

# A STUDY ON DIAGNOSTIC SYSTEM BASED ON ISOAGLIB FOR AGRICULTURAL VEHICLES

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## ABSTRACT

In this paper work, we consider implementation of Diagnostic System for functionalities of handling internal errors and monitoring states into Implement ECUs. Software implementation is based on IsoAgLib library developed by OSB&IT Engineering Company. We develop a target system including diagnostic and monitoring with IsoAgLib Library that has the communication services and management systems according to the ISO 11783 standard. This library allows building ISOBUS compatible equipment without the protocols implementation contained in this standard. We focus on developing Smart Sprayer ECU that is capable of controlling Nozzles adaptively according to a working environment such as wind, ground, humidity and etc. Hardware implementations of ECUs are developed by using STM32F107 ARM 32-bit Cortex™-M3 CPU and CAN-bus receiver/ transceiver driver chip. Time managing of the system is implemented using time stamp messages between ECUs and Diagnostic System with monitoring.

**Keywords:** CAN-bus, ECU, Embedded System, ISO11783, Smart Sprayer.

## INTRODUCTION

The global trend should take advantage of standardized systems in compliance with ISO 11783 standard on devices, or Electronics Control Units (ECU), of the agricultural production. Preferentially, the purpose of this study aims at systemizing the information necessary of the procedures for communication on the implement ECU with the tractor task management ECU, the needed standardized files and functional tests of the devices communication using ISO 11783 network. Secondly, after making test applications such as proposed Smart Sprayer and etc. using files of Part7's application\_layer into IsoAgLib, Main ECU supporting Diagnostic and Monitoring has ability to deals with errors between a tractor and its implement ECUs. For this implementation, we reference to part 3,

4, 5 and 12 in ISO 11783 Standards.

## IMPLEMENTATION OF HARDWARE AND SOFTWARE

The ECU processor used in this research is the 32-bit microprocessor (ARM Cortex™-M3) with supporting CAN 2.0B Protocol. It is capable of transmitting and receiving both standard and extended data and remote frames. We implement Diagnostic System for applying various agricultural implements and also develop smart sprayer using IsoAgLib for testing our diagnostic system. Our system consists of Diagnostic ECU (Tractor Part), Sprayer Implement ECU (Implement Part) with Actuator and Sensor. First Diagnostic ECU monitors status of each Implement ECUs and controls actuators of Implement via request. Secondly Implement ECU sends data of its ECU into the Tractor or performs actuator like a solenoid valve in Implement ECU according to the value of RGB sensor or ultrasonic sensor. Also, the Implement ECU acquires data of humidity, temperature and flux for knowing working environment. The Design of proposed sprayer is shown in Figure 1.

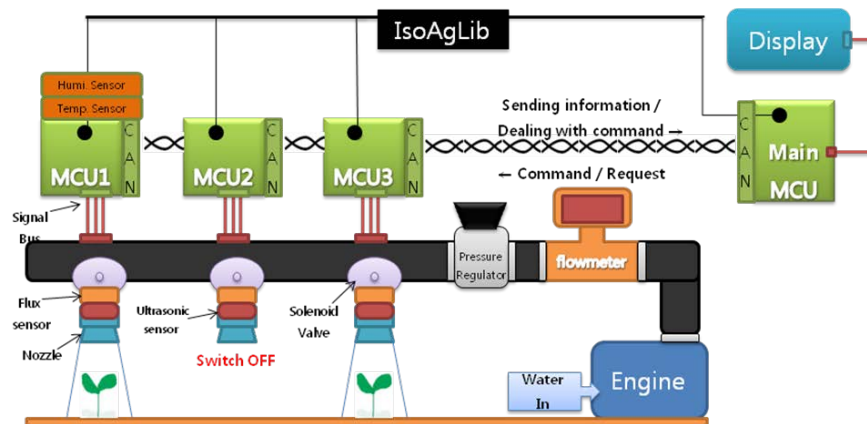


Figure 1. Proposed Diagnostic System

## CONCLUSIONS

We implement Diagnostic System based on ISO 11783 with IsoAgLib library and also develop Smart Sprayer ECU for testing our proposed system. Thus, we have the abilities to control our sprayer and exchange data between tractor and implements. This proposed system will give Korean agricultural firms possibility for applications based on ISO 11783.

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