Smart Basket

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Agenda

- What is Smart Basket?

Smart Basket

- A wheeled motorized smart Basket that can automatically catch projectile objects using Kinect 3D scanning as a sensor.

- Our system will track the projectiles to determine the path that it is flying in using the Kinect and determine the landing point will be, and then transmit the data to the basket, so it will move fast and catch it.

Smart Basket

- Video

Smart Basket .. Target!

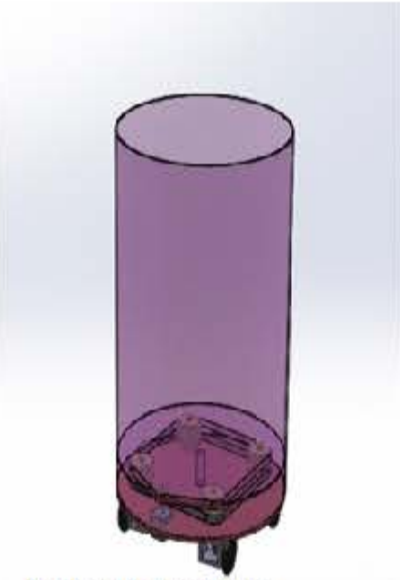
- Build automatically motorized basket with wheels.
- Build scanning application using Kinect.
- Build sport/game/education applications.

Kinect App scanning

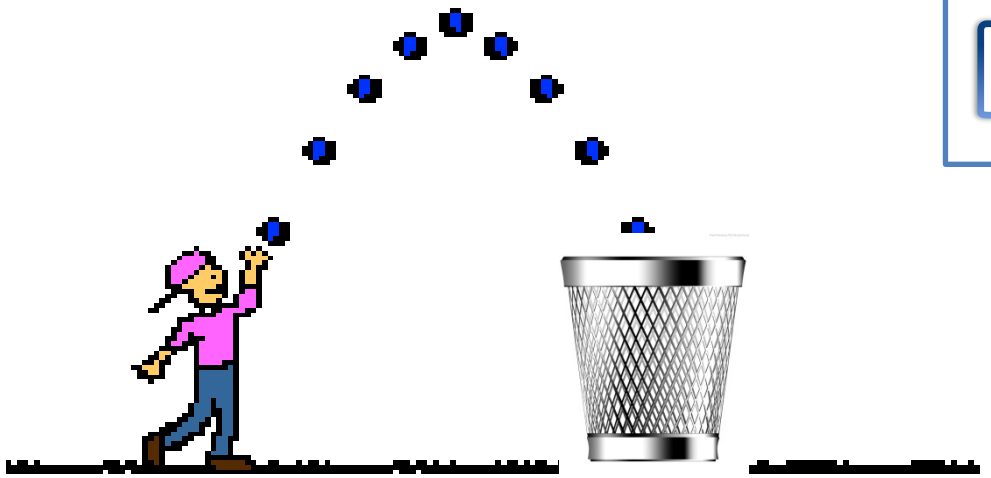
send data to first arduino

using Zigbee btw 2 Arduino

transmot data to the basket



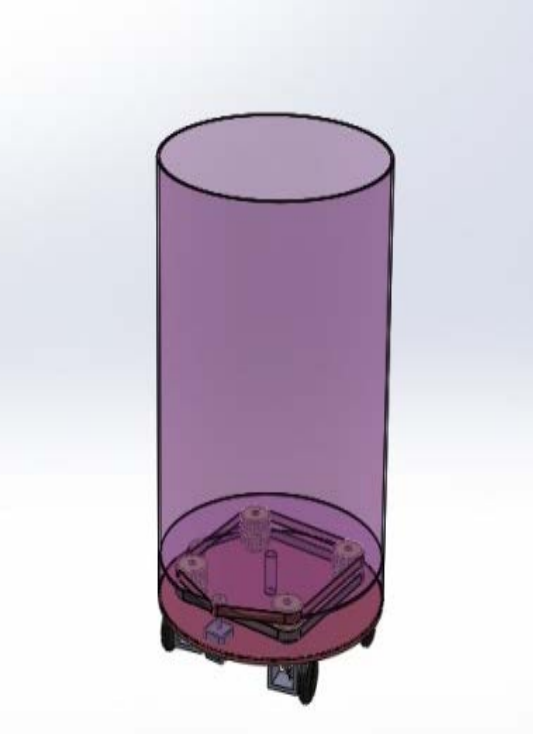
the basket will move towards sent position

