**Program: Electronic Materials and Devices**

To realize high-precision time control of the PC parallel port through software programs was once prophesized by my advisor as a mission impossible.  Prior to this, a talented student in XX University spent an entire semester attempting to work out this problem but he ended up in failure for the sheer difficulty of the task. In retrospect, it was the very negative attitude of my advisor and the failure of my predecessor that aroused my determination to make a try on my own. Through carefully studying a large amount of technical materials that I had collected, I carried extensive theoretical analysis and cautious calculation. By exploiting the strong power of VC++ and the high speed of the assembler language, I spent only three weeks and achieved time control of the PC parallel port with high precision on the order of microsecond. Based on the research findings in this project and on other projects, I submitted my thesis entitled XX, which was rated by the Thesis Evaluation Committee as “a pioneering thesis that deals with a challenging subject, yet demonstrating a high level of technical realization.”

The success of my undergraduate graduation project and thesis reinforced my resolution to seek further development in electrical engineering and in automation. After being successfully matriculated into the Master’s program at the College of Electrical Engineering and Automation of XX University, majoring in Electrical Machinery and Electrical Appliance Automation, I have devoted myself to serious academic pursuit with much greater enthusiasm. My coursework in The Control Theory of Electrical Machinery, Modern Design Theory of Electrical Machinery, Modern Testing Technology of Electrical Machinery and other subjects has enabled me to lay a solid theoretical foundation whereas courses like Digital Simulation Technology of Electrical Machinery, the Matric Analysis of Electrical Machinery and the Instantaneous Changes & Energy Conversion of Electrical Machinery helped me develop professional thinking and techniques. With an overall GPA of 81.5 and even better performance in the core courses, I have been awarded the scholarships of the University and honored as Outstanding Student.

On the strengths of my firm buildup in control theory and excellent ability in circuitry design, I came to the attention of Prof. XXX, a leading specialist in the field of ultrasonic motor, who recruited me into his research group. With this, I started actual research half a year earlier than other students. So far, I have participated in two research projects XX, and XX, one sponsored by XX and the other by XX. Based on my research findings from those projects, I have contributed a total of five research papers to the country’s leading technical journals like Journal of Electrical Motor Engineering. Among my five papers, XX, and XX have been published. The other three papers, XX, XX, and XX have been accepted and scheduled for publication in the later half of this year.

The conventional ultrasonic motor transmits energy through friction and it poses numerous limitations in application. In order to achieve important breakthroughs, we conceived the idea of introducing liquid into the space between the stator and the rotator. I decided that the liquid-media ultrasonic motor would be the focus of my research during my Master’s program, which is also part of the key research project led by supervisor as a larger program sponsored by XX. In view of all the technical literature available, the applied research worldwide in this field has been rather scanty, some are very simplistic while others are excessively empirical. There is marked discrepancy between theoretical research and practical application. For this reason, I self-studied a number of important subjects including Mechanics of Viscous Fluids, Fundamental of Acoustics, Non-Linear Acoustics, and Ultrasonic Motor and made in-depth study of the technical literature published in English by western scholars. I completed the derivation of equation regarding the distribution of speed in the liquid field of the motor and regarding the distribution in the acoustic field. In this process, I proposed my theoretical design.

As research on the liquid-media ultrasonic motor is a totally new subject in the Chinese academia, the major difficulty I have encountered is the lack sophisticated experiment equipment. Nevertheless, I have to make my utmost efforts to ensure the accuracy of my data. Therefore, I have extensively consulted the technical parameters of various electrical and electronic components both at home and abroad, and made necessary improvements in the existing facilities of my lab in accordance with the requirements of our experiment plans. Through my independent efforts, I made the motor control and the driving circuits. Moved by my dedication, my advisor and other senior professors have offered to help me with their knowledge in their respective fields. Some imparted me their useful expertise of experiment, even Prof. XX who was far away in XX Technological University maintained constant contact with me through e-mail to explicate specific details and clarify my problems.

With their support, I have performed detailed analysis and verification on the saturated flow velocity of the liquid-media electrical motor and its effect on the motor characteristics, determining the relationship between the motor’s rotational speed, drive frequency and drive voltage. My paper XX, which is retrieved by the EI, describes the structure and the working principles of the motor, the realization of the drive circuit, and provides theoretical and experimental analysis of the saturated flow velocity.

Ultrasonic motor is much superior to conventional motor in its low-speed big torque, short response time, and electromagnetic resistance. The research on ultrasonic motor started more than 20 years ago but so far few mature products have been produced. The only instance of the application of this technology is found in the Cannon camera. However, when problems of the motor’s complicated structure and high cost are worked out, ultrasonic motor will enjoy an unlimited prospect of commercial production.

I would like to apply for a Ph. D. program in Electrical Materials and Devices from your esteemed university. I believe I am a worthy candidate for your program. My undergraduate program in electrical automation has given me a solid foundation in control and circuitry while my Master’s program in Electrical Machinery and Electrical Appliance Automation has led me to pioneering research of liquid-media ultrasonic motor. I have a relatively strong capacity to carry out independent research and I have interdisciplinary knowledge across majoring fields of electrical engineering.

In my proposed program, I would like to pursue my research interests in piezo-electrics, sensors and transducers and ultrasonic motor. In terms of the research on the ultrasonic motor, I would focus on the research of the new-type ultrasonic motor, ultrasonic motor control, and the development of small-scale ultrasonic motor for commercial purposes. It is my belief that your program, by exposing me to the latest technology in electronic materials and to the development of novel device structures and manufacturing methods, device and circuit simulation and modeling, device and material characterization, will significantly facilitate my research on the ultrasonic motor and in other related fields. For this reason, I expect that you can give serious consideration to my application.