A huge amount of data is generated every minute in today’s world. The Hard disk drives (HDDs) store a larger portion of the total data. However, developmental trend of current HDD technology may not be able to meet the large data storage demands in future. Therefore, successor HDD technology called heated-dot magnetic recording (HDMR) is under research in the industry as well as academia. In addition, the domain wall (DW) racetrack memory is another potential alternative to the current data storage scheme. It can facilitate a large storage capacity to meet the demands of the rapidly growing digital data. In this thesis, we have made an attempt to address some of the issues of these future storage and memory devices. One of the major obstacles of the HDMR technology is the optimization of a suitable lithography technique for mass production of these devices. In the initial part of this thesis, we have proposed and researched the self-assembly and ion implantation based magnetic patterning process. Although this technique is expected to fulfill the technological requirements, further improvements are required for more controlled patterning of the films. However, in the later parts of the thesis, we have researched the issues related to the DW memory. Despite of tremendous research advancements in the field of DW memory, there are several outstanding issues. These include, controlled and reliable motion of DWs, power consumption, thermal stability of the bits, synchronous motion of multiple DWs, large pinning defects and DW device size. We have performed detailed simulation and experimental study to address the issues of (a) controlled and reliable motion of DWs and (b) power consumption.