



# Design and Manufacturing of desiccant disk for use in solar dehumidifiers and air conditioners

**Group : #14**

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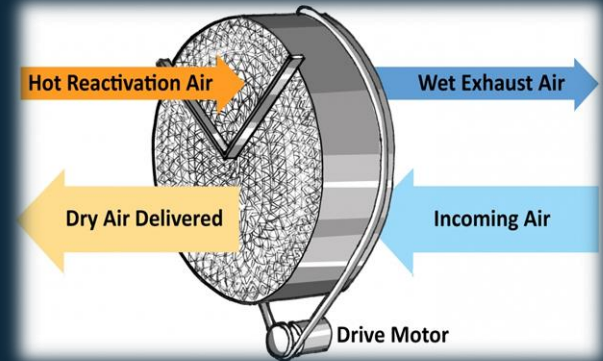
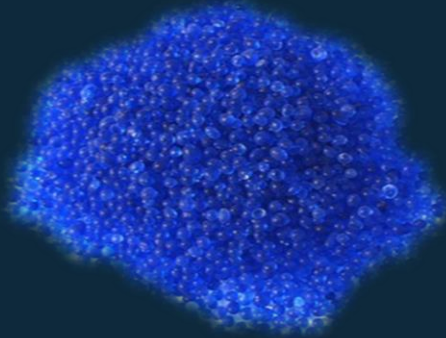
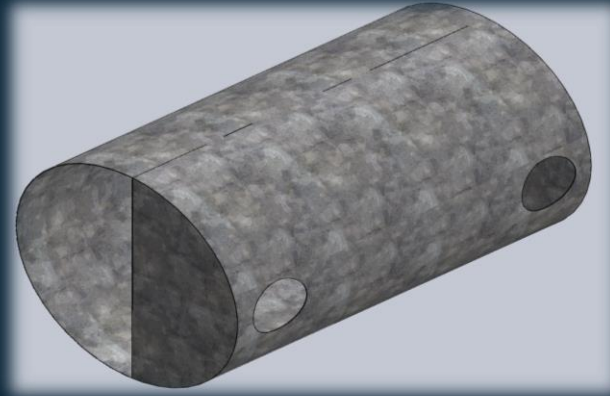
**Dr. Panos Spficas**

# Outline

1. Background & Motivation and relevance
2. Objectives
3. Application
4. Design Constraints Engineering Standards & Design specification
5. Conceptual Design and Calculations
6. Testing & Results
7. Feature & Recommendation

# 1

## Background & motivation and Relevance



# 2

## Objectives

- Improve the instrumentation of the system (Temperature & Humidity)
- Design a reduction mechanism for the system
- Add an indirect evaporative cooler and water sprayer
- Design and manufacture a trolley to mount the disk on for ease of move

# Application

3

# Design & Specifications

AMP meter



Tachometer  
10-100000 RPM



Torque Wrench  
6 - 30 Nm

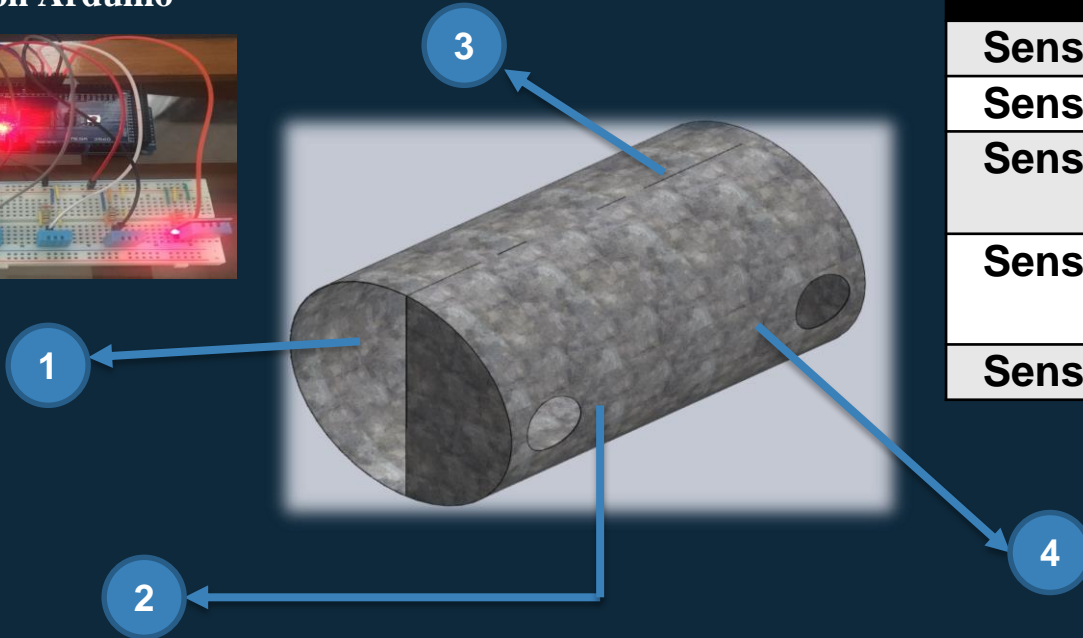
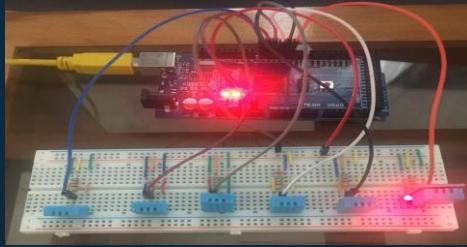


