Precision Farming (SDSU: Field Grid Sense): “Pioneer in Farm-based Precision Agriculture.”

Tested at SDSU

Lap-Top Computer Controls Fertilizer Rates in Research

The versatility of the farm computer may be further expanded into the fields pending research results by a graduate student at SDSU.

Joe Schumacher, Brookings, a graduate student in agricultural engineering, has conducted research using a lap-top computer to control fertilizer application rates in the field. He recently presented the findings at a meeting of the American Association of Agricultural Engineers in New Orleans.

During the past 18 months, Schumacher has tested a procedure in which fields are mapped in a computer program. When it is time to apply fertilizer, the rates are adjusted on-the-go via information provided by the computer mounted in the tractor cab.

Schumacher's advisor, Dr. Don Froehlich, believes this is a first attempt to combine automatic release of chemicals and grid mapping into a procedure which the operator can utilize.

"We're definitely on the cutting edge with that type of research," said Froehlich, an associate professor of agricultural

Dr. D.P. Froehlich and J.A. Schumacher (Farm and Ranch Guide , Feb 1990)

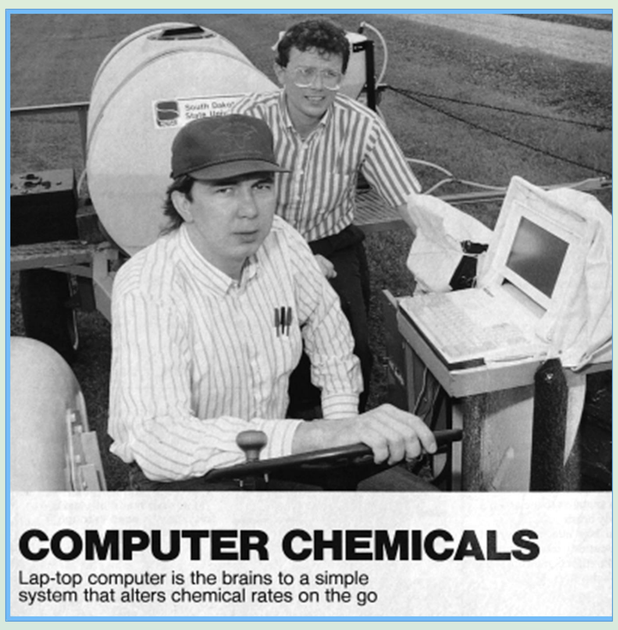
Change rates on the run

FARM BY THE FOOT

By LARRY REICHENBERGER

THIS COMPUTER CONTROLLED fertilizer system developed by South Dakota State University ag engineers automatically varies fertilizer rates in the field.

Farm Journal, March 1990 by Larry Reichenberger
SDSU Ag. Eng.: J.A. Schumacher and D.P. Froehlich



COMPUTER CHEMICALS

Lap-top computer is the brains to a simple system that alters chemical rates on the go

Successful Farming, April 1991 by Dave Mowitz
SDSU Field Grid Sense: Project Team (1991): Dr. D.P. Froehlich, D.G. Ollila (Seated), J.A. Schumacher (Standing), K.A. Klemme

CRIS Projects (dates listed): Precision Farming Agritopics Series no. AT 95-01, National Agricultural Library[1] (SDSU project highlighted: 1989-1993)

“ PRECISION FARMING RESEARCH

This section lists examples of precision farming research projects entered on the Current Research Information System (CRIS) database. CRIS is the U. S. Department of Agriculture's electronic documentation and reporting system for publicly funded agricultural and forestry research.

*****Applying and Recording Agricultural Chemicals Simultaneously via Computer Control Project No. SD00189 To ensure safety plus enhance productivity, applied chemicals for crop production need to be feasibly utilized with as much control as possible. A machinery system (both hardware and software) is being designed to control and adjust the release of pesticides so that the on-the-go applied delivery corresponds to the soil environment. A laptop microcomputer (positioned within the tractor cab) is the main component and provides simplicity, reliability and establishes the capability to record and maintain a chemical-field history.**

Investigator(s): Froehlich, D. P., Klosterman, T. & Alcock, R.
Agricultural Engineering South Dakota State University Brookings, South Dakota 57007
Project Duration: 10/4/89-9/30/93

*** Engineering Systems for Field and Vegetable Crop Production Project No. CA-D-AER-5468-H The objective of this project is to develop efficient and sustainable production systems for field and vegetable crops to: reduce soil compaction, energy use and dust generation; enhance residue utilization and management; accommodate nonchemical pest control alternatives; enhance product quality; allow site specific application of inputs, such as pesticides, fertilizers or water.
Investigator(s): Studer, H. E., Chancellor, W. J. & Garrett, R. E. Agricultural Engineering University of California Davis, CA 95616
Project Duration: 8/21/91-9/30/96

