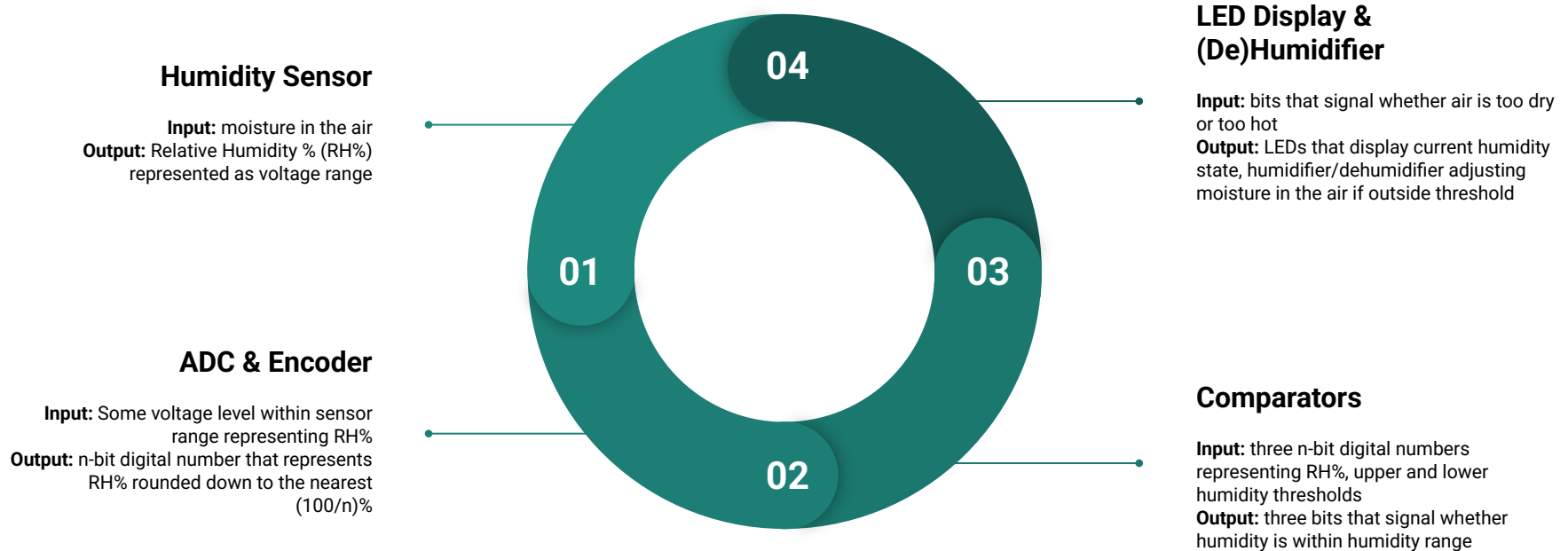# Humidity Regulator

Milestone 2 Presentation

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Project Relevance

- Infection Control
- Sterile Storage
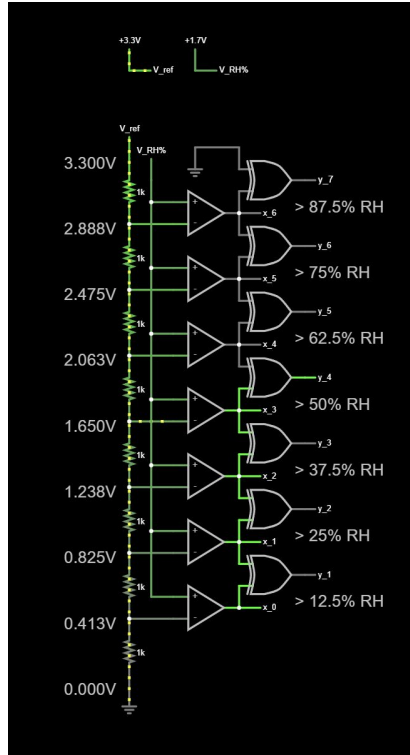- Patient Comfort & Recovery
- Medical Equipment Performance

