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The health monitoring system (HMS), which advises user's health condition, have emerged with wearable devices. This work describes the real-time heart rate monitoring system-on-chip architecture for healthcare device. For system efficiency, we chose a processor without any floating-point unit (FPU). Instead, a signal processing that requires high accuracy is replaced with hardware accelerators.

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[Xiang Feng](#) (Institute of Microelectronic Engineering, Tsinghua University, P.R. China);

[Shuguo Li](#) (Tsinghua University, P.R. China)

The high cost of large integer multiplication has become a major restrictive factor of Fully Homomorphic Encryption (FHE). In this paper, a radix-32 ping-pong Number Theoretical Transform (NTT) algorithm is applied to accelerate large integer multiplication. Based on the algorithm, we accomplish the design of a fast 32k-point NTT Engine for FHE. Implementation results on FPGA show that our work is able to compute 32k-point NTT in 0.056 milliseconds at the cost of 211k ALUTs and 132k registers, which outperforms the current competitors.