

## FIONA MALONE, BIOMEDICAL ENGINEERING PHD STUDENT AT GMedTECH, GALWAY-MAYO INSTITUTE OF TECHNOLOGY



“I went to an all-girls school in Carrick-on-Suir, Co Tipperary and I was very interested in maths and science,” says Fiona Malone. “I attended an engineering talk with biomedical engineers and I was intrigued to find out more about the ways I could use maths and science to work in the medical field. I was one of only 10 girls to be awarded an engineering scholarship with SFI (Science Foundation Ireland) in 2009, before starting an undergraduate course in biomedical engineering.”

Malone is today studying the role atrial fibrillation plays in acute ischemic stroke cases. Atrial fibrillation is the most common irregular heartbeat among adults and can cause blood to pool inside the chambers of the heart. When blood pools become stagnant, it clots, and in a single heartbeat this clot can be expelled into our cardiovascular system. If the blood

clot travels towards the brain and blocks a blood vessel, the brain tissue can become deprived of oxygen, causing a stroke.

As part of Fiona Malone's PhD, she has created blood clots from mammalian blood that replicate the blood clots caused by atrial fibrillation and has mechanically characterised these replicas under various loading conditions. Using 3D printing technologies, she has fabricated patient specific models of the cardio-vasculature, to monitor the motion and trajectory patterns of her clot replicas under normal and atrial fibrillation physiological flow conditions.

“This 3D physiological simulation system is the first of its kind; examining the effect of clot properties, patient vasculature and atrial fibrillation on stroke occurrence,” she says. “The data obtained from the system will be used for future stroke research, and will be especially important in the numerical and computational modelling of atrial fibrillation and clot behaviour.”

The simulation system can also be used to further device design and development for stroke treatment in patients. It has led to many collaborations between GMedTech (Galway Medical Technologies Centre), GMIT and the medical device sector.

Malone's research won her First Prize in the New Researcher Category at the 20th Annual Conference of the Bioengineering Section of the Royal Academy of Medicine in Ireland. She was also winner of the national ‘Thesis in 3’ competition and has represented GMIT at various STEM events such as ‘ResearchFest’ at ‘Inspirefest’ and ‘Soapbox Science’ held in Galway last summer. Malone is currently lecturing Mathematics in GMIT.

*For more information on research at GMIT, visit [www.gmit.ie](http://www.gmit.ie)*