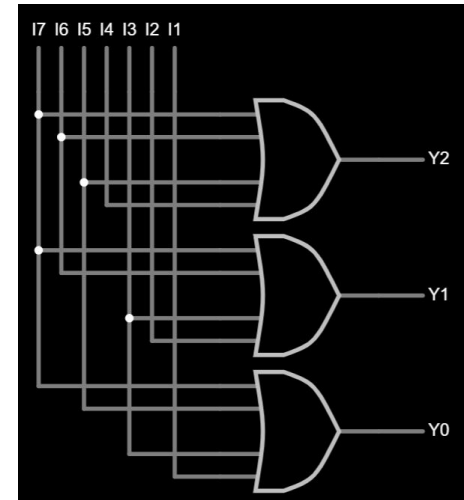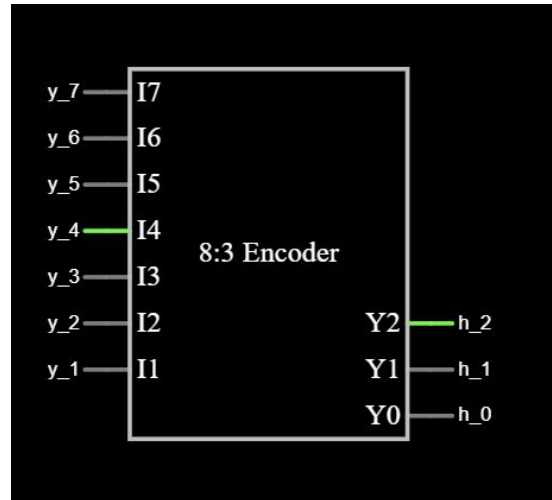| General Recommendations of Humanity Levels in Healthcare Facilities		
Room	Temperature (°C)	Relative Humidity (%)
Operation Theatre	18-20	50-55
Imaging Department: X-ray room, MRI, CT Scanner, Mammography, Ultrasound, Fluoroscopy, Angiology	22-24	50
Pathology Department: Dark room, Biology Lab, Chemical lab, Immunology, Hematology	22-24	50

Flyer_Humidity for Hospitals & Healthcare_EN_20220527.pdf

System Overview

Humidity Sensor

Input: moisture in the air
Output: Relative Humidity % (RH%) represented as voltage range

ADC & Encoder

Input: Some voltage level within sensor range representing RH%
Output: n-bit digital number that represents RH% rounded down to the nearest (100/n)%

LED Display & (De)Humidifier

Input: bits that signal whether air is too dry or too hot
Output: LEDs that display current humidity state, humidifier/dehumidifier adjusting moisture in the air if outside threshold

Comparators

Input: three n-bit digital numbers representing RH%, upper and lower humidity thresholds
Output: three bits that signal whether humidity is within humidity range

