

**IMPROVING THE OPERATIONS AND EFFICIENCY OF
PROCESSING, TRANSPORT AND STORAGE OF HEAT
SENSITIVE MATERIALS USING A NOUVO WIRELESS
REMOTE MONITORING AND CONTROL SYSTEM**

Gideon Zeidler D.Sc/MBA

**DEPT. OF ANIMAL SCIENCE, COOPERATIVE EXTENSION
UNIVERSITY OF CALIFORNIA RIVERSIDE, CALIFORNIA 92521**

PRESENTED AT:

AIChE 2005 Annual Meeting

October 30 - November 4

Cincinnati, Ohio, USA

ABSTRACT

A new system, which improves the performance and efficiency of, heat sensitive materials processing, distribution and storage operations. The wireless remote monitoring and control was developed by s-Control Systems, Chatworth, Ca. and the University of California, at Riverside campus. The System now In it fifth developmental level was initially designated to elevate food safety's Hazard Analysis Critical Control Points (HACCP) system performance. However its scope was expanded to non-food heat sensitive products and other applications. Updating HACCP performance was done by transforming it from reactive into proactive system, thus preventing potential failures. This is done by getting warnings and alarms when monitored parameters are approaching specification limits. Furthermore, as most HACCP failures are equipment, human error or act of god related the system also monitor equipment operation parameters, potential errors such as door ajar or electricity shut down, when a problem start to evolve the monitoring system the parameters involved, analyze the problem and issue repair order ticket. Thus provide routine as well as preventive on-line maintenance systems. The monitoring system is composed from hardware and software. The hardware includes several types of smart controllers, which are connected to the serial ports of each equipment. They retrieve the processing and equipment operational data and transmit them into a central interface unit located near a computer. The data from all parts of the facility are then transmitted into the computer where the specific software process into the various reports, store it or send it outside the facility as needed. This make HACCP fully automated, eliminating the extensive labor involved with current HACCP. The wireless capability of the system enables the integration of all aspects of the operation such as transportation and storage under one monitoring system. Furthermore, the system could be expanded into other non-related operations where various groups operate their part without interfering other operations. In hospitals for example the food system is monitored along side with blood bank refrigerated medicine refrigerated test samples etc. The two ways communication of the system enable headquarters, computers and equipment repair services to access the facility system for support or supervision in multi-facility companies all units could be better integrated Into world-wide tightly operated system. The new monitoring system is currently used in hospitals, mass feeding operations, school lunch programs, correctional institutions, fast food, various refrigeration Systems and others.

Proactive Wireless HACCP with Integrated Preventive Maintenance and Fast Identifying and Solving Problems Sub-Systems.

Pre-Requisites:

Food system where all production and support equipment are integrated by wireless into one operational system, with the ability to transmit and receive HACCP and equipment parameters, data, instructions, and training. Integrates all sister units into a global operating system.

EXPANDABLE

The system can be expanded to all food channel segments, such as production, processing, transport, storage, etc.

PURPOSE

- 1. AUTOMATE HACCP MONITORING**
- 2. TO PREVENT HACCP FAILURES DUE TO:**
 - A. CCP FAILURES**
 - B. EQUIPMENT FAILURES**
 - C. HUMAN ERRORS**
 - D. ACT OF GOD**

3. FAST IDENTIFICATION AND CORRECTION OF PROBLEMS

A. ONLINE PREVENTIVE MAINTENANCE

B. ONLINE ROUTINE MAINTENANCE

**C. ONLINE IDENTIFICATION OF PROBLEMS AND
WORK ORDER ISSUING**

4. TWO WAY COMMUNICATION WITH OUTSIDE ENTITIES: SERVICE DEPTS., HEADQUARTERS ENGINEERING, QA., QC., PRODUCT DEVELOPMENT, ETC.

