COMPONENT DOCUMENTATION

Keyboard Synchronizer:

Purpose:
Ensures that the data from the keyboard is synchronized to the Basys Board clock and controls the movement of each bit to the next flip-flop in the shift register.

Requirements:
Data from the PS/2 keyboard

Input/Output Descriptions:

Direction	Name	Description
Input	Pseudoclock	A signal from the keyboard that goes high when a button is pushed and signifies to the BASYS board that the new data is ready.
	PS2_DATA_ASYNC	The data bits taken directly from the keyboard. This data is originally not synchronized to the BASYS Board clock.
	BASYS_CLK	A signal from the built-in clock on the Papilio board, to which all data bits will be synchronized.
Output	DATA_READY	Signal which is linked to the CE (clock enable) signals of all of the flip flops in the shift register and allows the next data bit from the PS/2 keyboard to enter the shift register.
	PS2_DATA_SYNC	The newly synchronized PS/2 keyboard data bit.

Shift Register:

Purpose: Allows the multiple bits of data from the PS/2 keyboard to all be correctly synchronized to the BASYS board clock, and separates the 22 bits of data into the 11 bit key code and the 11 bit stop code.

Requirement: A data bit that is synchronized to the BASYS clock and a CE signal generated from the keyboard synchronizer.

Input/Output Descriptions:

Direction	Name	Description
Input	PS2_DATA_SYNC	The newly synchronized PS/2 keyboard data bit, waiting to be transferred to the next flip-flop at the next rising edge of the BASYS clock.

	DATA_READY	Signal which is generated from the keyboard synchronizer and which serves as the Clock Enable (CE) signal of the register.
	BASYS_CLK	A signal from the built-in clock on the Papilio board, to which all data bits will be synchronized.
Output	BIT_1, SCAN_B(7:1), BIT_10, BIT_11,	The 11 bit stop code from the PS/2 keyboard which is run through the register before each key is pressed.
	BIT_12	Start bit of the 11 bit key code characteristic of each key (universal for all keys).
	SCAN_A(7:0)	The unique 8 bits of the key pressed.
	BIT_21, BIT_22	The stop bits of the 11 bit key code (universal for all keys).

Comparators:

Purpose: To compare the unique 8 bit code generated in the shift register to the four hexadecimal equivalents of the 8 bit codes that correspond to the 'W', 'A', 'S', and 'D' keys, and performing logic that activates the appropriate motors of the robot to move in the forward (W), left (A), right (D), down (S) directions.

Requirements: The 8 bit scan code for the key currently pressed. And the 8 bit scan code from the first 11 bits of the shift register.

Direction	**Name**	**Description**
Input	SCAN_A(7:0)	The middle 8 bits of the second 11 bit strand generated from the shift register. This corresponds to a particular key pressed.
	SCAN_B(7:0)	The middle 8 bits of the first 11 bit strand generated from the shift register. The comparator checks to see if this is equivalent to the stop code which will deactivate all the motors and prevent the robot from moving.
Output	RIGHT_MOTOR_1, RIGHT_MOTOR_2 LEFT_MOTOR_1, LEFT_MOTOR_2	These outputs linked to the motors in the robot. The logic determines which motors are activated and therefore the direction in which the robot moves.