01
02
03
04

Analog to Digital Converter

Voltage Comparison

Encoding
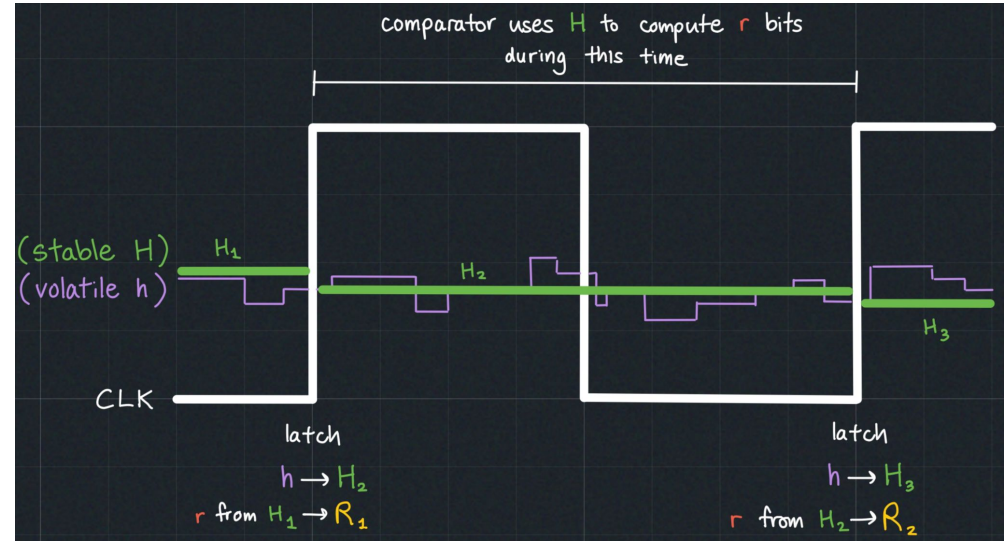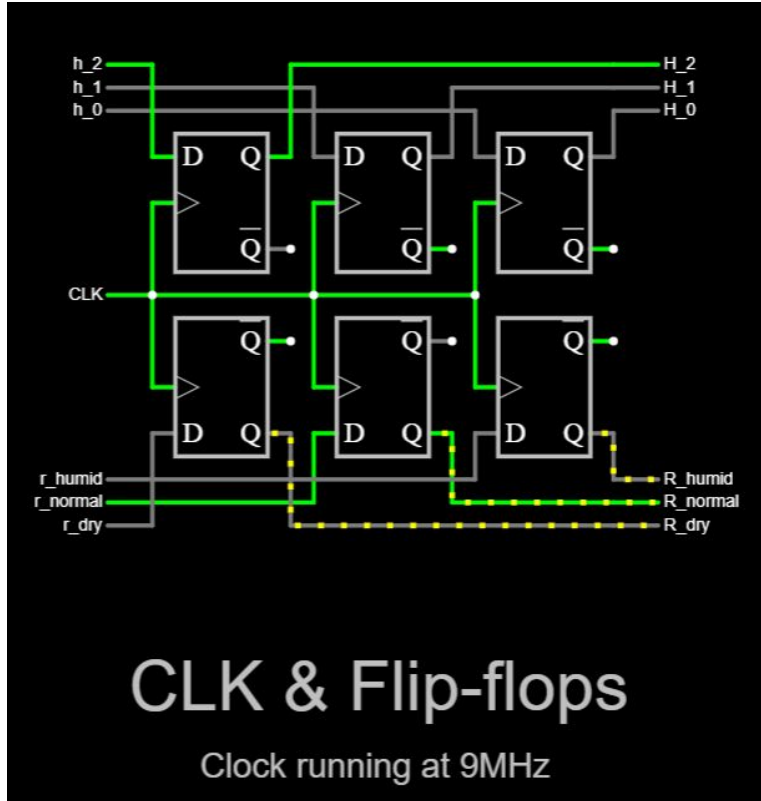
Comparators

Comparators

r_normal if T_lower <= H < T_upper
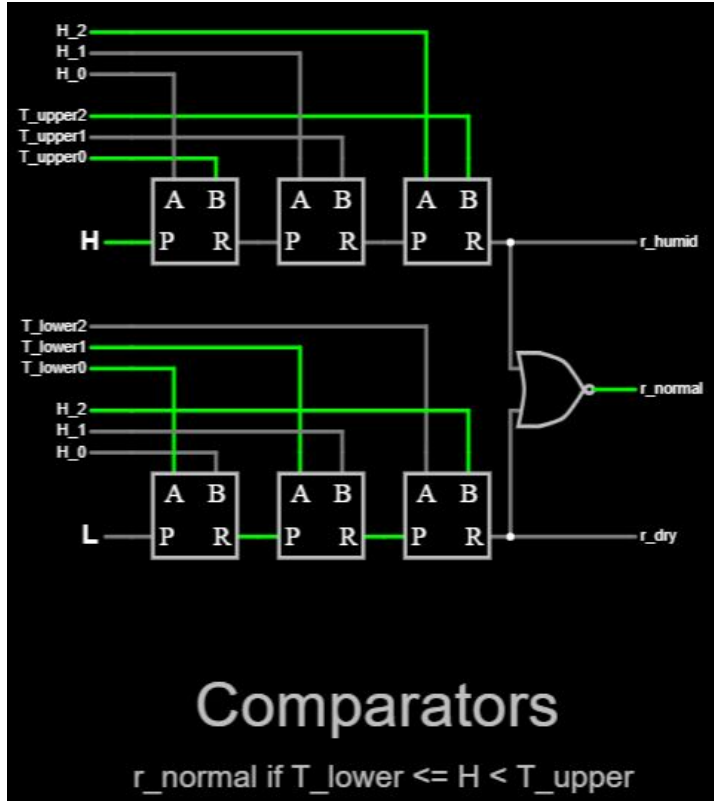
Modular Comparison Block Design

