IJABE

4

International Journal of Agricultural and Biological Engineering
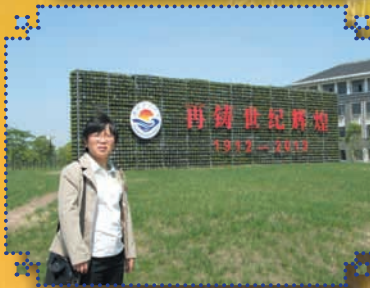
http://www.ijabe.org
Listed in DOAJ, Open J-Gate & Ulrich PD
Covered by CA, CAB, CABI, Inspec, EBSCO
AJ, IC, Scopus, Agricola, Google Scholar

Vol.5 No.4
2012

Research team of opto-mechatronics technologies and applications, Institute of Electron-optic Detection Engineering of Jiangxi Province, East China Jiaotong University

The research team of opto-mechatronics technologies and applications of East China Jiaotong University was built by Professor Liu Yande in 2009, which was approved as the Institute of Electron-optic Detection Engineering of Jiangxi Province. At present, the research team has 2 professors, 4 associate professors, 3 lecturers and 20 master students. The research team carries out basic research on application in the fields of visible- near-infrared nondestructive measurement of the eggs quality, on-line detection of near infrared spectroscopy for fruit quality and separation equipment and the quality and safety of agricultural products.

Professor Liu Yande has been investigating nondestructive evaluation of the eggs quality by visible and near-infrared spectroscopy since the 1990s, and expanding to the near-infrared, mid-infrared, Raman and hyper-spectral technology. The research team of Optics-Mechatronics Technology and Application, under the leadership of Professor Liu, has undertaken and completed more than 20 different kinds of projects, including projects supported by the National High Technology Research and Development Program of China (863 Program), National Natural Science Foundation of China, Ministry of Agriculture Scientific and Technical Achievements Transformation project, Program for New Century Excellent Talents in University, the National Key Projects in the National Science & Technology Pillar Program, etc. The research team has composed 2 Monographs, published over 200 scientific papers, including 35 SCI-indexed papers and 30 EI-indexed papers. The research team has won many awards and patents, including 8 national invention patents, the Second Prize of Jiangxi Province Technology Invention, the Second Prize of Natural Science of Jiangxi Province, the First Prize of Education Department Technical Invention Award, the Second Prize of Chinese Agricultural Science and Technology, etc. Some honorary titles were obtained, including the New Century Millions of National Person, The Ministry of Education New Century Excellent Talent, State Council Expert for Special Allowance, etc.

Centered on near-infrared spectroscopy, the research team integrates cross-disciplinary knowledge, such as machinery, electron, automatic control, and solves the problem of visible-NIR nondestructive measurement of the eggs quality, on-line detection of near infrared spectroscopy for fruit quality and separation of equipment.
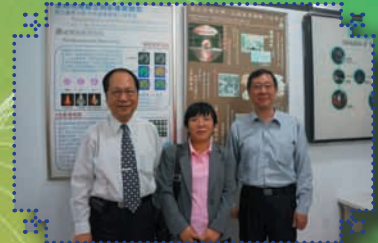
Visible-NIR nondestructive measurement of the eggs quality

The research team studied the interaction law of light and agricultural product texture systematically and found the measurement method of optical parameter for agricultural produce using Lambert-Beer, Kubelka-Munk, reverse doubling, diffusion, transmission and analytic model of Monte Carlo. The relationship among translucent degree of the whole egg, contents of egg and eggshell was analyzed using visible and near-infrared spectroscopy. The research team proved the transmission mechanism of photon within the egg, and built the mathematical model of egg freshness by nondestructive measurement, proposed the classification standards and developed the multi-processing software for the light features of egg, which found a theoretical foundation for the nondestructive measurement of egg freshness by Visible-NIR nondestructive measurement.

On-line detection and separation equipment of fruit quality by near infrared spectroscopy

The influence of the variation with light source – detector detection position and separation speed on the measurement error of fruit quality was studied for the system. The key technology of multivariate near infrared spectroscopy nondestructive detection based on the spectral reflection principle was conquered. The method of fruit accurate positioning, information synchronous transferring and separation control both based on photoelectric encoder was proposed. The technical difficulties of low accuracy, slow speed and poor repeatability on nondestructive detection of fruit quality by near infrared spectroscopy were solved. On-line detection and separation equipment of fruit quality by near infrared spectroscopy with independent intellectual property rights was developed. The equipment was tested and certified by JIMT. The research obtained five national patents, second prize in the Jiangxi technical invention award and first prize in the Jiangxi province natural science. The research was also popularized and used in the agricultural products processing enterprises, which was well accepted and welcome by users.