5. TO PREVENT INCIDENTS RELATED TO FOOD SECURITY, BIO-TERRORISM AND SABOTAGE INCIDENTS.

CURRENT

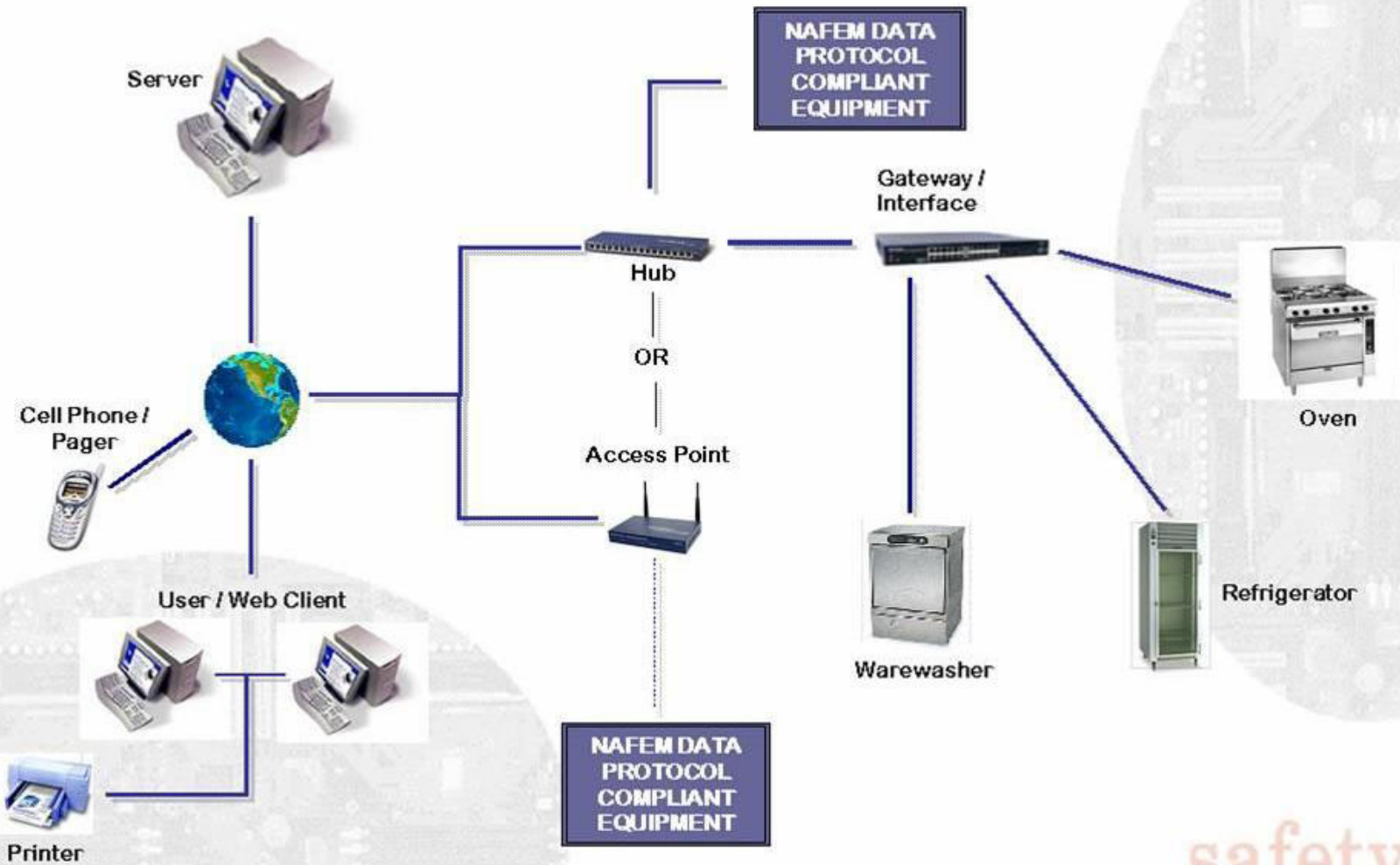
USERS

**AROUND 300-350 ENTITIES ARE CURRENTLY
USING THE SYSTEM.**

- RESTAURANTS**
- FAST FOOD CHAINS**
- HOSPITALS**
- UNIFIED SCHOOL DISTRICTS**
- JAILS**
- SPORTS STADIUMS**
- KITCHEN EQUIPMENT MANUFACTURERS**
- REFRIGERATION SYSTEMS
MANUFACTURERS**