52 RPM  
19 N.M



# Design & Specifications

## Humidity and Temperature Sensors on Arduino



#No. of sensor	Place of sensor
<b>Sensor 1</b>	after heat gun
<b>Sensor 2</b>	before cooler
<b>Sensor 3</b>	after heat gun after disk
<b>Sensor 4</b>	from room after evaporative cooler
<b>Sensor 5</b>	Ambient

4

# Conceptual Design and Calculation

# Motor

Old Motor: 1000 RPM, 750 W

Disadvantages :

- Consume a lot of power
- Give too high RPM



# Solutions

- Gear box



# Problem

Too big gear and cost a lot.

- Planetary gear box



Complex and cost a lot

- Worm gear

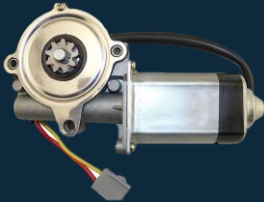


Too big gear

What we need:

- Torque (Disk) = 9 Nm
- RPM (Disk) = 0.08 rpm

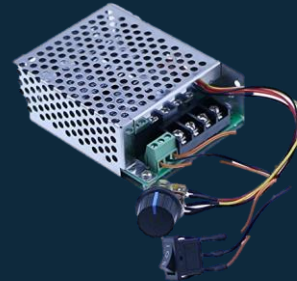
- 1 Car window motor:
  - Torque = 19 Nm
  - RPM = 52 rpm



