# 1.5 Motion System

(Duty of this system is maintaining mechanical rigidity of the driving system. Construction of this system contain two subsystems which are, wheels Subsystem and motor subsystem.)

Duty of this system is converting speed subsystem output to mechanical power and transferring to road.

1. Wheels Subsystem which is responsible for transferring power from motor shaft to road.

2. Motors Subsystem which is responsible for converting electrical power to mechanical power.

## 1.5.1 Wheels Subsystem

As the previous suggestion in CDR, 2+1 combination (2 wheel with power and 1 caster ball) is preferred due to easier implementation and control. Although this placement weaker in balance and obstacle handling, importance of easier implementation and control are considered more beneficial.

While choosing wheels, high friction property is considered. Because of this reason, super soft and slick tire are chosen with lighten aluminum rim. Besides, larger width is preferred to increase hanging on the lane.

3. After wheel test, we observe the choice gives what we expect. Although tires make dirty the path, their handling capability is fascinating. Therefore, this system satisfies requirements.

## 1.5.2 Motors Subsystem

As the previous suggestion in CDR, DC motor selection did not change. The reason of this brushed gearhead DC motors are designed to this usage. Even though 3kg-cm is proposed, because the size and weight of the motors in this specs are not appropriate under 600 RPM condition, and eliminate the over engineering, this calculation turns into weight = torque at the shaft of the motor. RPM condition is set in CDR with equation (1). According to this equation 95.5 RPM is the minimum condition, but to be a strong competitor, 5 times of this value is idealized to goal speed. To handle with this value 100 RPM margin is set, to health of the motors during competition.

After testing the new motors by using basic pulley structure, 1 kg-cm total torque is obtained. (bu kısmı silelim yav)

3. After tests, motors can move symmetrical without PWM offset, and vehicle can move fast enough with the motors. Also, they perform well in differential drive operation. Therefore, this system satisfies requirements.

TESTS

Motor tests

1. Torque test

Basic pulley system is set, and motor forced to pull a certain mass/ 750 gr is the max that can motor pull.

1. RPM test

Motors are drive with max PWM (255) with expected load, and velocity of the vehicle is measured/ No result yet

Wheels test

1. Handling test

Vehicle is placed under horizontal force, and no slipping is expected. In other word, friction between road and wheel should greater than road and ground. / test is passed