

Precision Agriculture for preservation of environment and food production

8th June, 2012

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Agriculture takes important part in industrial for preservation of environment and food production. In particular, following research projects are on-going: development of agricultural machinery, field robots, machine intelligence, remote sensing technology, and variable rate technology.

Agricultural machinery

Development of agricultural machinery for food production

Estimation of plant growth by remote sensing

Estimation of plant growth by image processing of hyperspectral camera

Variable rate application of fertilizer

Technology to control applied amount of fertilizer for site specific crop management

Development of robot combine

Head-feeding combine is used to harvest rice and wheat in Japan. The objectives of this study are to automatically harvest those crop by using RTK-GPS and gyro-scope as navigation sensor. In addition, machine vision systems are developing to detect unharvest and falling-down areas of rice plant. Furthermore, unloading system to transfer crop from tank to container is developed.

Development of unmanned helicopter and small crawler robot for agriculture

Application of unmanned helicopter for remote sensing, and development of small crawler robot with machine intelligence for planning and searching a path to go by using machine vision.

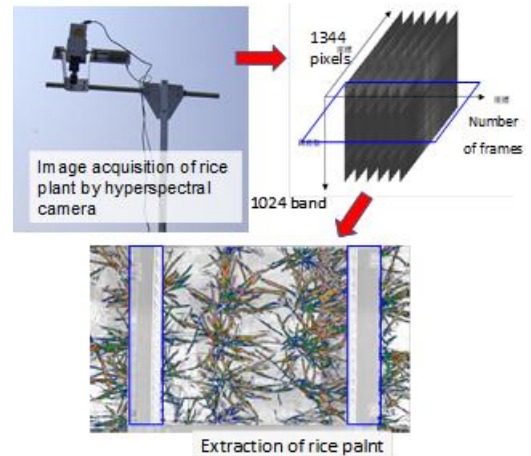


Fig.1 Remote sensing using hyperspectral camera



Fig.2 Head-feeding combine robot

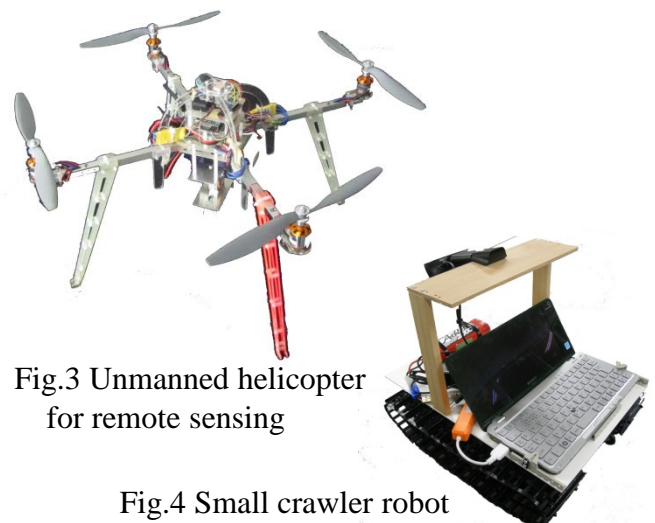


Fig.3 Unmanned helicopter for remote sensing

Fig.4 Small crawler robot

Keywords

agricultural machinery, field robotics, precision agriculture, remote sensing, machine vision, variable rate technology, smart machine, machine intelligence

Recent Publications

Book

Iida, M., Ryu, C. S., Ohdoi, K., Nakamura, K., Suguri, M., (Partial writer) :

“Report on Biomass Research in Agricultural Machinery, Application of Methane Fermentation Digested Sludge for Paddy Rice”, Japanese Society of Agricultural Machinery, 42–46, 2011

Ryu, C. S., Suguri, M., Iida, M., Ohdoi, K., Umeda, M., (Partial writer) :

“Manual on Utilization of Methane Fermentation Digested Sludge for Paddy Rice and Compost Combustion”, The Japan Association of Rural Resource Recycling Solutions, 23–38, 2011

Original papers

Iida, M., Nakashima, H., Tomiyama, H., Nakamura, T., 2011: Small-radius turning performance of an articulated vehicle by direct yaw moment control, *Computers and Electronics in Agriculture*, 76(2), 277–283.

Onoyama, H., Ryu, C. S., Suguri, M., Iida, M., 2011: Estimation of rice protein content using ground-based hyperspectral remote sensing, *Engineering in Agriculture, Environment and Food*, Accepted

Ryu, C. S., Suguri, M., Iida, M., Umeda, M., Lee, C. G., 2011: Integrating remote sensing and GIS for prediction of rice protein, *Precision Agriculture*, 12, 378–394

Iida, M., Nonami, K., Tanaka, S., Nanba, I., 2010 : Flow control of methane fermentation digested sludge applicator, *Engineering in Agriculture, Environment and Food*, 3(2), 54–60.

Ryu, C. S., Suguri, M., Iida, M., Umeda, M., 2010: Investigation into possibility of methanefermentation digested sludge liquid fertilizer for paddy field, *Engineering in Agriculture, Environment and Food*, 3(1), 32–37.