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Since 1973, Georgia Tech's Agricultural Technology Research Program (ATRP) has worked closely with the poultry industry, developing new technologies and adapting existing ones for the industry's special needs.

Mission Statement

ATRP's mission is to promote the economic growth of Georgia's agribusiness (especially the poultry industry) through:

- Research focused on the development of new technologies that improve productivity and efficiency;
- Exposure of students to the challenges of developing and adapting these technologies;
- Technical assistance to Georgia-based industry members with special problems; and
- Release of information on emerging technologies and improved operational management through newsletters, articles, seminars, and presentations to speed ultimate commercial use.

The program is conducted in cooperation with the Georgia Poultry Federation with funding from the Georgia Legislature.

Fiscal Year 2002 was a year of challenge for all of us. The events of September 11, 2001, forever changed our sense of security from acts of terrorism and helped to speed the onset of an economic recession. International events disrupted the export sale of poultry paws to China at a time when the poultry industry was just emerging from a recession of its own and in need of more, not fewer, export markets.

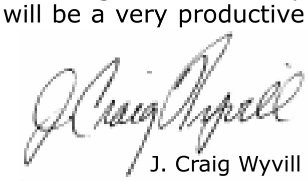
ATRP The Year in Review

And the weakening economy placed mounting pressure on research operations such as the Agricultural Technology Research Program (ATRP) to adjust to shrinking state funding levels.

Yet Fiscal Year 2002 was also a year of strong promise for many of ATRP's developments. Its systemic imaging system became the focus of intense industry interest in early 2002, as companies began exploring its potential to identify and remove systemically defective birds before they become separated from their paws. Continuing field trials of the imaging cell at Gold Kist's Carrollton, Georgia, processing plant have demonstrated that the unit is more than ready for commercial exploitation. Intensive endurance trials on ATRP's robotic case packer at co-partner Cryovac's testing facility proved the unit is more than up to the challenge for which it was designed. With field trials scheduled in December 2002, hopes are high that commercialization will follow shortly thereafter. ATRP's mobile computing technology has drawn the growing attention of a number of processing plants awakening to the need for improved capture and use of plant floor information for enhanced processing efficiency and control. With the events of September 11, ATRP's biosensor development team found itself in the eye of national interest related to rapid, portable chemical and biological screening technologies. The sensor's platform is ideally suited for a wide range of security and personal protection activities. And the program's continuing work on automatic live transfer, intelligent deboning, automated cone loading, and water and odor reduction technology has attracted broad industry interest and support.

Despite the downturn in the economy, closure was achieved on Phase I fund-raising efforts for Tech's new Food Processing Technology Research Facility. Five new industrial partners were added to the growing list of corporate supporters for the facility, and additional state and private funding was secured to help raise the overall building fund to more than $7.8 million. At the close of the fiscal year, the architect had completed preliminary design of the building, and the groundbreaking has now been scheduled for January 23, 2003.

As we look back on Fiscal Year 2002, I want to personally thank the ATRP research team members for the terrific job they have done in helping to stay focused on our development goals. I also want to thank our many industrial research partners for their continuing support and encouragement. Despite the challenges that still lay ahead, I am truly excited by what I know will be a very productive and exciting Fiscal Year 2003.



J. Craig Wyvill
ATRP Director

ATRP budget dollars supported four major research focus areas in Fiscal Year 2002: advanced automation technologies, food safety technologies, environmental engineering and management, and information systems technologies.

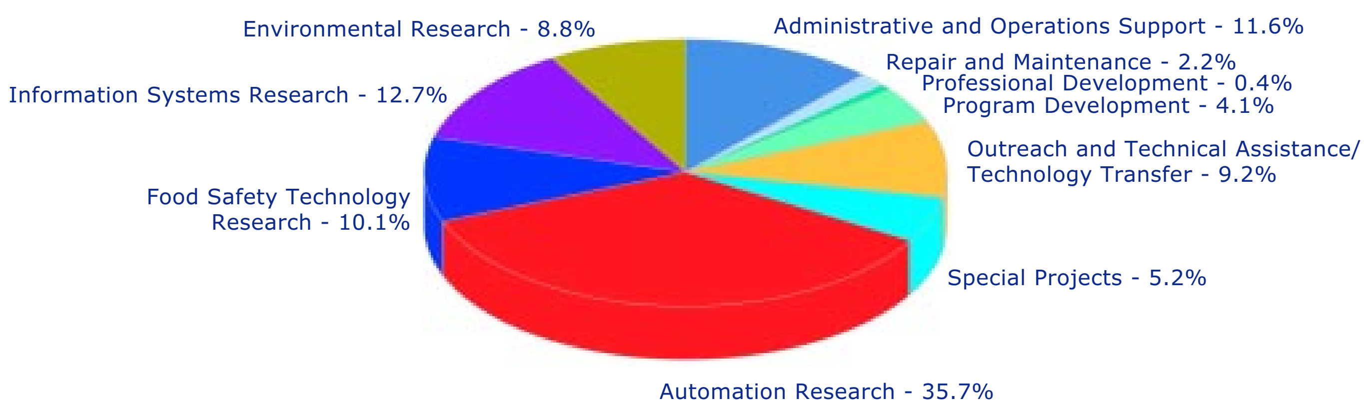
Financial Summary

In addition, monies were set aside for outreach and technical assistance/technology transfer, special projects, professional and program development, administrative and operations support, and repair and maintenance functions.

Two-thirds of the Fiscal Year 2002 program budget was channelled toward research in the four major research focus areas. In addition, half of the remaining program budget was channelled toward outreach and technical assistance/technology transfer and special projects.

