Xingbang Chen

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ADVISOR/MENTOR: Dr. Alexander
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BIOGRAPHY

Xingbang Chen graduated in 2015 with a B.S. degree in mechanical engineering from Sun Yat-sen University, in Guangzhou, China. During his undergraduate time, he won second prize in the 6th National Student Social Practice & Science Contest on Energy & Emission Reduction and first prize in the 7th Contest on Energy Conservation & Emission Reduction of SYSU. He was the minister of the Propaganda Department in the University Student Association for energy saving vehicles and led the team to attend the 2014 Honda China Energy Saving competition EV group. From August to October 2015, Xiangbang interned as a product engineer at Guizhou Anda Energy Technology Co. Ltd. where he participated in developing battery management systems. Later in the same year, from October to December, he interned as an industrial engineer at Zhuhai Singyes Renewable Technology Co. Ltd. where he worked to design solar heating systems based on the demands of different clients. He is now pursuing his Ph.D. in the aerospace and mechanical engineering at Saint Louis University.

RESEARCH

Xingbang's current research is focused on optimization of cardiovascular assist devices to improve haemocompatibility. Heart failure, which makes the heart weak and not be able to pump enough blood for circulation, affects 1-2% of the population in the western world. About half of people who develop heart failure die within five years. Heart transplant is the final solution to this disease. However, heart transplants just meet 1-2% of the demand. There is another promising cure---Ventricular assist device, or VAD. VAD is basically an implanted pump, partaking the responsibility of the heart to eject blood to circulation system. Xingbang's research aims to optimize the performance of the device. Among the design parameters, passage gap height is very important, which is the distance between the rotating part and housing of the devices. Generally, larger gap designs lead to higher regurgitant flow, higher power, and larger VAD. Larger gaps require higher power, so Percutaneous Energy Transmission (PET) is required, which can lead to infection where the electric power chord crosses the skin. Smaller gaps, however, will cause higher shear stress and thus more blood damage. Generally as the gap becomes smaller, shear-induced blood trauma become severe which restricted clinical adoption of the devices. Therefore, Xingbang is looking for an optimized design for this parameter. He has already developed collaboration with Louisville ventricular assist device team. Now, he is seeking funding for a specific Couette flow device which is designed to be used in experiments and hematologist collaboration. Then, several experiments to gauge haemocompatibility will be carried out by measuring hemoglobin, vWF, white blood cell, red blood cell and platelets. The result of this work can be used for all VAD designs.