LTH

Project Proposal

Embedded Systems Design-Advanced Course

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1. Introduction

Push box is a popular game among all different ages, it is good for the development of the intelligence. The push box game is designed for the real-time single player with the function of pushing three boxes to the three specific places on the map. The control of the movements will be using the direction control keys in the PS/2 keyboard controller. Then the game will reach the end if the player placed the three boxes correctly.

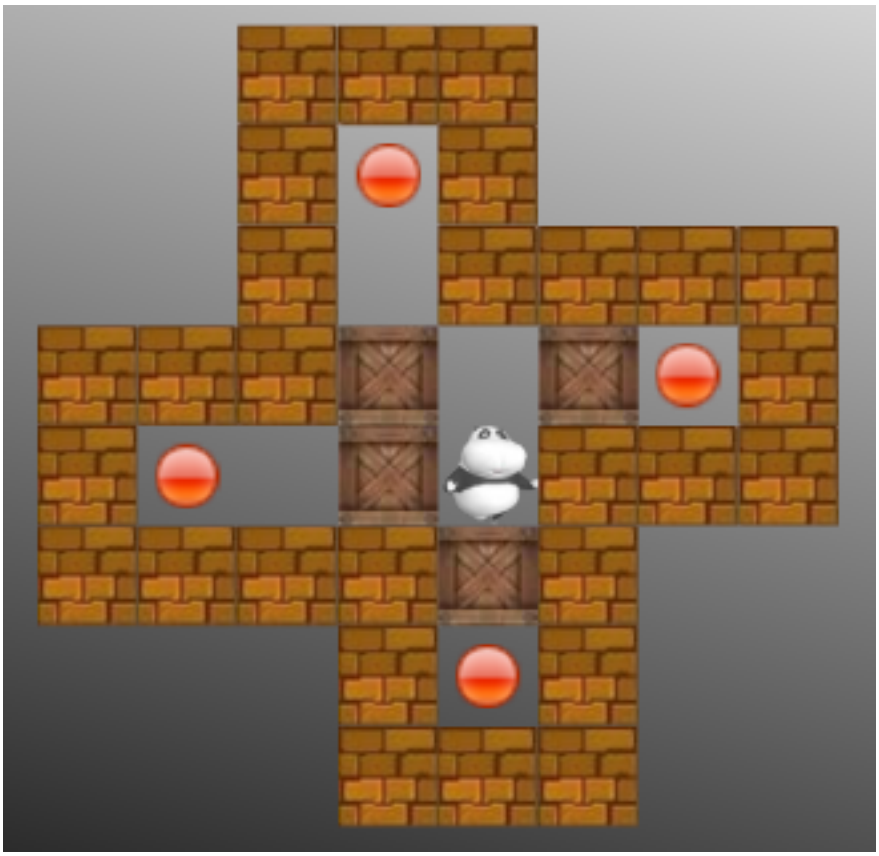

Figure 1. The Ideal Image of The Push Box Game

2. Architecture

The software part algorithm of the push box project will be using the MicroBlaze processor, which will be programmed by C language. There are also some other parts of the system will be implemented in the software level, such as: the interface of the PS/2 keyboard and the audio part.

The hardware implementation part of the system will be the VGA display, that is, the graphic accelerator, which will give the player real-time visual experience when he/she is playing the push box game. In the BRAM part there will be stored some graphic pictures of the images, for example, the vivid graphic of the boxes and the player and of course, the map of the game.

