

Car Battery Power Monitoring and Prediction System Using Microcontroller Based Linear Regression Method

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Abstract— *The accumulator is a device to storage for electrical energy in four-wheeled vehicles, requiring frequent maintenance and supervision therefore the battery can be used for a long time. Most of the drivers rarely check the age of the accumulator, this could lead the vehicle to fail to start the engine and this is usually caused by running out of power. This study aims to minimize the problems that are often faced by motorists, namely, running out of power suddenly which causes the car to be unable to run. In this study, predictions of battery power were carried out using the Arduino Uno microcontroller, the acs712 sensor as a battery voltage detector, and the python language to process data with linear regression methods. The system is evaluated based on the functionality and performance of the system. From the test result, it was found that the system functionality runs 100% according to its function. And the results of the prediction of power with the linear regression method can be done because linear regression gives an R2 of 0.88.*

Keywords: *Arduino Uno, Current sensor, car battery, linear regression.*

1. INTRODUCTION

the car battery power is the main energy source in-car electrical devices that need attention for smooth activities because they have a service life. A car needs a battery or battery to store electrical energy in the form of chemical energy, which will be used to supply electrical energy to the starter system, ignition system, lights, and other electrical components. The car battery power has interrelated components in the supply of energy because they not only provide energy for electrical components but also have a very important role in the delivery of the electrical grid energy system. An average running battery will have a voltage between 12.5 volts to 14 volts[1]. The car battery power in good condition has a voltage of not less than 12 volts, while the car battery power that has a voltage of fewer than 12 volts can be said that the car battery power is in a weak state. Measuring the battery voltage is done in two ways, namely when the engine is off and the engine is running. The measurement when the engine is off is to determine whether the car battery power is weak and needs to be replaced or not, while the measurement when the engine is running is to determine the ability of the charging system to work normally or no[2]. The magnitude of the car's accumulator voltage is the main key so that the car's electrical performance runs normally. Under normal conditions with the engine off the car accumulator has a voltage between 12 to 12.5 volts and when the engine is running the car accumulator is charging with a volt between 13 and 14 volts[3]. If the voltage is less than the normal number, it can be ascertained that the car's accumulator has weakened and is not maximally supplying electricity to the car's electrical devices. Car accumulators have a vital role in supplying electricity to devices that need it and require maintenance that is often overlooked by car owners [4]. In a car, two components can be related to the battery, namely the alternator and regulator, where the alternator serves as a supplier of electricity to the vehicle to run all the instruments in the car that must be driven by electric power. The accumulator can be filled optimally if the engine speed and alternator can function properly[5]. If the car is used within a short distance of turning on a load of all electronic instruments, then charging the accumulator has not yet been filled, which is not optimal so that it can cause a decrease in the accumulator voltage. In this new era, there are many changes in car components, car components that originally used a mechanical system to become an automatic system with an electric motor so that it requires a power supply from an accumulator[6]. At this time In this study, the author developed a prototype car battery monitoring system remotely. With this system as monitoring and prediction of car battery power [7]. On the other hand, technological developments make it easier for someone to monitor all aspects that should be done manually but can now be done automatically, this is supported by components such as the Arduino Uno microcontroller[8]. Arduino can be regarded as open-source physical computing, which has a combination of sophisticated hardware, programming languages, and an Integrated Development Environment (IDE). IDE is software that plays a very important role in writing programs, compiling them into binary code, and uploading them to microcontroller memory[9]. The hall effect technology applied by the allergeo company replaces the shunt resistor and converts the current into a sensor capable of measuring current. The term hall effect became known after the discovery of who discovered that if an electric current flows through a conductor placed in latitude, a strong magnetic field will produce a potential difference across the conductor at both corners of the conductor[10]. Hall effect sensor is a transducer that can convert a magnetic field into an electric quantity in the form of voltage. This type of sensor operates to detect the proximity, presence, or magnitude of the existing electric power voltage which will then be processed using available methods[11]. Based on the study's findings,