R1 is HIGH when A > B

R2 is HIGH when A >= B

Clock & Flip-flop

CLK & Flip-flops

Clock running at 9MHz

comparator uses H to compute r bits during this time

(stable H)
(volatile h)

CLK

latch
$h \rightarrow H_2$
r from $H_1 \rightarrow R_1$

latch
$h \rightarrow H_3$
r from $H_2 \rightarrow R_2$
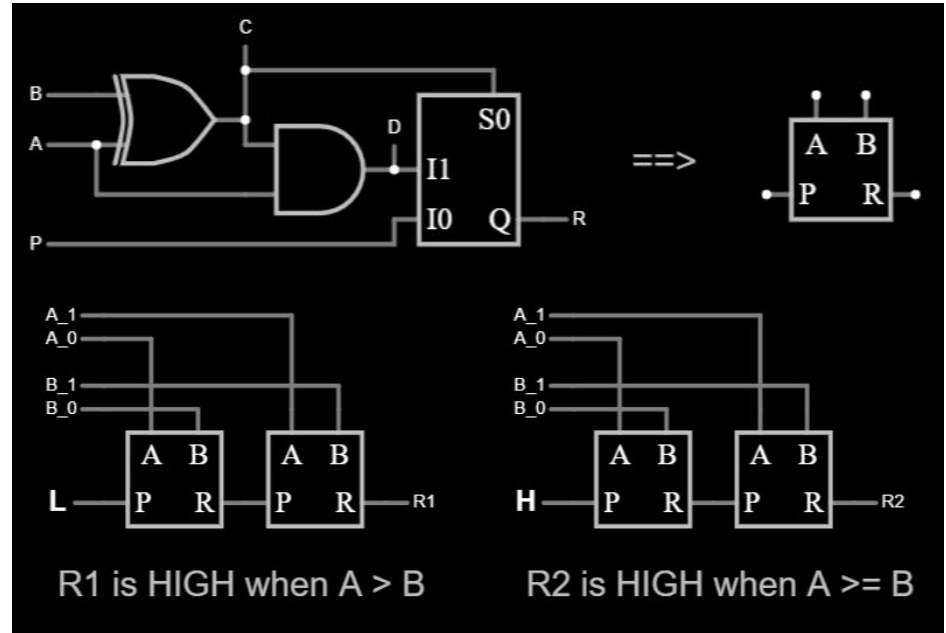
Longest delay path for a 2-bit comparator