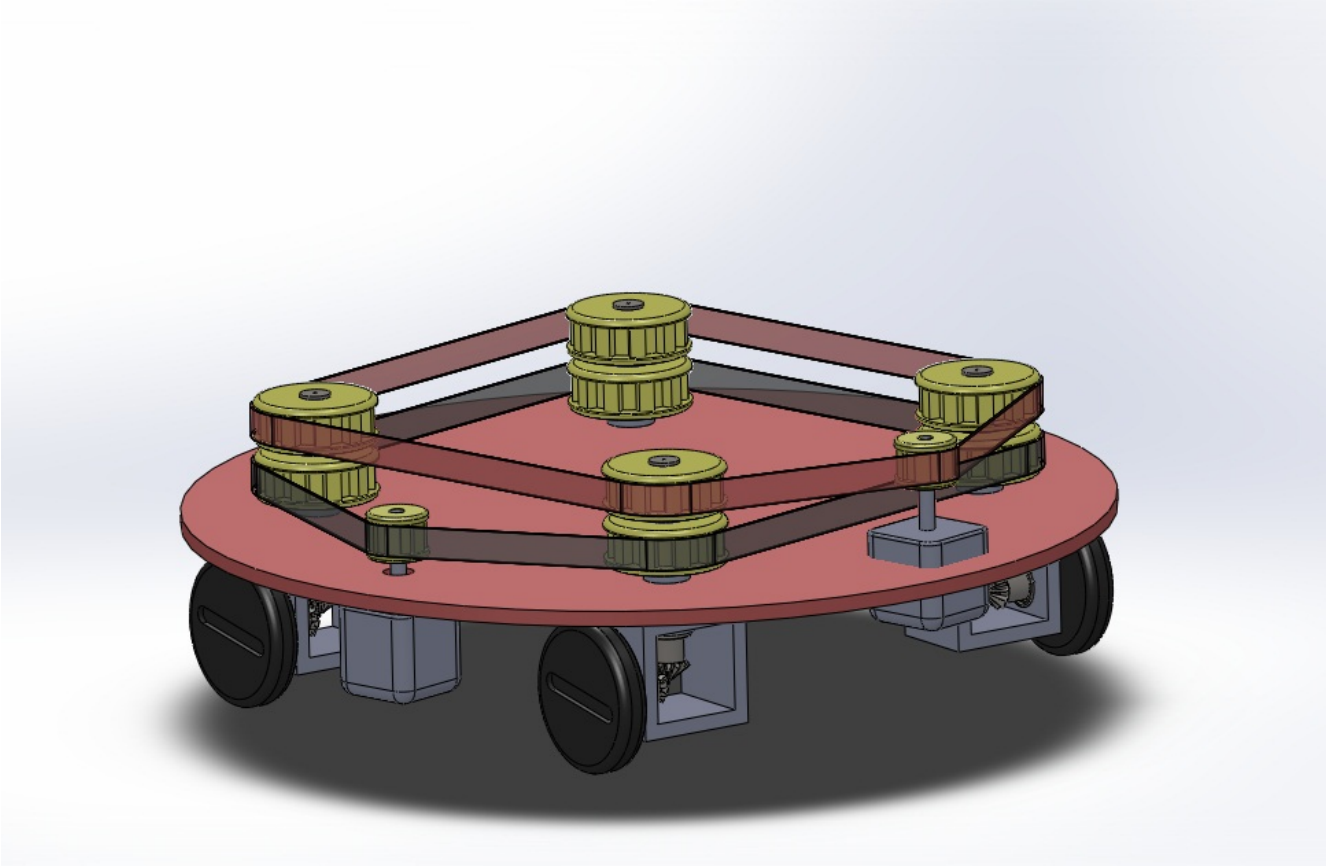


Project Architecture

- Mechanical Design

