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AUTOMOBILE BATTERY MONITORING SYSTEM USING ARDUINO UNO R3 MICROCONTROLLER BOARD

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1.Introduction

A battery is an electrochemical device which converts chemical energy in its active materials to electrical energy via electrochemical reactions (Jung et al., 2016). The temperature, current, and voltage of the battery need to be monitored and used to determine the state of charge and state of health of the battery used in the car in real time. The car starter motor usually draws a high current of over 500A, for generating enough torque for the flywheel to run the engine (Gilles, 2012). A battery monitoring system for determining the state of charge and state of health of the battery can be fabricated using an Arduino Uno microcontroller and installed in the car.

1. Results and Discussion

Figure 1: Unistar battery in Isuzu truck Figure 2: Land Rover Varta battery in Pajero

In Figure 1, the Unistar battery's state of health was very low on many occasions during which it couldn't crank the engine of the Isuzu truck. Figure 2 represents the data from a new Land Rover Varta battery installed in a 3000cc Pajero in which its state of charge and state of health coincided and remained at 100% throughout the testing period.

1. Conclusion
   When a battery is brand new and has no defects, its state of charge and state of health will be 100% and it will crank the engine successfully within 0.3 seconds. As the battery ages, deterioration of the active materials takes place and causes it to lose its capacity thereby leading to its failure. The resistance of the battery also keeps increasing with its usage, consequently lowering the current density in the battery. The degradation of the battery usually takes place in the background and may not be easily detected by visual inspection. Installing a BMS into the car can provide a more detailed analysis of the status of the battery and thus save the motorist time and money.

2. References
   [1] Gilles, T. (2012). Automotive Service: Inspection, Maintenance, Repair. Cengage Learning, MA 02451 USA, 8,367.
   [2] Jung, J., Lei, Z. and Jiujun, Z. (2016). Lead-Acid Battery Technologies: Fundamentals, Materials, and Applications. CRC Press, Boca Raton Florida USA, 2-3.

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