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## Abstract

In the recent embedded system development, that is not enough only using a single microprocessor or microcontroller design. Because system's tasks and devices becomes more larger and more complex to be controlled by a single microprocessor or microcontroller. So, the only way is decentralization and parallelization of system control. By this design, we expect that processor-load becomes more lighter and over-load can be avoided. In the other hand, modular concept can be achieved.

In this Final Project, a communication system based on Phillips I<sup>2</sup>C serial bus is designed to interconnect between microcontroller as representation of microprocessor system. Data and other control information are transmitted over this serial bus. This function is same as a computer network in the small scale. The serial bus is selected because it has more advantages than a parallel bus such as low cost and more easy to implement.

This research created software routines of protocol communication system based on I<sup>2</sup>C serial bus as the Physical Layer. This software routines are written in Intel MCS-51 assembly language which are implemented on Atmel AT89 microcontroller family. The ROM space that are needed for this routines as much as 392 bytes (9.57% of 4 kB) on Master and 565 bytes (13.79% of 4 kB) on Slaves. And highest bit rate achieved is 95057.03 bps at 24 MHz microcontroller clock speed (2 MIPS). This system are proven by a wheeled line-follower wheeled robotic as the final implementation.

Keywords : I<sup>2</sup>C serial bus, MCS-51 microcontroller, wheeled line-follower, parallelism, decentralized