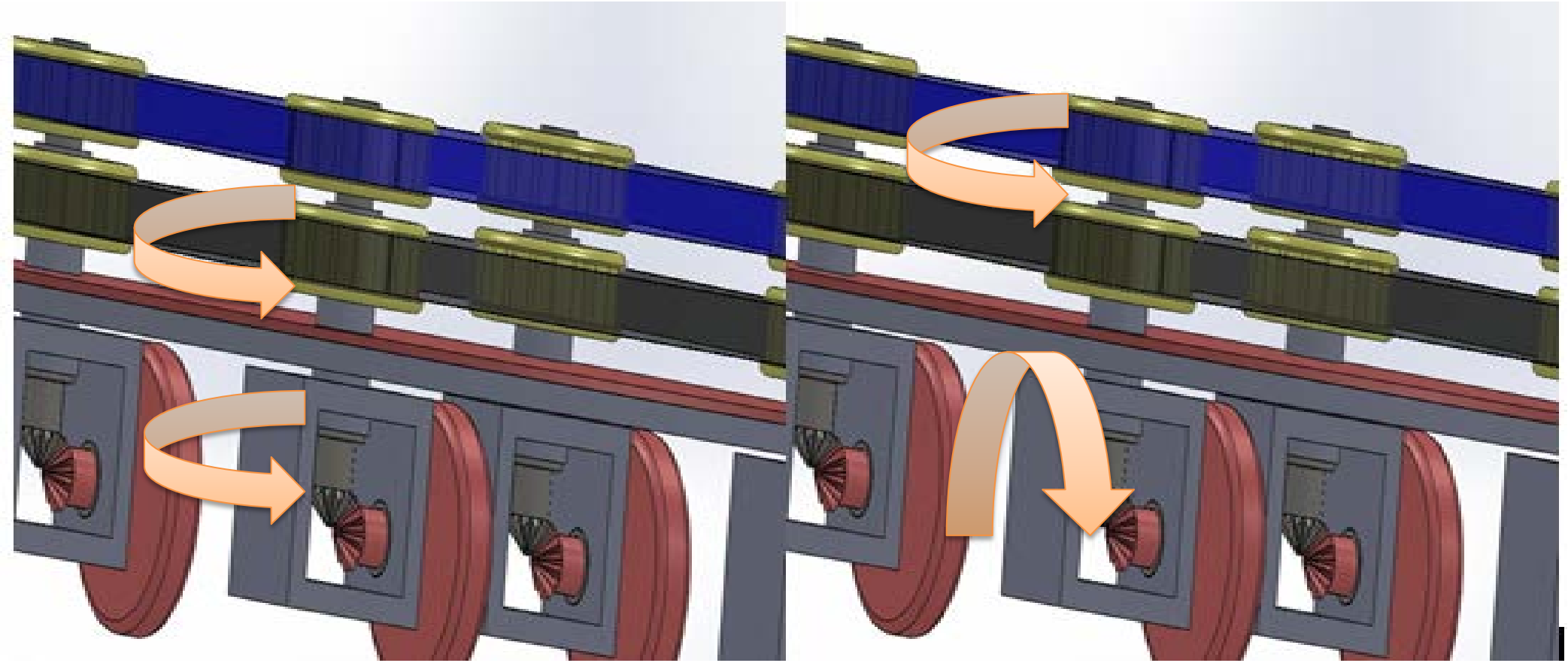
Model 1



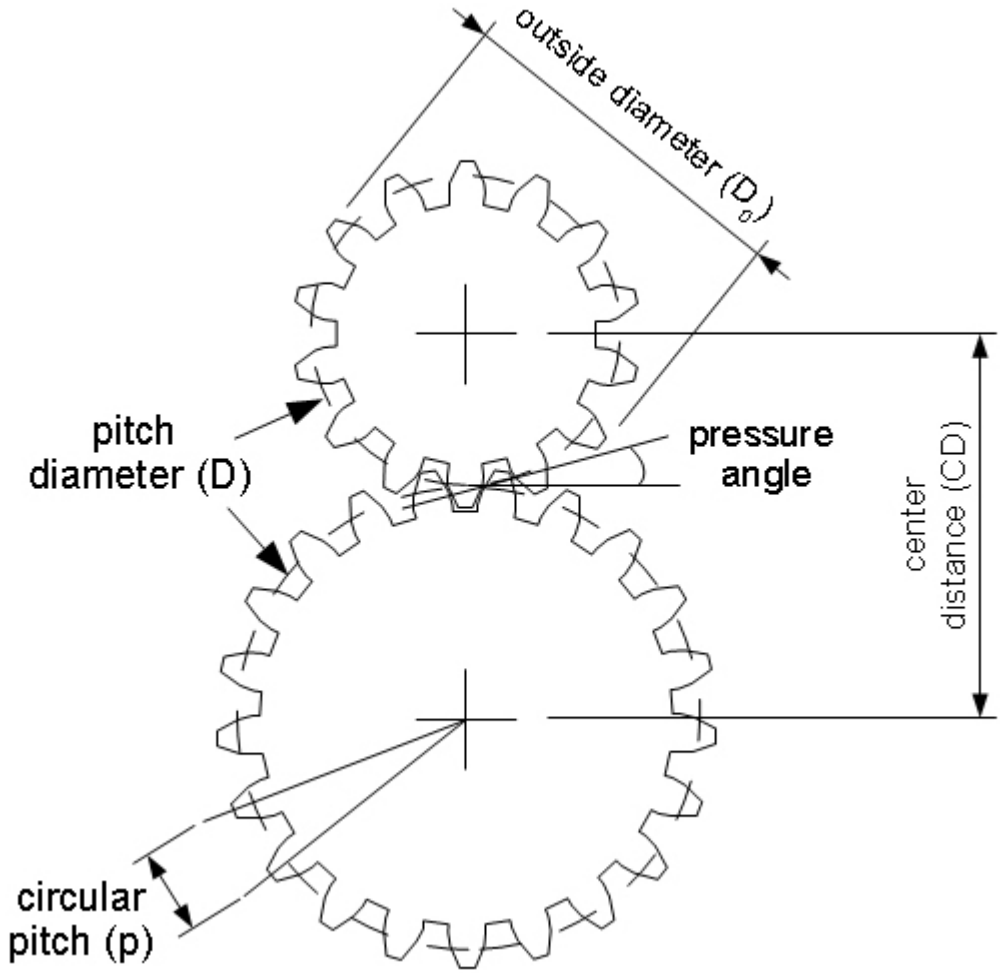


SOLIDWORKS