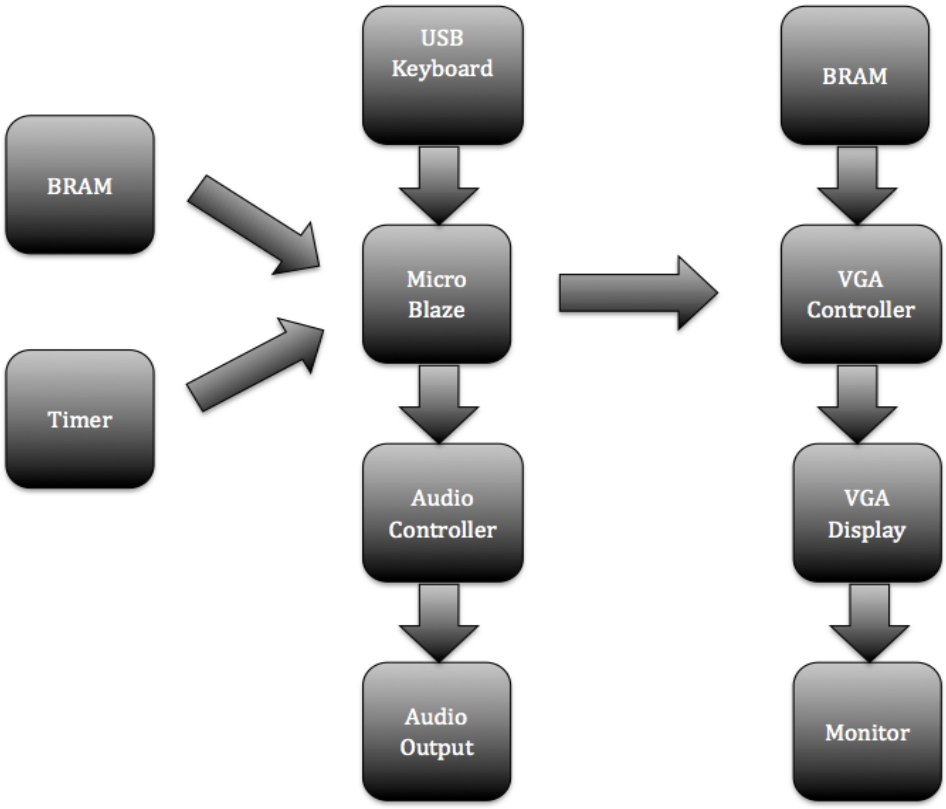

Figure 2. The Block Diagram of the Push Box Game

3. Description of the blocks

The vital blocks of the whole system are Microblaze, Keyboard controller, audio controller, Graphic accelerator (VGA controller).

3.1 Microblaze

The soft processor Microblaze is embedded in the Xilinx FPGAs. The Microblaze could be a strong support to the embedded systems. The I/O bus, PLB bus are the mapping methods for the bus construction concerning the master/slave functionality.

3.2 Audio controller

The audio controller is important for the realization of the whole game. By using the PMOD interface, we could add an amplifier to the system. It is crucial that we could combine the graphic images on VGA screen with the sound together.

3.3 Keyboard controller

We use the keys on the keyboard to control the four directions: up, down, left, right, so the player could determine how he/she is abou to move the boxes. The keyboard will be implemented on the Microblaze processor as the hardware part.

3.4 Graphic accelerator (VGA controller)

The push box will be played on the VGA displayer with the pixels of 320*60, which is controlled by the graphic accelerator. It will be further determined according the space left with the BRAM.

3.5 Memory

The algorithm which implemented by C language on the Microblaze will not take that much of the space in BRAM, but we have to save a lot of memory space for the graphic data of the player, the boxes, the map as well.

4. The time plan

	Siyuan Fu	**Aohan Jin**	**Ying Gao**
Week **1**	Analyze Architecture	Analyze Architecture	Analyze Architecture
Week **2**	VGA Controller realization	Game Logic	Keyboard Controller realization
Week 3	VGA Controller realization	Game Logic	Interconnection Between Blocks
Week 4	Audio Controller	Audio Controller	Audio Controller
Week 5	Testing	Testing	Testing
Week 6	System verification	System verification	System verification
Week 7	Report & Presentation	Report & Presentation	Report & Presentation

Figure 3. The Timetable of The Project