Contact person: Prof. Liu Yande, PhD, Vice Dean of School of Mechatronics Engineering, East China Jiaotong University
Address: No. 808, Shuanggang East Street, Donghu District, Nanchang, 330013, China
Phone: 0791-87046175   Email: liuyande@ecjtu.jx.cn, jxliuyd@163.com

International Journal of Agricultural and Biological Engineering (IJABE)

Open Access at http://www.ijabe.org

Table of Contents

Volume 5, Number 4, December, 2012

Renewable Energy System (RES)

Agro-product & Food Processing Engineering (AFPE)

Cover Caption

Information

Ruixiu Sui, et al. Development of sensor systems for precision agriculture in cotton (Figures 1, 4, 8, 11, 14, and 15)

Figure 1 Ultrasonic PHMS installed in a tractor was conducting plant height measurement in a cotton field
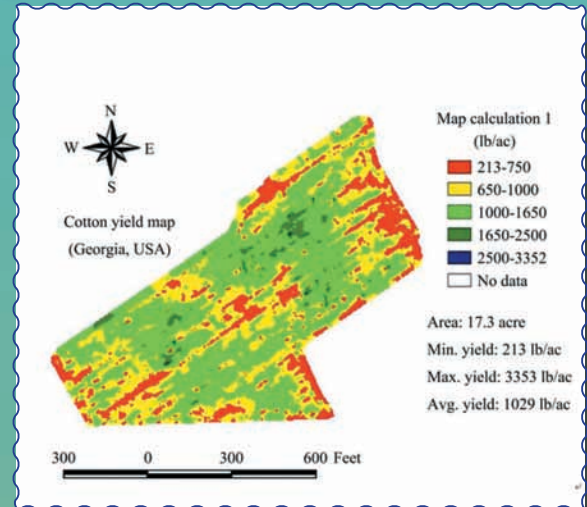
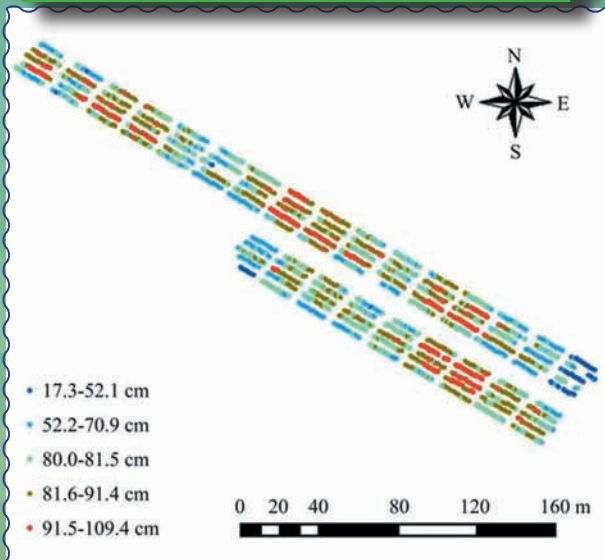Figure 11 Example of cotton yield maps created using the data collected by MCYM

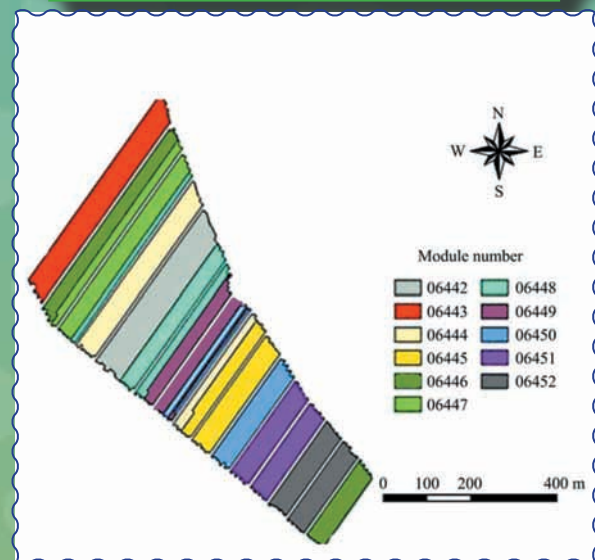Figure 4 Cotton plant height map

Figure 14 Cotton module boundary map in field test 2

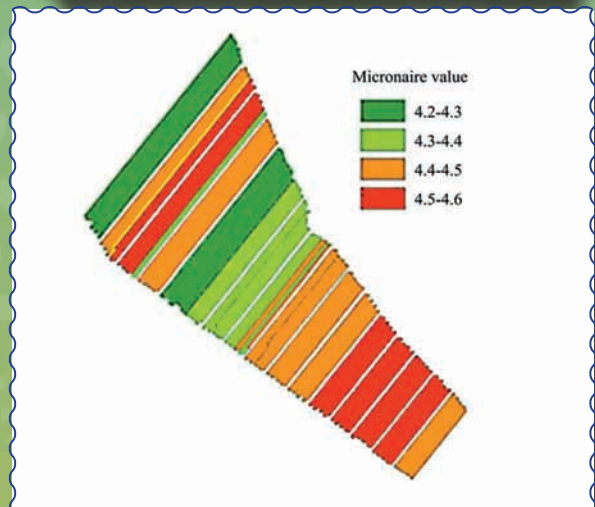Figure 8 Two mass-flow sensors installed in a cotton stripper harvester

Figure 15 Module-level cotton fiber-quality map in field test 2

Sui R X, Thomasson J A, Ge Y F. Development of sensor systems for precision agriculture in cotton. Int J Agric & Biol Eng, 2012; 5(4): 1-14.

IJABE Acknowledgements

We wish to express our sincere appreciations to many individuals and institutions for their generously sharing the cost of and contributing high quality manuscripts to IJABE. We are grateful that we join hands together in promoting the development and prosperity of the journal and research in agricultural and biological engineering. Our special thanks are extended to the following universities and research institutes:

HAPPY NEW YEAR

www.ijabe.org   ISSN 1934-6344   eISSN 1934-6352