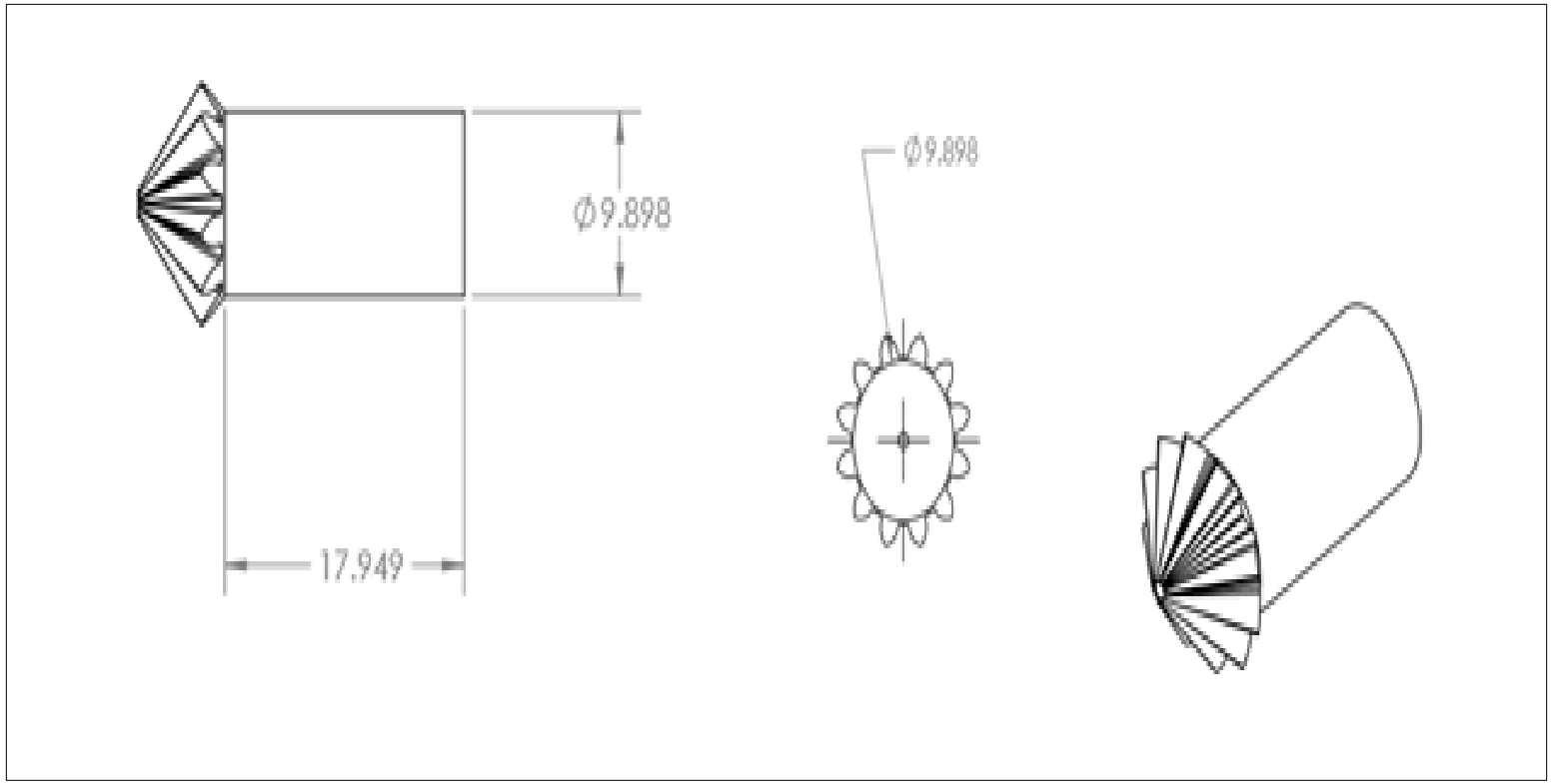
Model 1



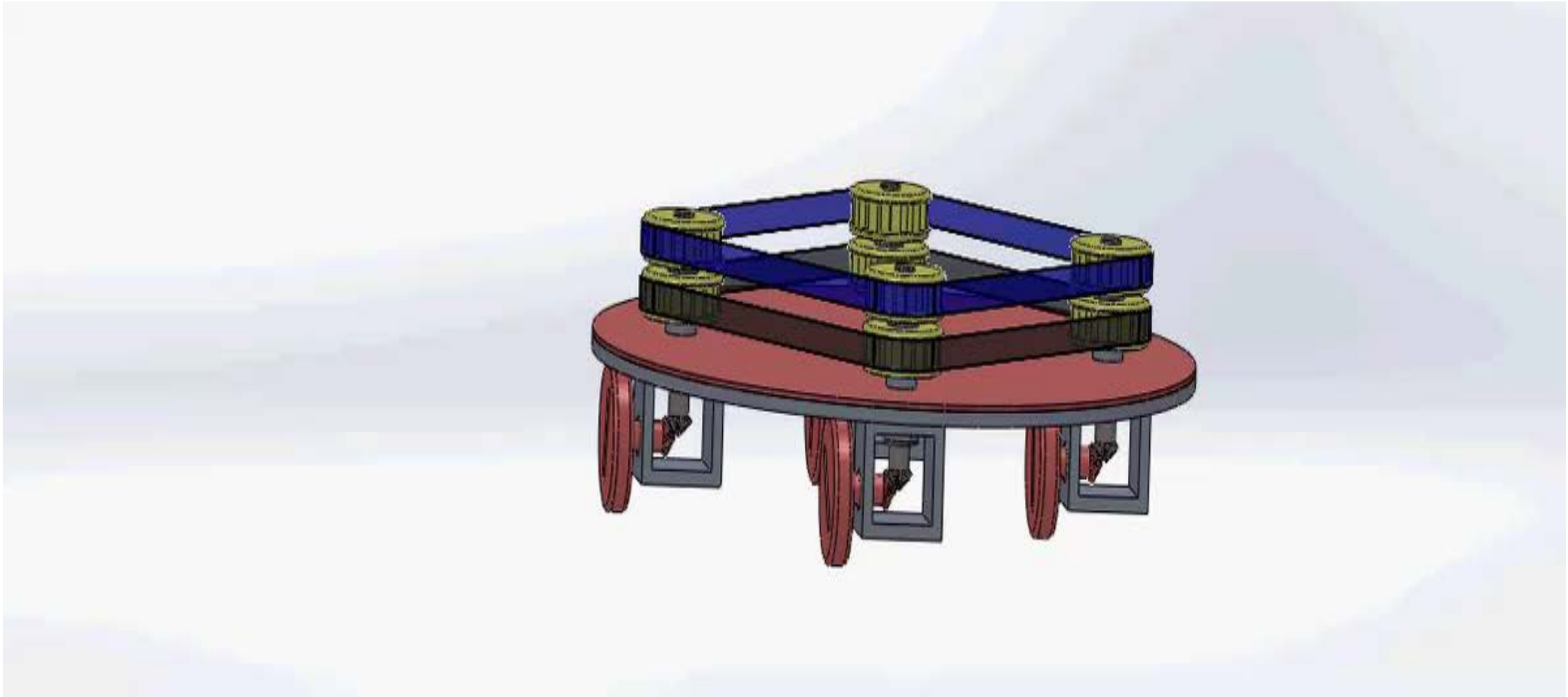
Gear Design


outside diameter (D_o)
pitch
diameter (D)
pressure
angle
center
distance (CD)
circular
pitch (p)

