RANCANG BANGUN DIAGNOSTIC DAN REMAPPING ELECTRONIC CONTROL UNIT SEPEDA MOTOR HONDA BERBASIS DIRECT DRIVER ACCESS.

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ABSTRAK

Perangkat diagnostik konvensional berbasis *Virtual COM Port* memiliki latensi komunikasi tinggi akibat intervensi sistem operasi. Penundaan ini berisiko menyebabkan kerusakan permanen pada memori *Electronic Control Unit* saat proses pemrograman ulang (*remapping*) akibat kegagalan sinkronisasi protokol K-Line. Penelitian ini membangun sistem diagnostik dan pemrograman ulang yang stabil pada sepeda motor Honda melalui penerapan metode *Direct Driver Access* menggunakan pustaka FTD2XX_NET. Metode ini memotong lapisan abstraksi sistem operasi untuk mengakses perangkat keras secara langsung. Pengembangan sistem mengintegrasikan modul antarmuka *level shifter* dengan aplikasi pemrogram dan pemindai kustom berbasis bahasa C# pada kecepatan transmisi 10.400 *bit per detik*. Pengujian performa divalidasi menggunakan dinamometer sasis pada tiga unit kendaraan. Hasil pengujian membuktikan sistem berhasil mengeksekusi penulisan memori secara instan tanpa kegagalan transfer data. Tercatat peningkatan performa mesin secara signifikan, yaitu dari 7,24 menjadi 8,83 tenaga kuda pada Honda BeAT K25, 11,09 menjadi 14,43 tenaga kuda pada Vario 125 K60R, serta 8,70 menjadi 10,21 tenaga kuda pada Vario 150 K59F. Capaian ini mengonfirmasi efektivitas akses penggerak langsung dalam mengatasi kendala latensi.

Kata kunci: *Direct Driver Access*, *Electronic Control Unit*, protokol K-Line, *remapping*, sepeda motor Honda

DESIGN AND DEVELOPMENT OF HONDA MOTORCYCLE ELECTRONIC CONTROL UNIT DIAGNOSTIC AND REMAPPING SYSTEM BASED ON DIRECT DRIVER ACCESS.

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ABSTRACT

Conventional diagnostic devices based on Virtual COM Port experience high communication latency due to operating system intervention. This delay risks causing permanent damage to the Electronic Control Unit memory during the remapping process due to K-Line protocol synchronization failure. This research develops a stable diagnostic and remapping system for Honda motorcycles by implementing the Direct Driver Access method using the FTD2XX_NET library. This method bypasses the operating system abstraction layer to access the hardware directly. The system development integrates a level shifter interface module with custom C#-based flasher and scanner applications at a transmission speed of 10,400 bits per second. Performance testing was validated using a chassis dynamometer on three vehicle units. The test results proved the system successfully executed instantaneous memory writing without data transfer failure. Significant engine performance improvements were recorded, specifically from 7.24 to 8.83 horsepower on the Honda BeAT K25, 11.09 to 14.43 horsepower on the Vario 125 K60R, and 8.70 to 10.21 horsepower on the Vario 150 K59F. These achievements confirm the effectiveness of direct driver access in overcoming latency constraints.

Keywords: Direct Driver Access, Electronic Control Unit, Honda motorcycle, K-Line protocol, remapping