- **Guangyu Sun**
  - **Title :** Memory Hierarchy Design with Emerging Non-volatile Memory Technologies
  - **Abstract :** Traditional memory technologies, such as SRAM, might not satisfy the memory requirement with technology scaling because of low density, high leakage power, poor scalability, etc. In recent years, various non-volatile-memory (NVM) technologies are proposed, such as Magneto-resistive Random Access Memory (MRAM), Phase-change memory (PCM), Resistive random-access memory (RRAM), etc. These memory technologies are considered as candidates of future universal memory because of their advantages of high density, zero standby power, fast access speed, non-volatility, etc. Several questions, however, should be answered before we employ these memory technologies: (1) Where to use these memories in the memory hierarchy? (2) How to modify the memory architecture in order to adopt these memories efficiently? (3) How to leverage the advantages from different memory technologies?

    In this talk, we answer these questions by using two emerging memory technologies in different memory hierarchy. First, we explored the advantages and limitations of replacing SRAM caches with 3D stacked MRAM, in respect of performance, power consumption and temperature. Then, we proposed architectural level optimization techniques to overcome the limitations. Second, we propose a hybrid storage scheme to improve the performance, power, and reliability of Solid State Disk (SSD).

  - **Bio:** Guangyu Sun received his bachelor degree and MS degree from Tsinghua University, P.R. China. He joined MDL group of Pennsylvania State University in 2006. His research interest focuses on computer architecture with an emphasis on memory systems and the three dimension (3D) architectures; He is also interested in 3D VLSI designs and CAD tools programming. Now, he is in the fifth year of Ph.D. study and is looking for a job.