Gear Design

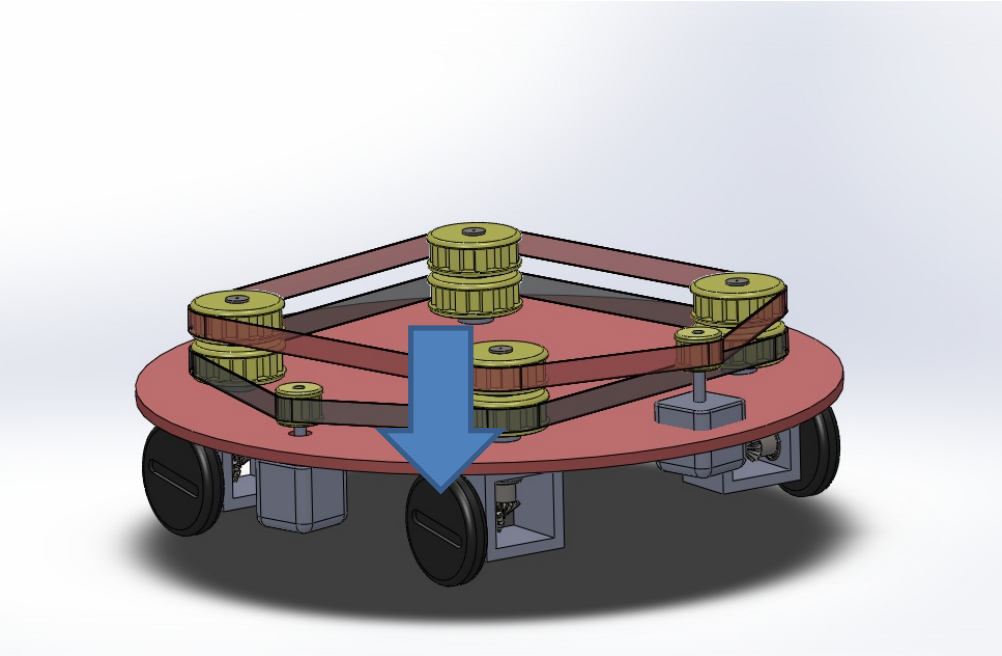


Gear Design

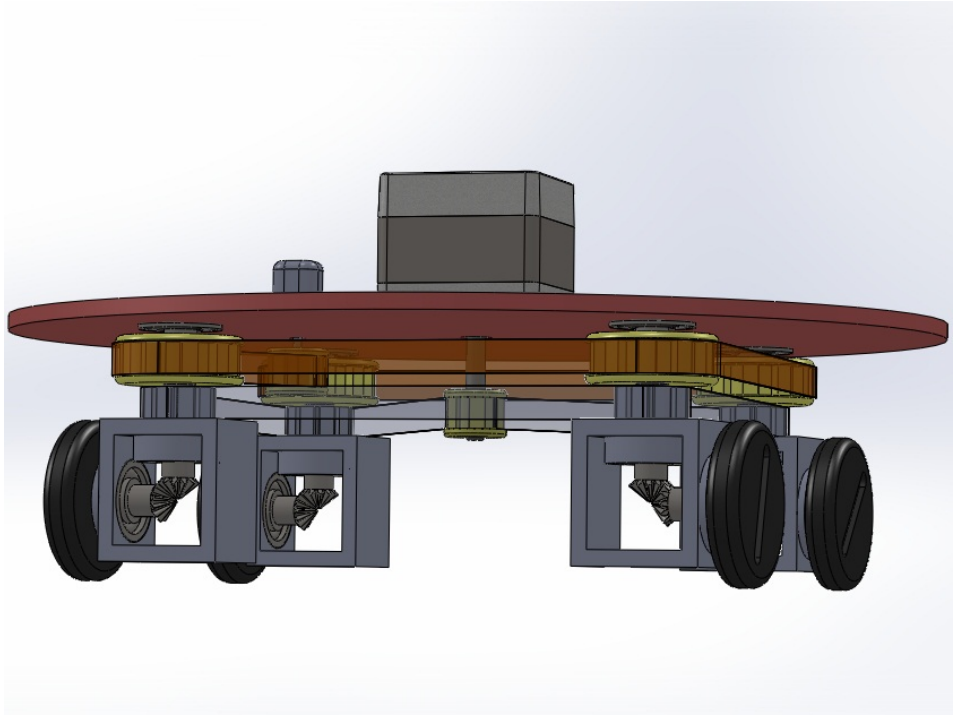


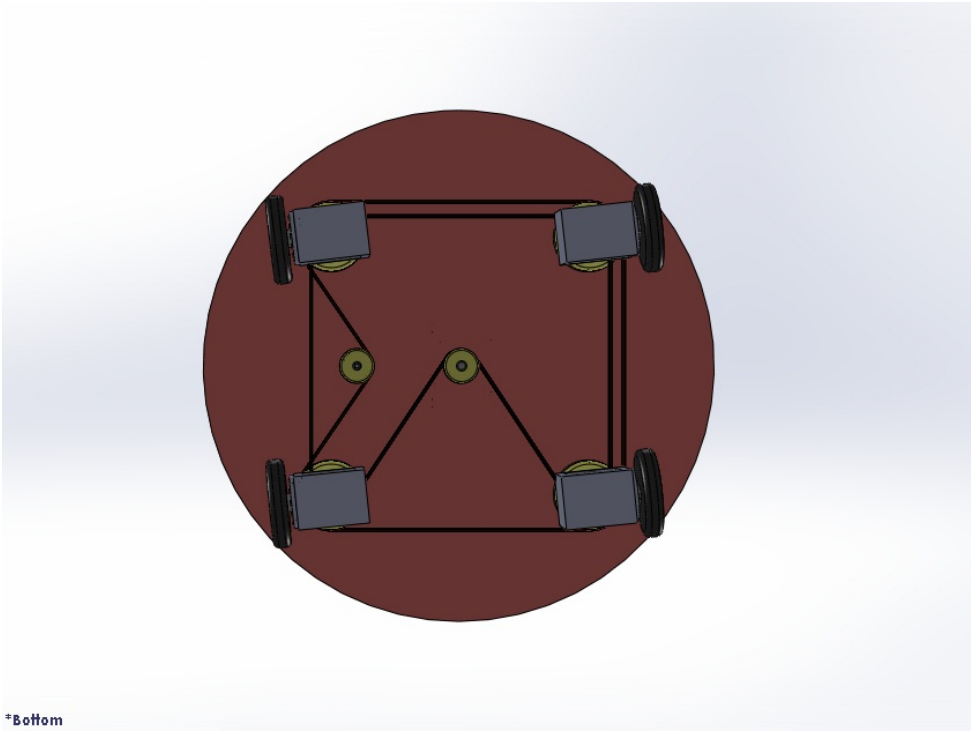
Problem with Model 1

During Simulation we figured that there is a problem in center of mass.

