IT'S A BIRD! IT'S A CAMERA!

IT'S THE X5!

BY **CHRISTOPHER ONG**

Four students built a plane that came up tops at the 2011 Taiwan Unmanned Aircraft Design Competition.

Seven crashes and five test planes – undergraduate Ma Xiao certainly does not know the meaning of defeat. He remained undeterred despite having to build his prototype aerial vehicle five times and seeing it crash seven times. And for the record, two of the crashes resulted in irreparable wrecks.

Thankfully, the fifth time was the charm for Ma Xiao and his NTU teammates at the 2011 Taiwan Unmanned Aircraft Design Competition. Named the X-5, their plane emerged tops in the Navigation Flight Design Level category.

The success formula of the students, who are all from different schools, is one of interdisciplinary partnership and teamwork. Besides Ma Xiao of the School of Materials Science & Engineering, the team consisted of project leader Joshua Chao (School of Mechanical & Aerospace Engineering), Yuan Shenghai (School of Electrical & Electronic Engineering) and Eunice Lim (School of Art, Design & Media).

Taking flight

At the competition held in Pingtung, Taiwan, from 26 to 28 February, the NTU plane had to fly a distance of four kilometres to three remote locations and take pictures of objects in the vicinity. All this without the help of a remote control, which meant the team had to pre-programme the X-5's flight path using Global Positioning System technology.

The plane has its roots in Joshua's campus research project, an unmanned aerial vehicle. His project supervisor, Asst Prof Yongki Go, saw that the microprocessor Joshua had designed for the project could work as part of a prototype for the competition.

Inspired, in September 2010, Joshua took up the challenge to refine the project under his school's Product Development Challenge. Two months later, he roped in Ma Xiao, Shenghai and Eunice, all of whom shared his love for aviation. Indeed, Eunice sums up the group's passion best when she says: "It's weird but I have always wanted to fly. When I see planes soar, I feel very, very happy."

Fab four

The team members complemented one another well. In fact, Joshua said that their diversity was a plus point. "We each contributed in our own way, taking what we had learnt in our fields and applying it to the project," he adds.

Ma Xiao's knowledge of suitable materials for airborne vehicles came in handy during the building of the 1.3m-wingspan plane. He also became better with each attempt and, having taken two weeks to construct the first prototype, needed only a day to make the last.

> "We each contributed in our own way, taking what we had learnt in our fields and applying it to the project."

A great way to fly: Aviation buffs (from left) Ma Xiao, Yuan Shenghai, Joshua Chao and Eunice Lim lent their talents to help the X-5 take flight.

PHOTO: DIOS VINCOY JR

Shenghai used his engineering knowledge to programme the plane's camera and he got all keyed up when it failed to work as programmed. Says Shenghai with a laugh: "It's not easy to troubleshoot a system like this. I would use my imagination to visualise which part of the programme was causing the problem."

The artistically-inclined Eunice helped to design the plane and put together the videos that included footage of the test flights as well as the images taken by the X-5. These came in handy during the team's presentation at the competition, and helped them bag the Best Report award as well.

Equally important was the strong team spirit. For instance, the four spent the night before their morning flight to Taiwan cooped up in an NTU laboratory as they fine-tuned the X-5. The day before, reveals Joshua, they had tested the plane "from 1pm until it turned dark".

No easy task

The winning prototype has its own computer and can fly autonomously. It is able to self-stabilise in mid-flight and can send signals back to Joshua's laptop, allowing the team to locate it on Google Maps. Their feat was all the more impressive because back in Singapore, they were unable to test the plane beyond a radius of 400m due to airspace restrictions.

Joshua says that this limitation made them "very anxious" about whether the X-5 would be able to find its way back during the competition. He adds: "Because of this, we did a lot of simulations of the plane flying out of range."

"During our tests, we turned off the transmitter so it gave us no control over the plane at all – this gave us the confidence that the plane could actually fly without any directions from us."

However, Ma Xiao never had any doubt as to whether the project would succeed. He says simply: "All of us worked really hard from the start, so I always believed it would pay off." ■