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| colored background with feather like doodlesSmart  room |

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| Especially for kids! |

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| 12 Bahman 1399  Computer-Aided Digital System Design |
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## Introduction

Kids are the most important part of a family that needs so much care.

In real life you have many works to do which makes you forget to do something that you have been planned for but now in this smart room we do something to take care of your room and house while you are busy enough to forget what you are about doing and also gives you an alert to do it yourself.

Kids in every age needs to be cared appropriate to their age. For example, when the baby feels hungry and wakes up, the mother must feed him.

In essence, the room should include things like room temperature and ventilation and keeping out of danger and keeping her health and the most important of her needs.

## 

## WHAT WE DESIGNED?

We briefly outline the items that has been implemented in this project.

1. Parents can protect the child's room if necessary and specify a password

for the door.

1. There are sensors in the room, and the first sensor is used to set the temperature,

and the parents can observe and determine the desired temperature.

1. A second sensor is used to set the proper light for the room during the day.
2. A third sensor is placed near the window and a certain sensor is lit to

warn the parents if the child approaches the window and is in danger.

1. Another sensor is embedded for the needs of the child and activates

when the child is crying.

1. When a child is asleep, when it approaches the edge of the bed,

the sensor becomes active and automatically climbs onto the bed and

prevents the child from falling.

1. Another sensor for ventilation, considered in two cases to enable it to be activated,

is the first mode in which the parents turn on, and the second mode is lit up

at a certain time.

1. We consider the sensor for the moisture of the bed.

## ASM Description :

We would prefer to describe the whole shape in general, in a complete detail at a glance.

## Password protection:

First, the room is in its initial state with minimal facilities as we mentioned earlier the child’s room has a password protection service that keeps the baby safe from any unpleasant events

The parents should enter the correct password to use other facility if the entered password

was not correct they can try again for two times, if their password matches and it was

correct so they can successfully enter to kid’s room and they can use other facility but if

password was not correct and their attempted twice but the password does not match

the room will be set to the initial state with minimum facilities.

## Check The Temperature:

In our designed room , we have a sensor to check the temperature of the child’s room.

at first the sensor senses the environment temperature then based on

it’s value decides the air conditioner should be work on the cool or heat system.

As we mentioned above The air condition first senses the environment and

then checks some condition and then decides if the air condition should work in

cooler or heater mode.

The instruction works as follows ,if the environment temperature is

between 18 to 24 centigrade the kids temperature is in a desired state.

but if the environment temperature is bigger than 24 centigrade, we

also need to check an additional statement to decide the air conditioner speed, if the

difference between environment temperature and 24 centigrade is bigger than 10

centigrade then the air conditioner speed should be set to fast speed but if it’s less

than 10 centigrade then the speed should be set to slow.

If the environment temperature is less than 18 centigrade and the difference

between environment and 18 is bigger than 10 the air conditioner should be

in heater mode with fast speed , and it the difference is less than 10 the air

conditioner is in heater mode with slow speed.

## Light Setup:

Our designed light system is very smart! You may asking why we say this , it’s because the light will be set properly based on light sensor and a clock.

Which means in the child’s room we have a sensor which detects the light and decides the light should be turned on or off but it’s not enough for a smart room so we decided to add and additional state to check the time, so if the time is between 11 PM to 7 AM the light should be turned off and the curtain is closed and if the time is between 7 AM to 3 PM the lights should be off and the curtain should be open the reason of this action is the sun is up and we can save the energy and use sunlight.

If the sensor senses that the child’s room needs light and the clock was in 3 PM to 11 PM the light should be turned on and the curtain should be closed.

## Window Alarm:

If the baby came near the window, the window will make an alarm to warn parents.

This caution is based on the distance of the baby…

And also we have an additional smart feature for window and it’s for opening and closing windows based on a special word detection , if the parents says the word “BAZ” the window will be open automatically.

## Baby is Crying!

When the baby is crying we will make an alarm to warn parents.

The sensor will be work when it’s detect a special word in our design for this small room we set the special word “OWA”,because most of the babies while crying said that word so when the sensor detect this word it will start an alarm to warn to parents.

## Edge Of Bed:

When the baby is sleeping and came to edge of bed we will make an alarm to warn parents and prevent baby’s falling.

The sensor is set on the edge of bed so when the baby’s body hit that sensor and sensor senses the baby’s body it will start to make an alarm to parents.

## Ventilation:

The used a sensor for check the air quality, which has to be controlled every 30 minutes.

we used a counter, which is activated when it’s meet the defined deadline which is set to be 30 minute.

If the ventilation was needed, the ventilation system will be turned on and if it’s not necessary it will be switched off.

## Moisture Of Bed:

When the baby wet their beds a sensor senses the water vapor rate and if this rate is less than 100 the parents can find out that the baby’s need their parents to change their diaper or help them to clean their bed .

## ASM Chart:

The ASM chart attached as follows.

(if the quality of the image is not so well you can find the image in the document folder of project)

## FSM Chart:

Well , as you know ASM and FSM very similar to each other so we’ll not describe this chart in much detail , we just cover important aspects.

## Verilog Implementation:

For each items that described in features list we have Verilog implementation.

We have also implemented the test benches and Wave form.

## Synthesis:

We used ASIC implementation.