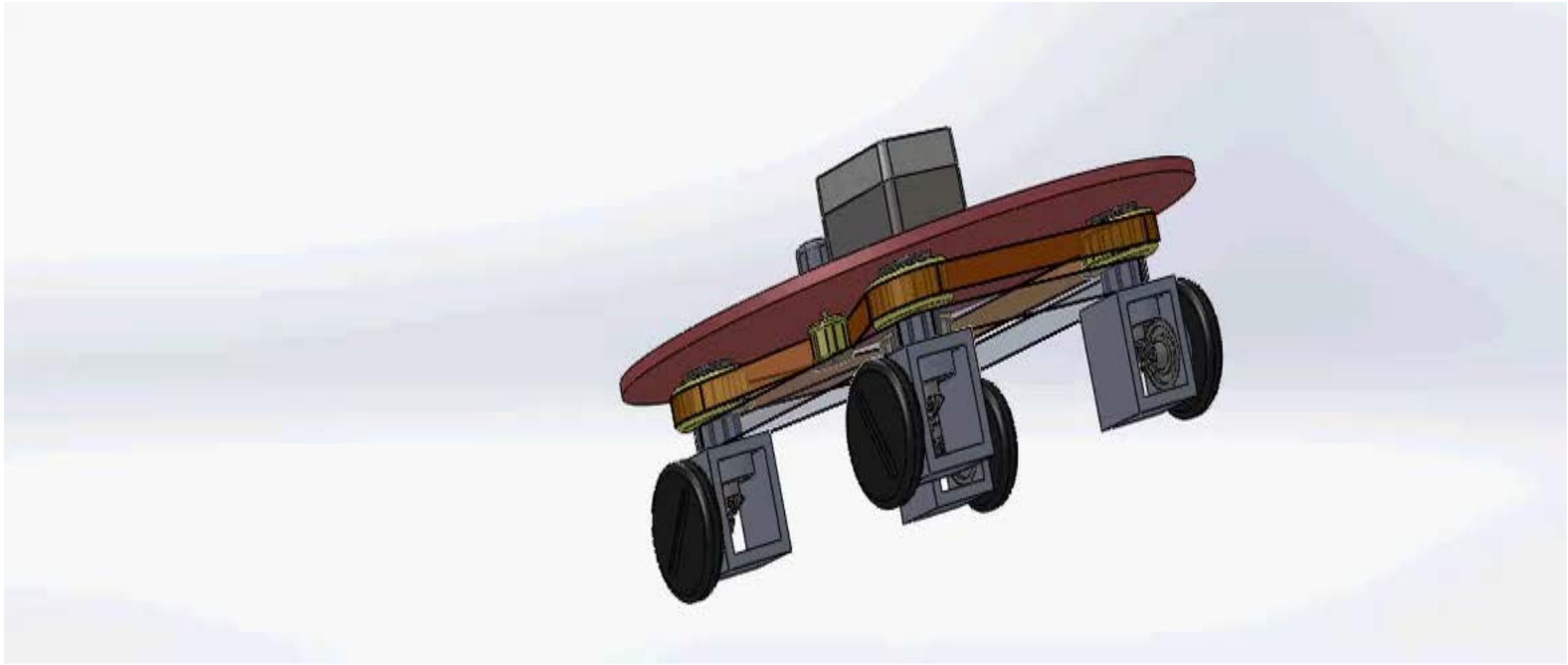


Model 2





Model 2



”!الحياه ليست وردية “

أشرف عرموش.د-

Problem with model 2

- No specialized CNC machine to make Bevel Gears in our dimensions.
- Could not find it in the market!
- Cost was around 1000$ for the remaining parts.

Model 3

- Search for other models or ready cars.

Model 4

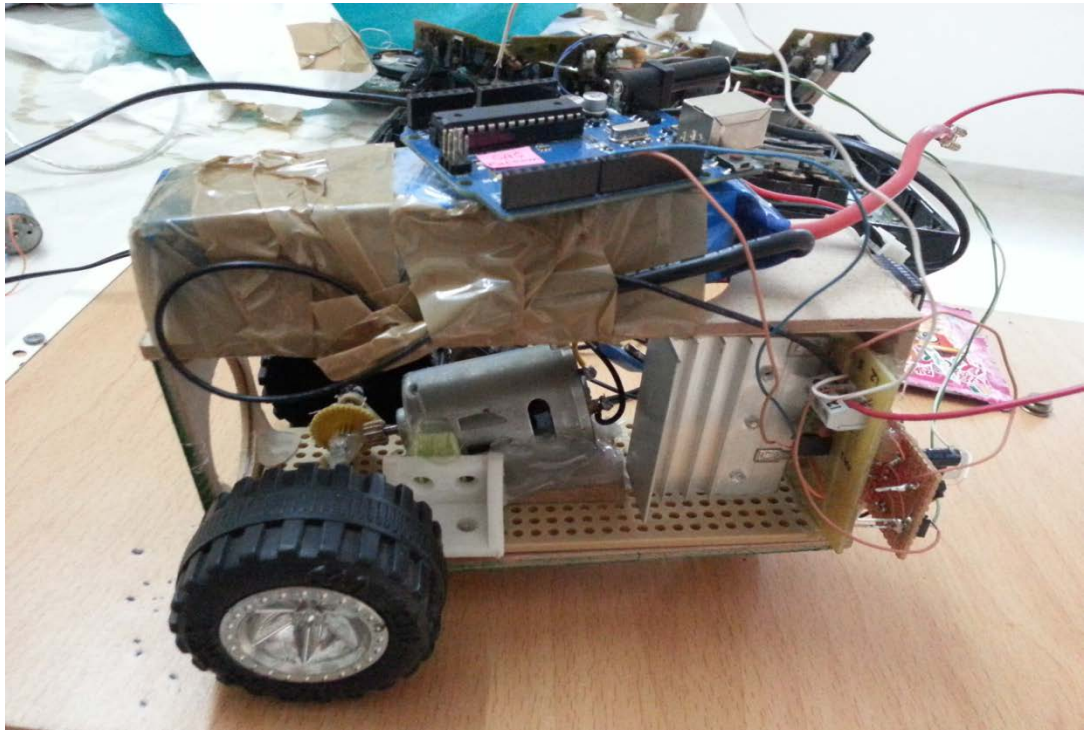
- Ready Car, and tank.

Problem:

- Too slow for our purpose: 30 cm per second.
- Even slower with load.

