DESIGN OF ECU MONITORING SYSTEM FOR AGRICULTURAL VEHICLE BASED ON ISO 11783

J.Moon, W. Yang, D.Kim, S.Kim*

Center for IT Convergence Agricultural Machinery Chonbuk National University
Jeonju, Jeonbuk, South Korea
* Department of Bioindustrial Machinery Engineering College of Agriculture & Life Science Chonbuk National University

ABSTRACT

International standard for implementation of electronic control unit (ECU) in agricultural tractors has been required for interoperability of various agricultural vehicles. The ISO 11783 standard is basically based on communication technology using the controller area network (CAN), it is typical standard technology for implementation of ECU in agricultural vehicle. CAN bus Communication system was developed by the distribution control of ECUs to comprise an agricultural tractor and implements. It can improve the performance, the productivity and the functions of agricultural vehicle through independent ECUs.

This study presents the implementation of method and evaluation about the monitoring system that displays the value of sensors and the status of actuator for agricultural vehicles.

We also call the real-time monitoring system because of collecting a large amount of data in ECU modules periodically. The prototype ECUs for the measurement of sensors or the control of actuators was laboratory experimental tests, and the requirement in accordance with ISO 11873 was satisfied.

Keywords: Agriculture vehicle, Electrical Equipment, Tractors, Implements, Network.

INTRODUCTION

This technical article is implementing for Agriculture Machinery Control system based on ISO11783 standard. The Virtual Terminal (VT) which used for the parameters of tractor and implements is described in the part 6 of ISO11783. VT is an electronic control unit consisting of a graphical display and input controls providing the capability to display information to and retrieve data from an operator for a connected implement or working set.

IMPLMENTATION

Sensor and actuator ECU can be divided into network description stated at part

3, 4, 5 in ISO 11783 and describe applications of tractor or implement at part 7 in ISO 11783. Each ECU has the different physical specification of hardware from the various manufacturer. But the communication description of data must follows the specification stated in ISO 11783. We implement the real-rime monitoring system for agricultural vehicles according to ISO 11783. Micro procesor unit (MPU) used in ECU modules is AVR (AT90CAN128, ATMel, USA) series, which can have the fast operation speed by simple command of 8-bit structure in Reduced Instruction Set Computer (RISC). Using an emulator, ECU program was developed. Base AMP is mounted additionally to amplify signal microscopic current. In addition, a relay module was added to control DC motor or hydraulic system of actuator. The user interface defined at part 6 of ISO 11783 is shown in Figure 1. In this study, the resolution of VT is 800*480 pixel units. An operator can determine the contents of works effectively and send their commands to tractor and implements via the user-friendly interface.
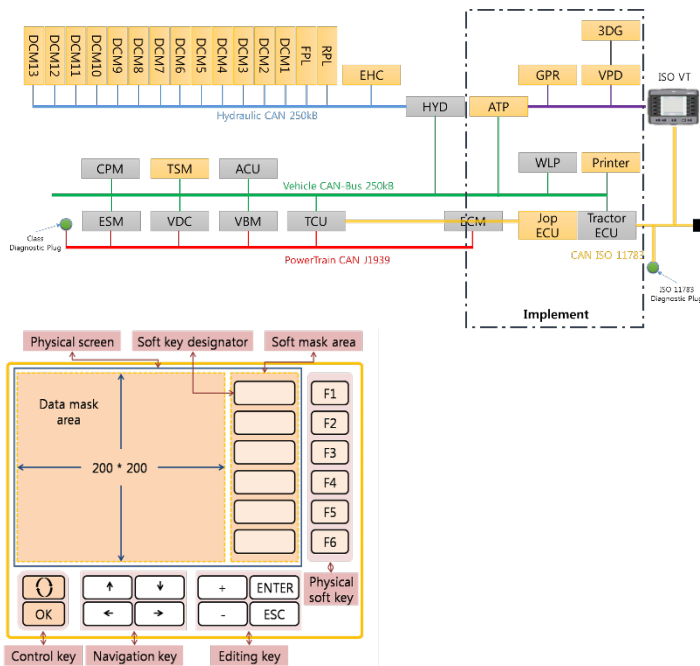

Figure 1. Schematic diagram of monitoring system and ECU in implement based on ISO 11783.

CONCLUSIONS

The number of nodes within agricultural implements is important for realizing CAN2.0B protocol. The monitoring system for ECUs is able to implement the ECUs data management infrastructure. ISO 11783 also requires a wide range of measurement and control technique based on ISO 11783. The purpose of this paper is to study on developing the monitoring system which the state of each ECU in implement can manage. Thus, the monitoring system can display the value of sensors and the status of actuator.

ACKNOWLEDGEMENT

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