THE SYSTEM AND ITS OPERATION

D. THE ONLINE KITCHEN ARCHITECTURE

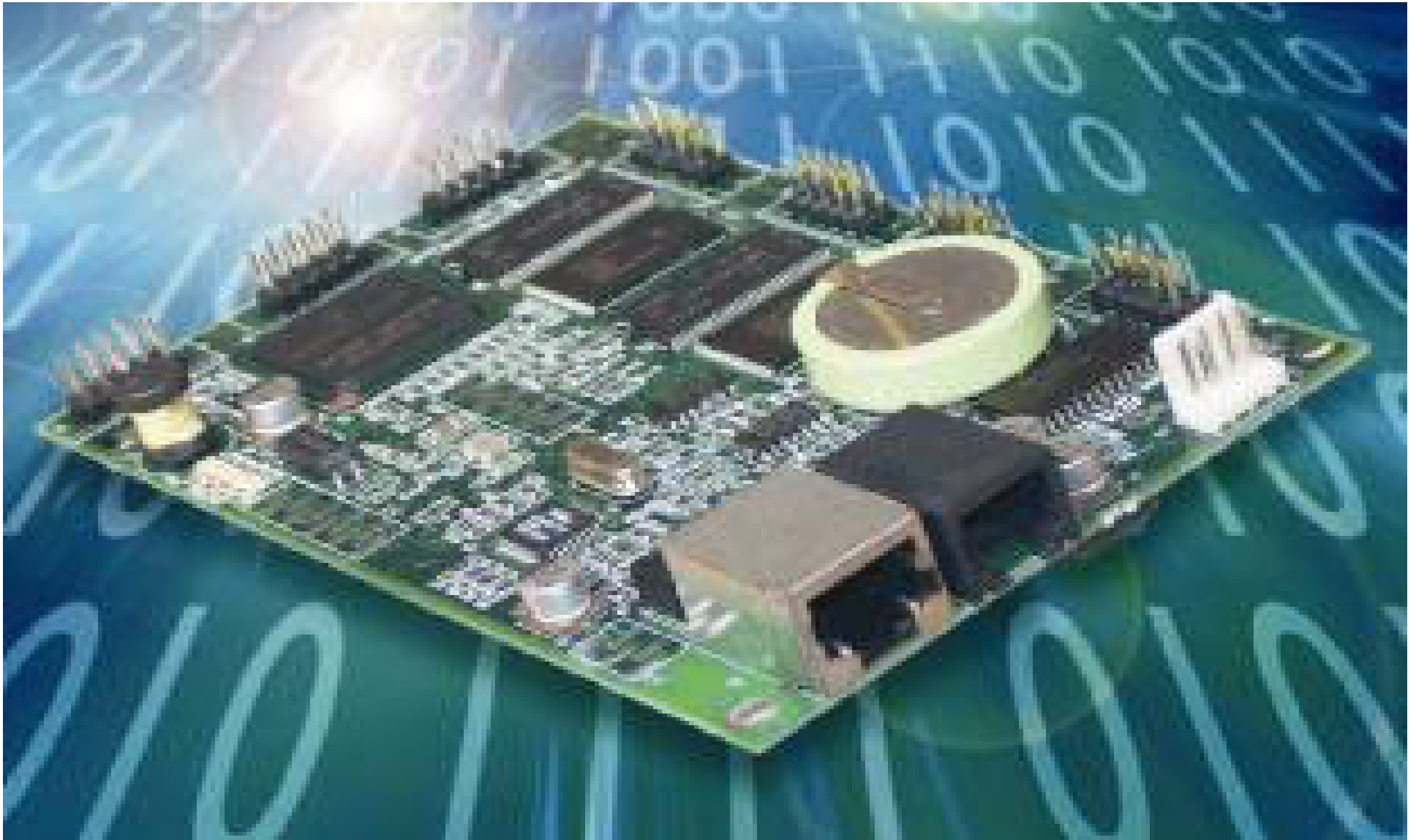


technology

safety

central monitoring

A. THE MICROGATE™



B. THE PICO GATE™



C.

SOFTWARE #1

RAPTOR WEB SOFTWARE™ (RWS)

- ❖ **COMPLIES WITH NAFEM DATA
PROTOCOL SPECIFICATIONS**
- ❖ **ONLY ONE SOFTWARE IS NEEDED TO
OPERATE THE WHOLE SYSTEM**
- ❖ **WARNINGS, ALARMS, AND
NOTIFICATION SENT OUTSIDE FOR
IMMEDIATE RESPONSE**

Software No 2

WORK STATION

- 1. Receive warnings or alarms from raptor software.
- 2. Search the system and Identify the problem.
- 3. Analyze the problem.
- 4. Issue maintenance work order which includes parts needed and their current cost.

technology

1010100101010010001010101111110101
0101011101010101010001010010101010001010111110101
1010100101010010001010101111101011010101010010001010101
0101011101010101010001010010101010001010111101010101011101010101000101

safety
central monitoring

Work Station (cont.)

