



A ST X-NUCLEO-BASED TELEMETRY UNIT FOR DETECTION AND WiFi TRANSMISSION OF COMPETITION CAR SENSORS DATA: FIRMWARE DEVELOPMENT, SENSORS TESTING AND REAL-TIME DATA ANALYSIS

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Abstract – Telemetry is a technology that allows remote measurement and transmission of moving car information, allowing to collect a huge amount of data that are interpreted to ensure that car is performing at its optimum. In this research work, by using electronic modules and sensors available at very low costs, a reliable and accurate telemetry system was realized in order to monitor physical and mechanical parameters of a racing vehicle during its motion. Implemented data acquisition and wireless communication unit allows to collect, on board of vehicle, the temperature of engine compartment and cooling liquid, suspensions' extensions, vehicle speed and also its orientation and acceleration and to send wirelessly all these data to a base station, where are monitored by technical staff, so ensuring quick intervention in case of malfunctioning. STM32 Nucleo development board, heart of realized telemetry system, properly programmed with the developed firmware, acquires data from used sensors and, through a WiFi radio module, sends them to the base station; the data are also stored on a SD memory card to avoid data losses. Sparkfun CAN module is employed for this aim and to interface the engine control unit with ST Nucleo board. Experimental tests were carried out for verifying correct operation of realized system; by analyzing trends over time of monitored vehicle parameters as function of the vehicle movements, driving conditions and race track, the technicians ensure safety of pilot life and also an optimization of the vehicle performances.

Index terms: Telemetry, sensors, electronic modules, firmware, wireless monitoring, prototype testing.