

Universal I/O Design for Customizing MCU

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Abstract — Typically, a variety of digital devices are built into the MCU. These digital devices in order to develop a variety of applications PC, various devices such as smart phones should be easily connected. But so far the interface of these devices has not been a unified approach. Development of various types of devices to easily shall be equipped with various interfaces such as UART, SPI, I2C. However, there follows a lot of hardware problems to greatly increasing the number of I/O ports. Universal I / O are four types based on the same port. Each port is controlled the software approach to operate UART, SPI, I2C, etc.

Keywords — MCU; Universal I/O; UART; I2C; SPI)

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1 Introduction

Typically, a system for controlling a variety of digital devices is built into the MCU. A variety of digital devices to develop applications for various devices such as PC, smart phones and should be easily connected. But so far these devices is not the interface has been unified approach, developed by using various forms of SoC devices in order to ease the development UART, SPI, I2C, such as shall be equipped with various interfaces. However, I / O ports greatly increase the number of the more limited hardware. The same shape and 4-port based software manner, each port UART, SPI, I2C, etc. to operate Universal I / O mode is desirable.

2 Universal I/O

The Universal I/O for MCU is being used largely UART, SPI, I2C interface support. To this end, Universal I/o has UART, SPI, I2C modules. For them to control the Universal I/O Controller is composed of. Controller to select the operating mode control signal input received from the MCU. UART, SPI, I2C interface operates at whether any of the Enable signal is transmitted to the selected modules will be determined. UART and I2C communication for the 2 I/O pins, SPI will need a 4 pins for each universal I/O consists of a 4-pin, 4 active depending on the interface

of I/O pins can be decided according to need. Universal I/O block diagram is shown Figure 1.

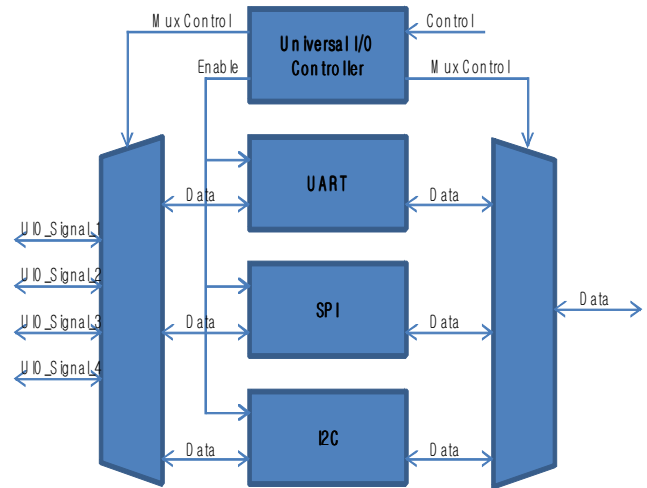


Fig. 1 Block diagram of the Universal I/O

3 Architecture

Using the proposed Universal I/O Interface for the development of the various device environments is shown in Figure 2.

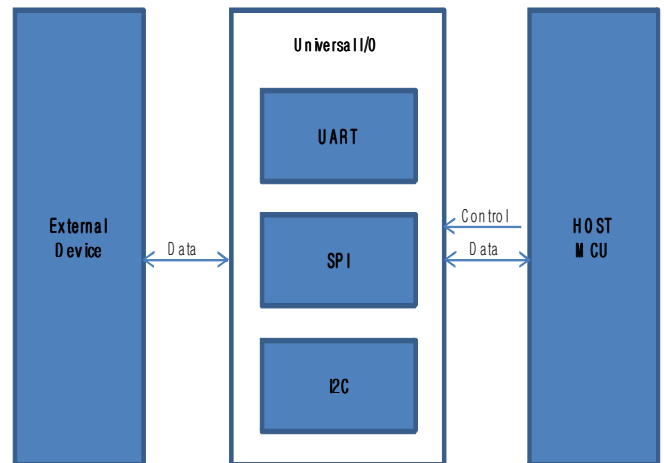


Fig. 2 Development environments using Universal I/O

External devices are connected to Universal I/O through HOST MCU. HOST MCU sends a control signal to the Universal I/O to determine the mode of

operation, and it is through communication with external devices.

How different each I/O voltage of the conventional UART, SPI, I2C I/O ports on the board as shall be settled by Level shifter. HOST MCU controls the entire system and I/O protocol that is used for processing applications to optimize the environment to use to customize the MCU.

Figure 3. is showing the Layout. TSMC 0.18um Library was used. Synopsys' design vision and the astro were used.

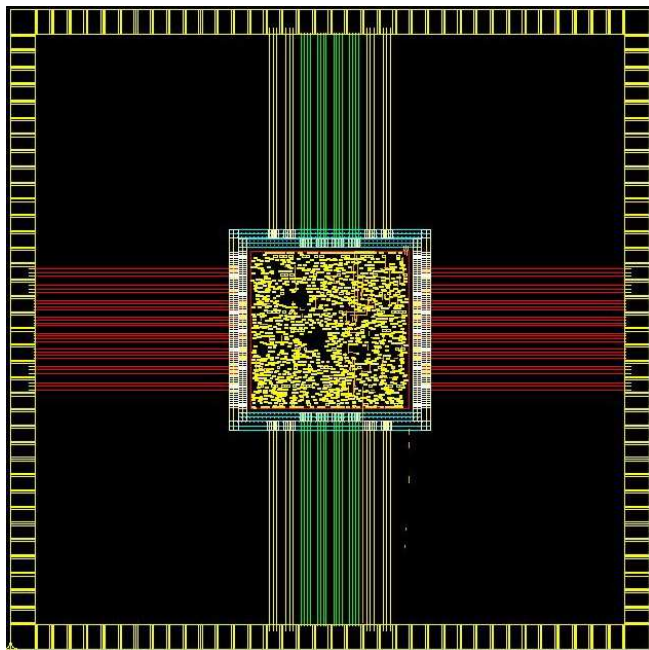


Fig. 3 Layout by TSMC 0.18um

4 Conclusion

In this paper, we propose a Universal I/O Interface using UART, SPI, I2C and environment

through integrated and scalable system offers a compact. Current health care equipment or sensor signal processing system for external devices are connected, such studies are being actively. These devices should be easy to connect to each other, but yet the interface is not a unified but using Universal I/O interface, a variety of devices to connect easily. Future Universal I/O connected to the MCU and will aim to develop integrated SoC. H/W and the S/W of various protocols with mounting H/W, S/W integration Universal I/O interface is planning to develop.

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