- 5. Check work done and close work order
- 6. Record maintenance activities and their cost.
- 7. Monitor maintenance budget.

technology

1010100101010010001010101111110101
0101011101010101010001010010101010001010111110101
1010100101010010001010101111101011010100101010010001010101
0101011101010101010001010010101000101011111010101011101010101000101

safety
central monitoring

ACCESSING THE SYSTEM FROM THE OUTSIDE

D. GLOBAL MAP OF SITES

Welcome To RWS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address <http://map50.usa.econtrolsystems.com/Users;JSESSIONID=cutf57xreosc> Go Links


E-Control Systems, Inc. Raptor Web Software™ User: **rephodak1** Help · [Logout](#)

Status Views Alarms Configuration Reports

Menu:
- [Select View](#)
- [Refresh Tree](#)

- Demo
- [Denver, CO](#)
- [Lancaster, CA](#)

Demo [Refresh Map](#)



Info:

Sub-Levels	Operations
Lancaster, CA	
Denver, CO	

Internet

ROADMAP FOR SPECIFIC SITE

Welcome To RWS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media

Address <http://map50.local23.econtrolsystems.com/Users;JSESSIONID=cutf57xreosc> Go Links

E-Control Systems, Inc. Raptor Web Software™ User: **rephodak1** Help · [Logout](#)

Status Views Alarms Configuration Reports

Menu:
- [Select View](#)
- [Refresh Tree](#)

- Demo
 - [Denver, CO](#)
 - [Lancaster, CA](#)
 - [123 Main Street](#)
 - [Cooler](#)
 - [Freezer](#)

Denver, CO [Refresh Map](#)

Info:

Sub-Levels	Operations
Culinary Equipment	

Done Internet

RESTAURANT LAYOUT

Welcome To RWS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://store57.costamesa.econtrolsystems.com/Users;JSESSIONID=cutf57xreosc> Go Links

User: **administrator** Logout


E-Control Systems, Inc. Raptor Web Software™















[Status Views](#) · [Alarms](#) · [Configuration](#) · [Reports](#)

Menu:

- [Select View](#)
- [Refresh Tree](#)

- [Default](#)
 - [Costa Mesa Store](#)
 - [Cooler Room Temperature](#)
 - [Freezer Room Temperature](#)
 - [Dining Room Temperature](#)
 - [Kitchen Room Temperature](#)
 - [Pizza Warmer Temperature](#)
 - [Steam Table Temperature](#)
 - [Back Door](#)
 - [Freezer Door](#)
 - [Cooler Door](#)



Dining Room			68.43 F
Kitchen			89.60 F
Pizza Warmer			72.10 F
Back Door			Closed
Cooler Room			37.98 F Open
Freezer			2.59 F Closed
Steam Table			198.33 F
View WebCam			

Done Internet

EQUIPMENT VIEW

Welcome To RWS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: <http://store58.costamesa.econtrolsystems.com/Users;JSESSIONID=4gj60ur4rl8n8>

E-Control Systems, Inc. Raptor Web Software™ User: rephodak1

Status Views Alarms Configuration Reports Help · [Logout](#)

Menu:

- [Select View](#)
- [Refresh Tree](#)

Demo
 Denver_CO
 Lancaster_CA
 123 Main Street
 Cooler
 Freezer

Lancaster Freezer Logged Info

Info:

Room Temperature
-10.0 F

Name	Value	Status	Date
Valve Flow	6 %	OK	2004-05-19 07:55:48
Calculated Superheat	5.0 F	OK	2004-05-19 07:55:48
Suction Pressure	5.0 psi	OK	2004-05-19 07:55:48
Evaporator Outlet Temperature	-34.0 F	OK	2004-05-19 07:55:48
Room Temperature	-10.0 F	OK	2004-05-19 07:55:48
Defrost Termination Temperature	-30.0 F	OK	2004-05-19 07:55:48
Auxiliary Temperature	-40.0 F	OK	2004-05-19 07:55:48
Master Operating Status	Ref	OK	2004-05-19 07:55:48