*** Engineering Systems for Spatially Variable Agricultural Production Project No. TEX06745 (1) To develop a computer based system that can obtain data, analyze that data and implement management practices on small area production units. (2) To determine the nature of variability of parameters affecting agronomic productivity on a spatial basis and to determine the economic impact of that variability. University College
Investigator(s): Searcy, S. W., Whittaker, A. D. & Coble, C. G. Agricultural Engineering Texas A&M Station, Texas 77843
Project Duration: 3/29/91-3/28/96

*** Remote Sensing and Associated Technology Transfer to Production Agriculture Project No. 1270-66000-011-03S Develop remote sensing based products in cooperation with Agricultural Research Service scientists and users that are most appropriate for agriculture production management decisions. Assist users in independently evaluating cost effective use.
Investigator(s): Hart, G. F. & May, G. A. Institute for Technical Development Stennis Space Center, Mississippi 39520
Project Duration: 9/1/93-8/31/95

*** Remote Sensing Laboratory: Remote Sensing of Agricultural and Natural Resources Project No. MIN-40-016 The overall project goal is to advance the development and application of remote sensing and geographic information systems (GIS) in agricultural and natural resource inventory and management. The major objectives are: develop a quantitative understanding of the relationships of spectral-radiometric properties of vegetation and soil to biophysical characteristics; and research and develop analysis techniques and capabilities that will enable resource managers in Minnesota to effectively utilize remote sensing and GIS.
Investigator(s): Bauer, M. E. & Martin,R.D. Natural Resources University of Minnesota St Paul, Minnesota 55108
Project Duration: 7/1/89-6/30/94

*** Sensing and Control Technology to Optimize Cropping System Inputs Project No. 3622-21000-006-00D Establish methods and develop instrumentation for sensing organic carbon, depth to clay layer, and other agronomic properties important in spatially variable cropping systems management. Develop integrated agrichemical application systems utilizing soil and crop spatial data as basis for variable application rate control. Assess performance of sensors, application systems, and techniques in field evaluations.
Investigator(s): Sudduth, K. A., Agricultural Research Service Columbia, Missouri 65211 (**Side note: President of the International Society of Precision Agriculture 2014-2016**)
Project Duration: 10/1/90-9/30/95

*** Sensors for Measuring Physical and Chemical Properties of Agricultural Materials Project No. IND046056 The general objective is to develop reliable methods for sensing important physical and chemical properties of agricultural materials, particularly grain and soil. The adaptation of these sensors for use with real-time process control systems on agricultural equipment will be a high priority consideration. Special attention will be given to developing equipment suitable for prescription application of pesticides.
Investigator(s): Gaultney, L. D Agricultural Engineering Purdue University West Lafayette, Indiana 47907
Project Duration: 10/1/90-9/30/95

*** Spatial Variability of Crop Production Variables Project No. ILLU-10-0339 Investigate alternative navigation systems, then select and obtain a system for use in building a Geographic Information System (GIS). Investigate alternative possible organizations of geographic information systems and begin to develop a system structure suitable for midwest agricultural production.
Investigator(s): Goering, C.E., Reid, J.F. & Hummel, J.W. Agricultural Engineering University of Illinois Urbana, Illinois 61801
Project Duration: 10/1/89 - 9/30/94

*** Use of Global Positioning System in Production Agriculture Project No. NEB-11-094 The overall objective of this research effort will be to utilize GPS as a tool to provide site-specific location: (1) integrate computer, GPS receiver and signal conditioning equipment so that sensitivity and reliability can be evaluated (2) develop hardware and software to measure seed crop yield and location within a field (3) develop a system for using fertilizers or pesticide based on site-specific requirements.
Investigator(s): Bashford, L.L. Biological Systems Engineering University of Nebraska Lincoln, ND 68583
Project Duration: 9/3/92-8/31/97

*** Variable Rate Crop Management System Project No. 3611-12220-001-02S Assess the potential impact of variable rate crop management on improving water quality.
Investigator(s): Hummel, J.W., Goering, C.E. & Wax, L.M. Illinois Agricultural Experiment Station Urbana, Illinois 61801
Project Duration: 5/20/93-4/30/96 ”

Reference:

1. Emmert, Bonnie, Jane Potter Gates, and Joe Makuch. *Precision Farming*. Agritopics Series, no. AT 95-01.National Agricultural Library, December 1994. page 9: https://handle.nal.usda.gov/10113/7083479.