**Smart Lecture Halls**

1. **The idea of the project is to count the number of students in the lecture halls and keep track of how many of them in it and implementing a smart sanitizer which works when you put your hand below it**

**Inputs:**

1. **Basma ( IR sensor) to record the people entering**
2. **Hana ( IR sensor ) to record people exiting**
3. **Nada ( ultrasonic sensor) implemented using Arduino uno to activate the sanitizer**
4. **Clk ( clock implemented in the fpga)**

**Outputs:**

1. **Zain( water pump) the sanitizer motor.**

**Others:**

1. **Hamza (signal) it is used to record the number of students in the lecture hall**
2. **Ticks (signal) used to count ticks of the clock**
3. **Freq(signal) used for the timer to activate when it reach the required time**
4. **Led1 (buffer) used to display the 7 segment and show the number of students**

**Pin assignment:**

**Explanation of the code:**

1. **At first we import the libraries we will need which are:**
2. **ibrary ieee**
3. **ieee.std\_logic\_1164.all**
4. **ieee.std\_logic\_signed.all**
5. **We defined the entity amory with its inputs/outputs/buffers:**

**1)inputs: basma,hana,nada,clk ( the 3 sensors and the clk)**

**2) buffer: led 1 for the 7 segment display**

**3)output: zain which is the motor**

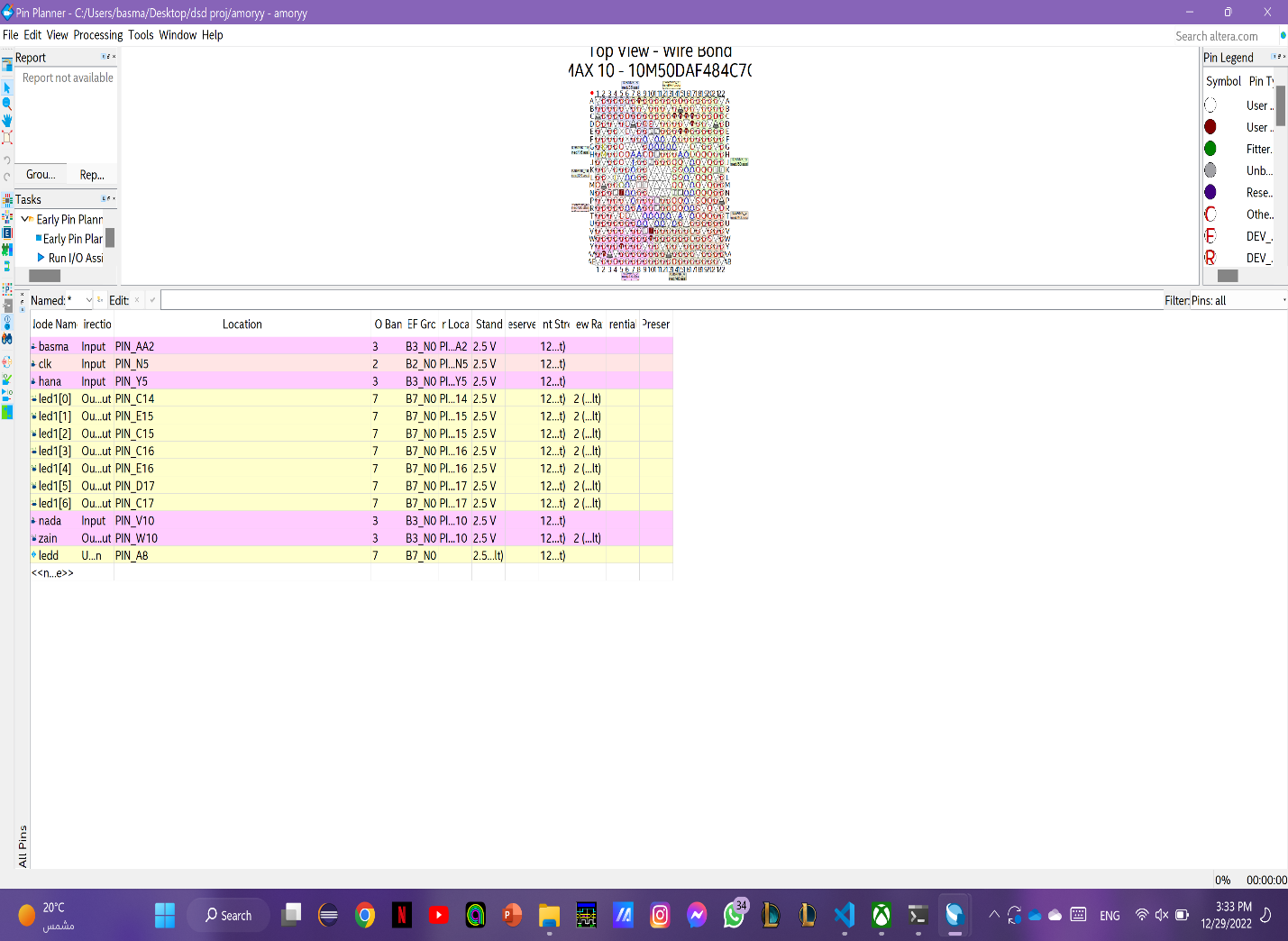
1. **We started the architecture beso and defined the signals that we will be using:**
2. **Hamza: to count the number of people**
3. **Ticks: to count for the timer**
4. **Freq : to set the time required**
5. **We started a process on the clk and checking if it is a rising edge or not , after that check if the ticks reached the freq-1 or not , if yes it will go and execute the code, if not it adds +1 to the current ticks**
6. **If it reached ticks=freq-1 we first set the ticks to 0 to restart it then we start checking on the first sensor (basma) the entering sensor if it is a (0) because It is a falling edge sensor if yes we will increase (hamza) the counter by 1 , and we check if hamza reached the maximum capacity or not(which is 9)**
7. **For (hana) which is the exiting sensor if it is a (0) we will decrease (hamza) counter by 1**

**and we check if it reached the minimum(0) or not .**

1. **For (nada) the sanitizer sensor(ultrasonic) we implemented its code using Arduino which reads up to 15 cm and it is a rising edge sensor, if it is a 1 we activate (zain) the motor and set it by 1**

**If not we set the motor by 0 to stop it**

1. **Then we go for cases on (hamza) the counter from 0 to 9 to display it on the 7 segment where we set the values of led1 by the required number**
2. **Then we end the process and end (beso) the architecture**

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