Part 1

Nonvolatile storage is computer memory that can retain the stored information even when not powered. With the rapid growing demand for portable electronics, the request for non-volatile memory has been greatly increased.

A memory driver controls when and how to program a memory cell. A CMOS-compatible memory driver was introduced to drive the memory cell to be programmed without affecting other devices in the circuit.

Nonvolatile memories typically require more than 5V of programming. It is essential to make a charge pump to step up the supply voltages. In designing the memory driver with low voltage technology, handling the high voltage would take into careful consideration.

Part 2

A CMOS-compatible non-volatile memory driver was designed and implemented based on the memory cell developed in HKUST, including:

- Schematic simulation
- Layout circuit
- Post-simulation

The Major designing components:

- Charge Pump
- Voltage Switch
- Decoder
- Memory Array Driver
Design Phase, designing the simplest 2x2 memory, which can only store 4 bits of data with the memory driver. After familiarizing the working principle of the memory, any $2^n \times 2^n$ memory can be implemented.

Implementation Phase, Cadence, a simulation software, is used to produce the simulation result numerically and graphically with a more realistic layout circuit simulation result.

Evaluation Phase, evaluation of the performance, power dissipation, and chip area of the integrated circuit will be conducted in order to further improve the integrated circuit.
Part 4

Block Diagram of the Memory Driver

Schematic of the Memory Driver

Simulation Result of the Memory Driver

Non-Volatile Memory Driver in Embedded Systems