- 2 Using two aluminum pulleys with 3:1 ratio



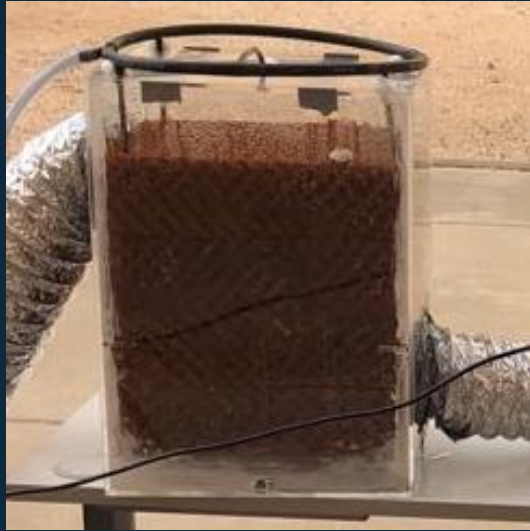
- 3 DC speed controller



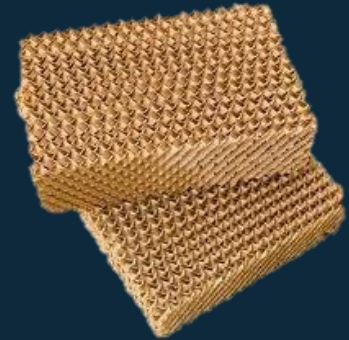
# Used Formulas

- ▶ Speed ratio = Number of teeth Driven / Number of teeth Driver
  
- ▶ Power = Torque \* Rotational Speed

# Evaporative Cooler



**Material:**  
Kraft Paper Pad





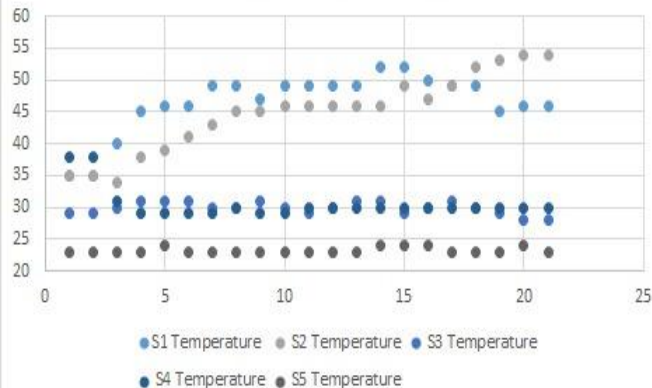
# Testing & Results

# Overall

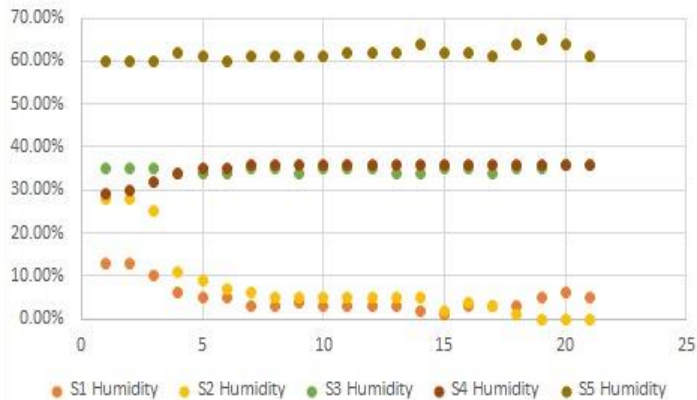


# Testing & Results

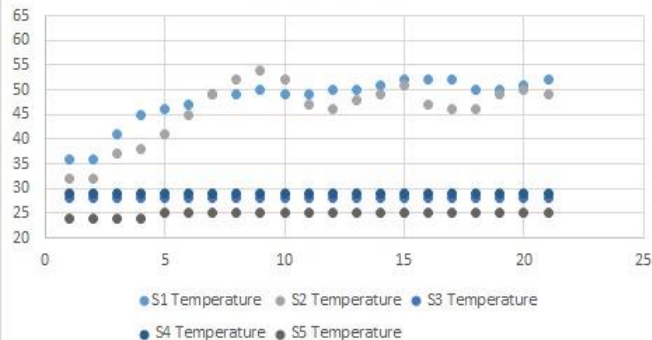
Without Cooler



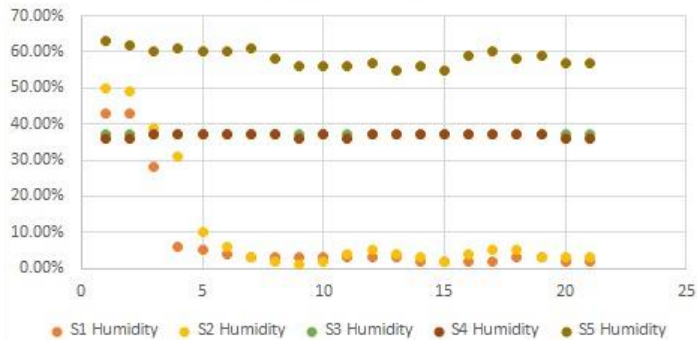
Without Cooler



With Cooler 2



With Cooler 2



#No. of sensor

Place of sensor

Sensor 1

after heat gun

Sensor 2

before cooler

Sensor 3

after heat gun  
after disk

Sensor 4

from room after  
evaporative  
cooler

Sensor 5

Ambient

# Recommendation

1. Improve the design of evaporative cooler
2. A gear box to reduce the revolution of the disk
3. Maintenance of the bearing and shaft
4. Checking the efficiency of Silica
5. Anemometer to calculate the speed of air



MYSTF

DESIGNING DESICCANT DISK



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Regards