Connection	Online	Maintenance Report
Device Address		Asset Management Report
Serial Number		Clear Alarms

INDIVIDUAL SENSOR VIEW

Welcome To RWS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://store79.costamesa.econtrolsystems.com/Users;JSESSIONID=59tvdag7juit> Go Links

E-Control Systems, Inc. Raptor Web Software™ User: administrator Logout

Status Views · Alarms · Configuration · Reports

Costa Mesa Unit > Freezer Room Temperature

Start Time: 08-22-2003 14:00:00 (MM-DD-YYYY HH:MM:SS) End Time: 08-22-2003 16:30:00 (MM-DD-YYYY HH:MM:SS) Submit

● Freezer Room Temperature (F)

Rows 1 - 29

Log Date	Value
2003-08-22 14:00	-0.92 F
2003-08-22 14:05	3.01 F
2003-08-22 14:10	13.06 F
2003-08-22 14:15	22.59 F
2003-08-22 14:20	32.83 F
2003-08-22 14:25	14.50 F
2003-08-22 14:30	5.30 F
2003-08-22 14:36	1.03 F
2003-08-22 14:41	-0.40 F
...	...

Internet

OTHER BENEFITS OF THE ON-LINE KITCHEN

- ❖ **TRANSFERRING HACCP FROM EXPENSE CENTER TO PROFIT CENTER**
- ❖ **TRANSFERRING HACCP FROM REACTIVE TO PROACTIVE**
- ❖ **ENABLING INTEGRATION OF FOOD SECURITY AND BIO TERRORISM WITH HACCP**
- ❖ **REDUCING OF FOOD SPOILAGE AND DETERIORATION**
- ❖ **REDUCE CROSS-CONTAMINATION CAUSED BY MEASURING INSTRUMENTS AND HUMAN HANDLING**

- ❖ **REDUCE PLANT DOWN TIME AND COSTLY EMERGENCY REPAIRS**
- ❖ **OPTIMIZATION OF EQUIPMENT PERFORMANCE**
- ❖ **OPTIMIZATION OF ENERGY UTILIZATION**
- ❖ **ON-LINE TRAINING OF EMPLOYEES EVEN IN REMOTE LOCATIONS**
- ❖ **PRODUCTION AND POINT OF SALE INSTANTLY AVAILABLE**

FACTORS CONTRIBUTING TO LOW COSTS

- **INTEGRATING WITH EXISTING SYSTEMS**
- **INTEGRATING WITH NEW TECHNOLOGIES**
- **ADDING DESIRED FEATURES ONLY (NO PACKAGES)**
- **WIRELESS. FAST AND LOW COST INSTALLATION**
- **ONE SOFTWARE PER SYSTEM**
- **CONTINUOUSLY UPDATED**
- **MINIMAL INITIAL INVESTMENT (CAN BE EXPANDED AT LATER TIME)**

CONCLUSIONS:

- 1. THE ONLINE KITCHEN WILL BE THE NEXT GENERATION OPERATING KITCHEN**
- 2. NEW EQUIPMENT WILL HAVE BUILT-IN CAPABILITIES**
- 3. EXISTING KITCHEN CAN EASILY BE UPGRADED**
- 4. REPORTS ALLOW PROGNOSTIC AND DIAGNOSTIC OF EQUIPMENT**

**THANK YOU FOR YOUR
ATTENDANCE!**

A COMBINED PROJECT

BY

**E. CONTROL SYSTEMS
CHATSWORTH, CALIFORNIA 91311**

AND

**UNIVERSITY OF CALIFORNIA
DEPT. OF ANIMAL SCIENCE
COOPERATIVE EXTENSION
RIVERSIDE CALIFORNIA 92521**

Abstract ID#: 14844

Password! 484162

Title: improving the Operations and Efficiency of Processing, Transport and Storage of Heat Sensitive Materials

Using a Nouvo Wireless Remote Monitoring and Control System

Session Selection: T9022 Food Process and Product Development - Case Histories

Preferred presentation Format: Oral.*withdraw If not accepted for preferred format*

Lead Presenter's Email: GIDEON.ZEIDLER@UCR.EDU

Comments to Organizers: If you find that this paper fit a different category please do it.

First Author

Presenting Author

Gideon Zeidler food engineer

Animal science/cooperative extension