Developing *Regenerative Brake* Model On Electric Bike For Increase The Distance

**Name**: Oky Bayu Murdianto  
**NRP**: 2109100002  
**Departemen**: Teknik Mesin FTI-ITS  
**Advisor lecture**: Prof. Ir. I. N. Sutantra, M.Sc., Ph.D.

**Abstrak**

Electric bike is one of the technologies to overcome fuel crisis. However, electric bikes have limitations, if the battery runs out, electric bikes cannot run. At the end of the previous task has designed a technology EERS (Electric Energy Recovery System) that principle, change the mechanical energy is wasted during braking into electrical energy stored in the battery. The device is expected to increase the mileage of the vehicle. Then made a simple example device and test them to find out additional mileage and efficiency of these devices.

This research will be conducted initial experiments to find the distance that can be reached, the increase of mileage bike after braking device control system, and the efficiency of the braking system control of braking an electric motor. The method be done by the beginning of the current record \((I_0, I_1, I_2, I_3)\), the initial round \((n_1)\) the initial test, and noted \(I_0, I_1, t, n_1, n_2,\) and \(m\) (mass of the motor under test) from testing the motor the charging device. From the value \(I_0, I_1, I_2, I_3\) obtained average current consumption of electric motors on lap \(n_1\), then obtained a current consumption of battery until exhausted, and finally electric motor mileage unknown.. While \(I_0, I_1, t, n_1, n_2,\) and \(m\), we will get the average current efficiency were captured battery and charging device.. The average current is later used to obtain the total charging time of the battery and the total time will be calculated adding mileage.. Variations of this data is \(\omega_1\) and \(\omega_2\), where \(\omega\) is the angular velocity of the initial braking and \(\omega_2\) is the final
angular velocity braking, value $\omega_1$ obtained from 20 km/jam, 30 km/jam dan 40 km/jam. While during braking has a load of 25%, 50%, 75% and 100%. $\omega_1$ value is converted into a round shape $n_1$ dan $n_2$. While the efficiency of kinetic energy obtained from the comparison that should be captured with the actual electrical energy captured by the battery.

From the results, the electrical energy storage battery captured most of it coming in braking with an initial velocity of 40 km / h and braking percentage of 100% for 14,080 Watt-hour and the smallest occurred in the initial velocity of 20 km / h and the percentage of braking at 20 km / h 0.192 Watt-hour, additional greatest distance occurs in electrical energy absorption = 14,080 Watt-hour for 1,048 miles and the smallest occurs in electrical energy absorption = 0.192 Watt-hour for 0,018 miles, the greatest efficiency occurs at braking with initial speed 40 km / h and 100% braking percentage of 4.52% and the smallest occurred in the initial velocity of 20 km / h and braking percentage of 0.56%.

**Keyword**: Electric bike, control braking system, EERS, mileage, battery charging current, regenerative brake.