

CSEN 605 :Digital System Design

Course Project Report

**Team Name :**

<b>Member Name</b>	<b>Member ID</b>	<b>Tutorial #</b>
<b>Mohamed Ihab</b>	<b>37-0251</b>	<b>T-21</b>
<b>Hesham Hamdy</b>	<b>37-6934</b>	<b>T-19</b>
<b>Omar Shaker</b>	<b>37-2403</b>	<b>T-13</b>
<b>Ahmed Sherief</b>	<b>37-9406</b>	<b>T-19</b>
<b>Omar Hesham</b>	<b>37-4450</b>	<b>T-14</b>

**Project Title :**

**Robotic Arm**

**Submission Date :**

**9/12/2017**

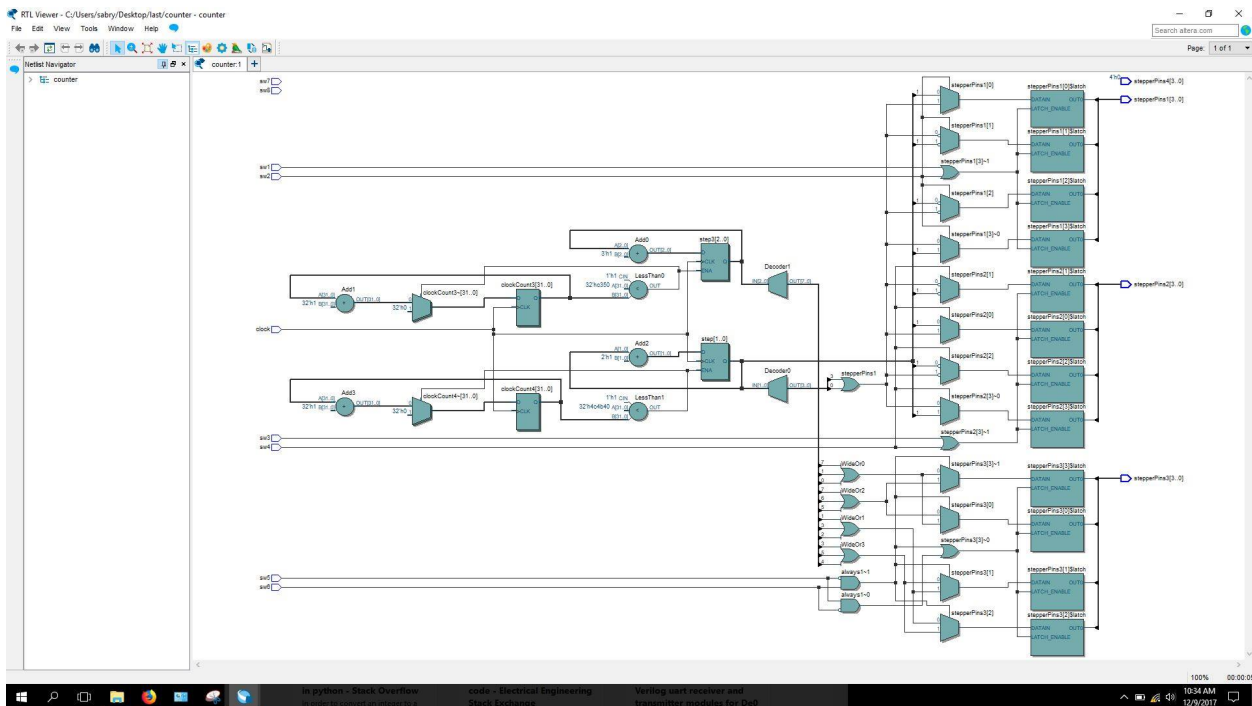
## **1)Overview :**

- Project Description and features :
- The Project is basically a prototype of a robotic arm that can be used to move objects from one place to another by controlling it with switches. In theory it's motion is more precise than humans for critical situations such as in a surgery where a tiny mistake can result in a catastrophe. Another application that the robotic arm can come in handy is in dangerous environments where humans can be endangered, such as defusing a bomb, space construction work or even underground construction where the temperatures can be very hot. It only uses 3 stepper motors and some mechanical gears and parts to operate.
- How to run the project :
- The operation of this prototype is very simple. It is controlled by 6 switches on board the fpga, 2 switches for each motor to rotate clockwise and anti clockwise.

## 2)Design Methodology :

### RTL Design :

<<The RTL design of the modules ,showing how the inputs and outputs of modules are connected with each other or with other interfaces >>



### Resources used :

<<Online Demos .other similar projects and how they were adapted for your project >>

<<<https://trandi.wordpress.com/2014/09/17/fpga-rc-servo-and-stepper-motor/>>>

this was the only demo used for the project. The clock was used for one motor and for the 2 different steppers we had to go through trials to reach an acceptable clock for them to work properly.

## **Devices:**

<<Hardware devices used and how they were connected >>

There are only 3 stepper motors connected to the fpga that were connected to 12 output pins from the fpga, 4 for each motor as each have multiple coils

## **3) Implementation:**

### **Module Description:**

<< A short documentation of each defined modules, its function and how to works with respect to other modules. >>

There is only one module used in this project which takes the fpga clock , reset , switches and outputs 12 outputs, 4 for each stepper motor.

## **4) Results and Limitations:**

<<Discussion of any limitations or short comings in your project. >>

for the Stepper motors to work correctly, trial and error must be done as not all steppers have the same timing to operate correctly.

## **5)Video:**

**youtube:**

**<https://www.youtube.com/watch?v=31ISW9szc2M&feature=youtu.be>**

**Google drive :**

**[https://drive.google.com/file/d/1ZuHI\\_00EY73w3pBU3w2wsW7mWSGPzug/view](https://drive.google.com/file/d/1ZuHI_00EY73w3pBU3w2wsW7mWSGPzug/view)**