ABSTRACT

In its development, trains are considered capable of also acting as a means of transporting workers and then developing again into mass transportation. Given the importance of trains as part of the main means of transportation, a maintenance process for other supporting structures is needed, such as stations, rails, and wheels. Train wheels are a type of wheel that is specifically designed for use on railroad tracks. Because trains are guided vehicles, meaning that their direction is determined by the rails, the profile/structure of the wheels is very important. Friction between the train wheels and the rails during braking generates heat energy. Train braking is divided into compressed air brakes and automatic compressed air brakes. Braking is related to friction, heat generated, and noise generated. The noise generated by trains when crossing the rails includes engine sounds, horns, and friction between the wheels and rails. So that wear occurs on the train wheels.

This Capstone Design provides a solution by detecting wear on a wheel, especially a Light Rail Transit (LRT) train using a tool called a laser displacement sensor and other aids, the data of which is taken from the atDisplacement application and will then be analyzed with a website called SMAR + PARS using the help of Artificial Intelligence. Laser displacement senor will detect damage with Zero Compensation method which makes it easy to measure an object. The numbers that will be generated will be displayed on the amplifier or on software called atDisplacement. The application has been integrated with the main tool in this study. The stored data will be uploaded to the SMAR + PARS website manually and will display graphs and analysis.

Data collection for 3 days in the Jabodebek LRT with a testing period of 30 days showed that the system successfully detected damage, with an average response time of several seconds, allowing immediate repairs. The tool will produce data in real time so that it can be displayed on the amplifier and on the atDisplacement application. This effectiveness makes the system a very valuable tool in improving the safety and efficiency of train operations. For continuous development, the main focus will be on increasing the system's resilience to varying environmental conditions, refining the Artificial Intelligence algorithm to improve accuracy.

Keywords : *Artificial Intelligence*, *Light Rail Transit* (LRT), *Rail*, SMAR+PARS, *Website*, , *Wheel.*