Digital Design and Computer Architecture LU

Lab Protocol

Exercise II

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Task 1: External Interface to AD7843

Document the interface you designed for communication between the touch controller and the input manager. Use Table 1 for this purpose.

Signal	Mode	Width	Description
x	out	12	This is the output(x-Coordinate) that *Touch_Controller* gives, after it receives as an input, the *ADC_DOUT* Signal from ADConvertor
y	out	12	This is the output(y-Coordinate) that *Touch_Controller* gives, after it receives as an input, the *ADC_DOUT* Signal from ADConvertor
penirq_n	in	1	Pen Interrupt Request. It's low active, when you touch the screen, it's 0
busy	in	1	The 1 clock cycle between DIN and DOUT.
dout	in	1	The conversion resulted from the ADConvertor. It contains either X or Y Coordinate, depending on the DIN bits.
scen	out	1	Is derived from SCEN Signal and when is 1, the ADConvertor is active. In the other case, the LCD and touch panel Module. Both can not be active at the same time.
dclk	out	1	The clock used by the *Touch_Controller* and ADConvertor.
din	out	1	The 8bit ControlWord that is provided to the ADConvertor which contains information towards X or Y Coordinate.

Table 1: Touch controller interface

Include a simulation screenshot (Figure 1) that shows how your touch controller forwards one coordinate pair of a single touch event (i.e. x and y coordinate) to the input manager.
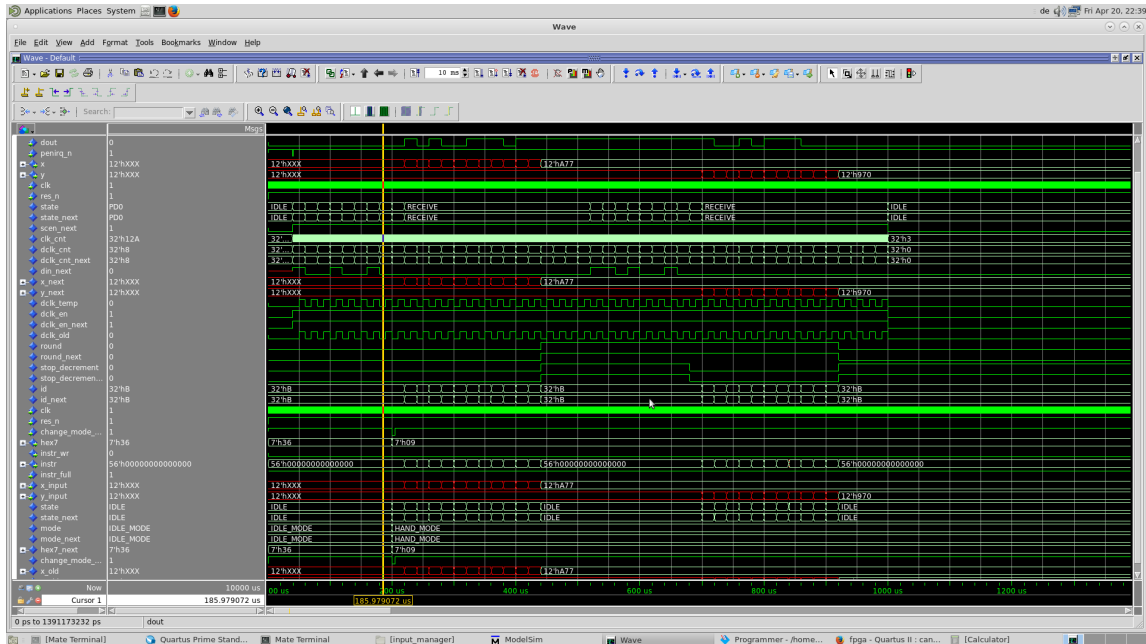

Figure 1: Simulation screenshot showing the touch controller interface

Question: What is the minimal time that must lie between the falling edge of the CS signal and the first rising clock edge of DCLK?

Answer: The minimum time that must lie between the falling edge of the CS signal and the first rising clock edge of DCLK is 10ns. This is the t_1 from the ADConvertor Manual.

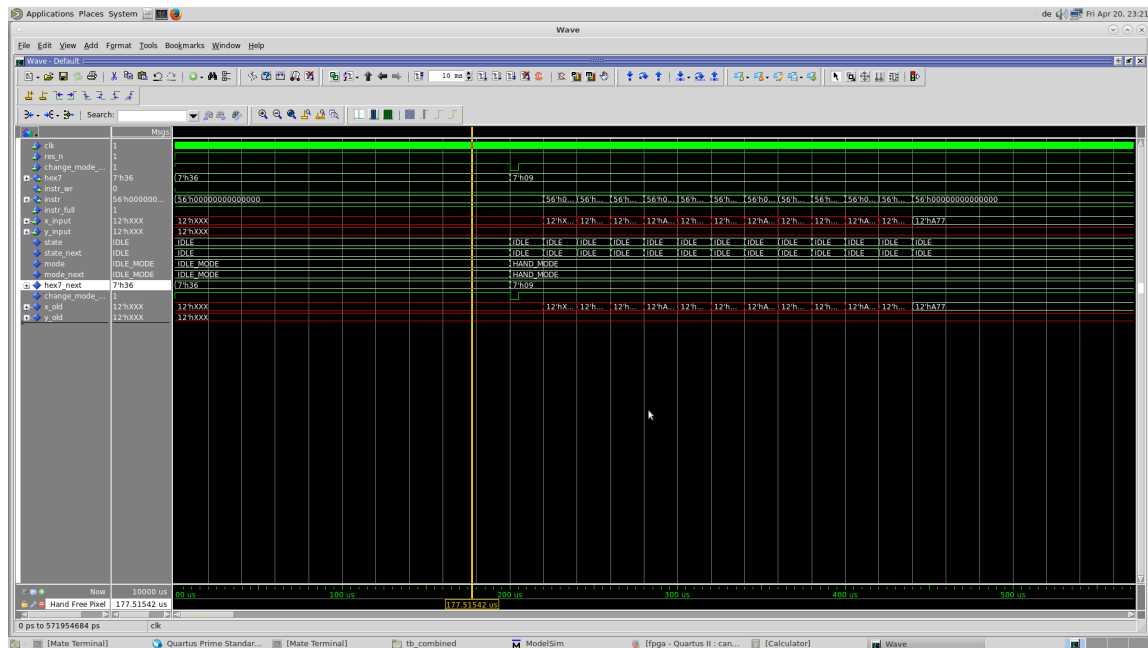## Task 2: Internal interface to the graphics controller

Figure 2: Simulation screenshot demonstrating the Free-Hand mode

Task 3: Integration

	LC Combinationals	LC Registers	Memory
Absolute number	324	152	0

Table 2: Combined resource usage of the touch controller and input manager