$t\_pd = (4 + 2n + 1)d$

Comparator needs (50+20n) nanoseconds to process n-bit data (gate delay d = 10ns)
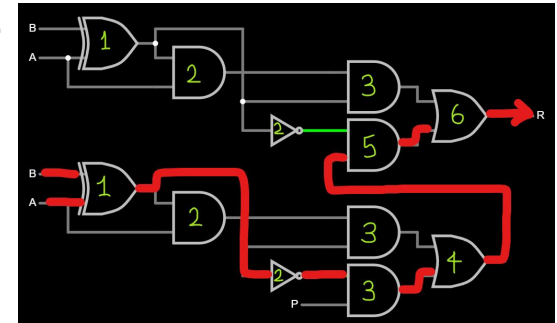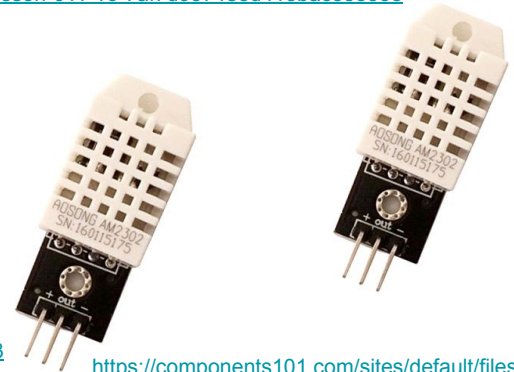
Falstad Simulation (3-bit system)
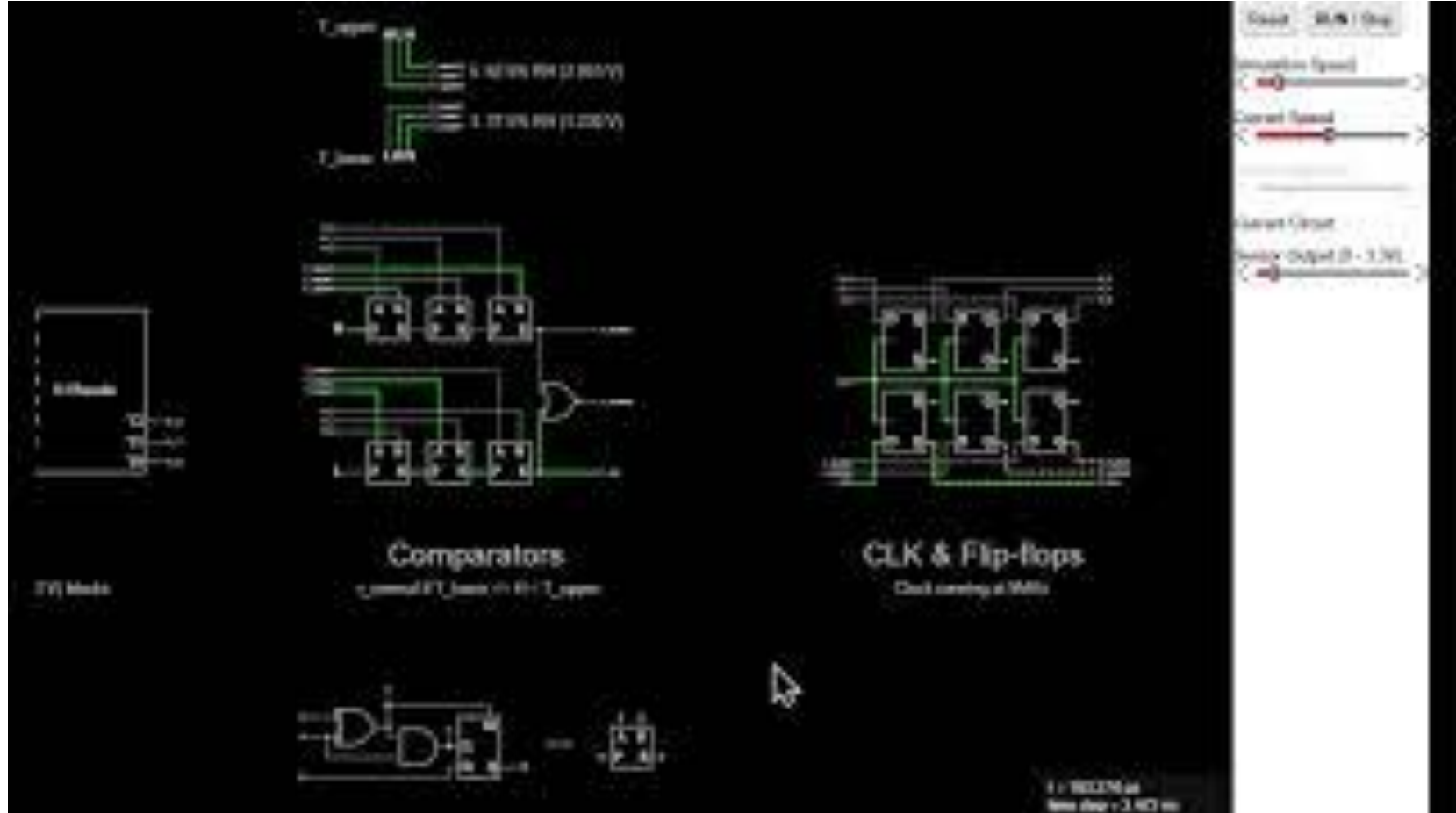
Potential Improvements