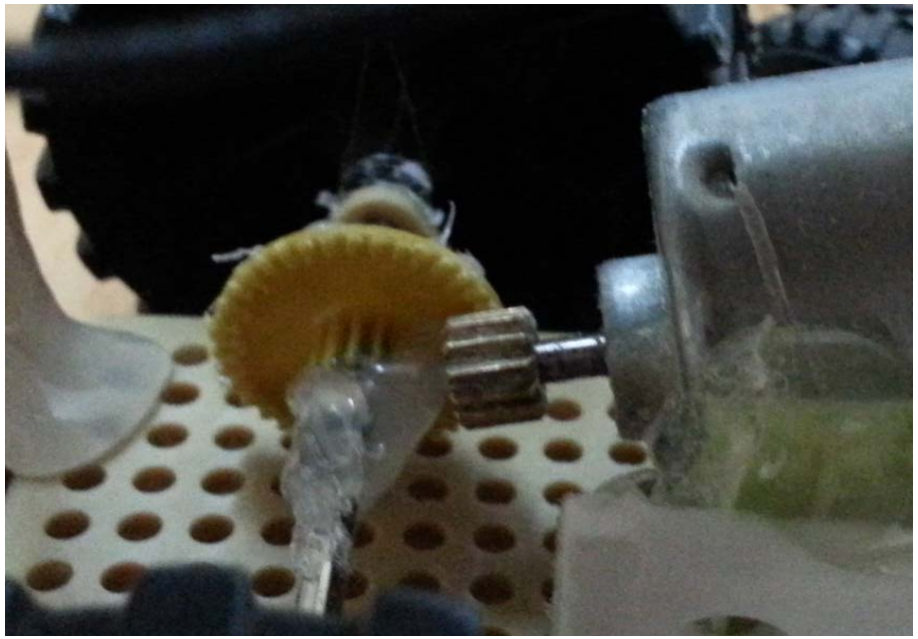
Model 5

- Design our own car.
  (one dimension movement)



Problem with model 5

- Plastic gear could not sustain the load and broke down!



Model 6

- Design our own car.
  With Pulleys and tracks.

- Problem:

Track could not handle fast speed,

Either :

- It is cut.
- Or it can’t keep up with high speed.
  (do not rotate)

Model 7

- Design a Trail.

- Problem:

Track could not handle fast speed

Either :

- It is cut.
- Or it can’t keep up with high speed.
  (does not rotate)

Model 8

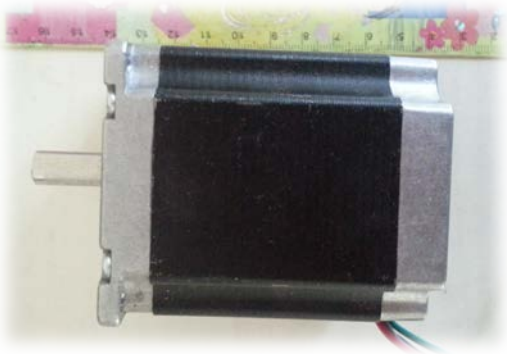
- Design our own car (again!).
- Speed up to 45 cm per second.
- Trail to keep in straight line.

Hardware

- **XBEE Wireless Transmitter/Receiver**

- **Arduino**

- **Motors**



Hard ware

- **H-bridge L298N**

- **Battery**

- **Regulator**

Hardware

Problems with overcame:

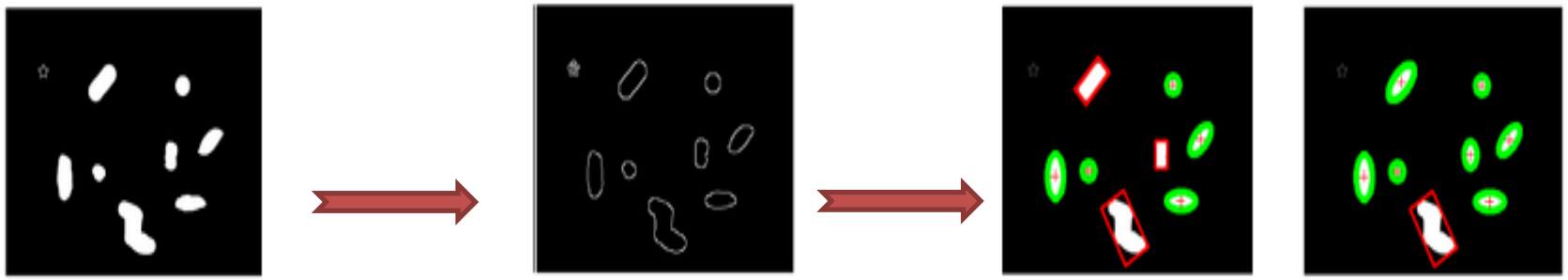
- Hand-Made printed circuits.
- XBEE firmware fixing!
- High current motor driving circuit. (4A).

Kinect Application

- Using depth scan with flood fill algorithm : by taking the difference between frames.

- Problem
- Result is not accurate and it’s hard to find the projectile object and its angle.

Using OpenCV



Initial threshold

Edge detection

First and Second contour Detection

Sphere detection

- Process the contours to determine of they are sphere.
- Using Ellipse detection algorithm

Tracking System

- Identify sphere in new frame.
- Predict new location from past.
- Associate new ball with existing balls from the past.
- Update ball trajectories based on position of ball in new frame.

It is Demo Time!

Q & A ..

Hope
You
Enjoyed
it