter," explains Dr. Cheung.

Without eyes in space to pinpoint the problem, the solution is often to launch another satellite, at the high cost of a new piece of equipment and an additional launch. The RRM project could save tens of millions of dollars on this wasteful procedure.

Dr. Cheung and his crew were very much involved with NASA's final missions, which included sending their demonstration model of the RRM to the International Space Station, ISS. They are now working cooperatively with Canada in using their Special Purpose Dextrous Manipulator, known as DEXTRE, to perform the jobs the RRM has been created for. Since its placement, they have been performing various delicate tasks, and are very pleased with the results. One of the first was cutting wire, which again, sounds simple, but not when being performed by robotics attached to the 65-foot long SSRMS, which carries the 11-foot long DEXTRE. They have also demonstrated this past year the capabilities of the RRM for removing tiny screws and caps.

The success of RRM and Dr. Cheung's team has precipitated an expansion, and he now oversees about a dozen engineers. Aside from heading the team, he has some particular projects he is working on, and is quite excited about the Visual Inspection Poseable Invertebrate Robot tool, or VIPIR. The challenge was to create a system that could extend into the tightest spaces, sending back images enabling them to pinpoint and diagnose specific problems and equipment failures.

Imagine an in-space exploratory procedure as is performed on digestive systems by doctors on earth, except the pin-sized camera is attached to a robotic tool at the end of a 65-foot DEXTRE. Though equipment and materials are vigorously tested in simulated conditions on the ground, the long term effects of unfiltered radiation, ultraviolet rays, and bombardment by space dust and debris can frequently result in the unexpected. This extendable camera, attached to a flexible, retractable "snake," which Dr. Cheung has devised and perfected, should provide the solution for diagnosing the problem and effecting the exact repair required.

Presently, the RRM team is busy assembling a variety of interchangeable task boards and unique tools, which will increase the capabilities of the principal RRM unit. They have a deadline to deliver their equipment for a space launch in early summer with SpaceX, which deploys reusable rockets. NASA is still going into space, but now relies on private space carriers, like SpaceX, (http://www.spacex.com/), which Dr. Cheung reports has "a very impressive track record." They will be launching out of Kennedy Space Center in Florida, and then monitoring in Mission Control at Johnson Space Center outside Houston, Texas. Dr. Cheung will be very involved with the mission, as they unload and install the new equipment, ready to handle any challenges that may arise. This will be his first time working with SpaceX.

"Our six core capabilities at Goddard, which we are shooting for, are called the six "R's," explains Dr. Cheung. " Remote-servicing, Refueling, Repair, Relocation, Refilling, and Replacement; each has a traceability to NASA's overall main goals. They demonstrate how we fit in to the overall architecture here. This is how we break down our objective."

The exploits of Dr. Cheung and his team are regularly reported on the space news website http://spaceflightnow.com/news as well as NASA's official site http://www.nasa.gov/. For a more personal experience, Dr. Cheung frequently blogs his missions, their preparation and the ongoing event, on his website: http://www.edcheung.com.

By Rosalie Klein

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