Due to an anticipated downturn in state revenue collections resulting after the 9/11 tragedy, the program's funding (like other state agencies) was reduced mid-year by $46,983, lowering the program's initial annual budget allocation of $1,879,313 to $1,832,330.

FY 2002 BUDGET MIX [$1,832,330]



ATRP's Poultry Advisory Committee is made up of poultry industry leaders who give their time to help the program identify research topics that best address priority industry needs. The committee meets semiannually to hear updates on program research efforts and to discuss challenges and future direction with program personnel.

Industrial Partnerships

Poultry Advisory Committee (Fiscal Year 2002)

Chairman:	
Jerry Lane	Claxton Poultry Farms, Inc.
Doug Anderson	American Proteins, Inc.
Gus Arrendale	Fieldale Farms
Denny Artley	Dutch Quality House
Bob Burns	ConAgra Poultry
Bill Crider	Crider Poultry
Richard Curvin	Gold Kist Inc.
Hal Floyd	Tip Top Poultry
Jerry Gattis	Cagle's Inc.
Alan Habegger	Cagle's Inc.
Skip James	ConAgra Poultry
Don Mabe	Gold Kist Inc.
Tommy Myers	Wayne Farms LLC
Vernon Owenby	Tyson Foods, Inc.
Keith Rudowske	Tyson Foods, Inc.
Phillip Turner	Mar-Jac Poultry
Mike Welch	Harrison Poultry
Greg West	Sylvest Farms
Ex Offico:	
Craig Wyvill	Georgia Tech Research Institute
Abit Massey	Georgia Poultry Federation
Mike Giles	Georgia Poultry Federation
James Scroggs	Georgia Poultry Processors Association

Industrial Collaborators (Fiscal Year 2002)

Industrial collaborators provide the direction needed to tailor research and development activities to specific industry challenges. They also participate directly in research projects by providing technical assistance as well as offering in-kind and cash contributions. Below is a list of industrial collaborators by project for FY 2002.

Intelligent Cutting System for Deboning Meat
- Tyson Foods, Inc.

Automatic Intelligent Live-Bird Transfer System
- Gold Kist Inc.
- Stork Gamco Inc.

Computer-Vision Systemic Screening System
- Gold Kist Inc.
- Meyn Poultry Processing LLC

Dynamic Automated Cone Loader
- Tyson Foods, Inc.

Mobile Computing System
- Cagle's Inc.

Robotic Case Packer
- CAMotion, Inc.
- Cryovac, Inc.
- Gold Kist Inc.

Water Use and Quality, Wastewater Capacity, and Air Emissions
- American Proteins, Inc.

Biosensor for Rapid Microbial Detection
- Gold Kist Inc.

The goal of ATRP's intelligent cutting system project is to develop a flexible sensor-based system for deboning meat. Successful implementation of such a system should improve machine yields, allowing existing plants to increase overall output of high-value, further processed products.

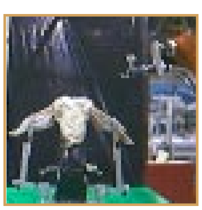
Intelligent Cutting System for Deboning Meat

Initial work focused on developing a testcell to support studies on innovative automation cutting techniques. The cell constructed consists of a research robot, a variety of cutting end-effectors, a miniature force-torque sensor, and an array of digital cameras. In addition, the design team developed a computer model that incorporates measured cutting trajectories used by skilled workers to debone a chicken breast.

Efforts this past year centered on integrating and operating the testcell. While overall integration was completed, problems surfaced related to controlling the robot's orientation. Work is continuing with the robot manufacturer to find a solution to the problem. In the meantime, the research team has been able to begin testing most aspects of the approach being considered. This includes vision sensing to locate reference points, trajectory generation, and robot operational control.

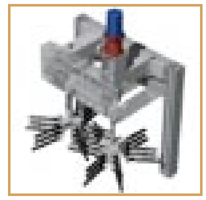
A key aspect of the work completed relates to locating the incision points for the initial cut, identifying the direction in which the trajectory is to be made, and modifying the trajectory based on force-feedback information. Using a straight-bladed knife mounted on the robot, the team was able to conduct a number of test trials. The vision-processing algorithm for determining the reference point locations proved fairly reliable, and the straight-blade cuts produced have been very encouraging. The force-feedback control has also provided excellent results in straight cutting motions but exhibits a few difficulties in the joint or rotational cut. The research team is continuing to work on this by upgrading the model to recognize some of the forces specific to rotational cuts not currently built into the control algorithm.

The research team is also working to enhance the accuracy of 3D data taken from the cameras related to key reference points. The approach initially employed proved laborious to initialize and presented problems related to overall practicality. A new camera approach has been designed that is expected to eliminate these problems.



The progress being made on this development overall is encouraging. The long-term plan is to develop a dynamic sensor-based method for controlling the cutting motions of an automatic deboning machine.

The Automatic Intelligent Live-Bird Transfer System project continued to make remarkable progress in developing an automated system for transferring live birds from moving conveyors to shackle lines.



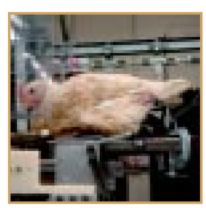
Automatic Intelligent Live-Bird Transfer System

The project team transformed the breadboard configured testbed, consisting of a conveyor with a shackle (which was designed to test each of the elements of inverting a single, forward-facing bird), to a semi-automated, computer-controlled system that will grip and invert a sequence of singulated live birds regardless of orientation (either forward- or backward-facing birds). The development has taken into account the general production requirements and implementation issues for a typical processing plant.

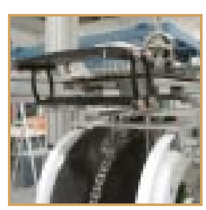
First, an analytical simulation algorithm was developed to aid design optimization of the rotating compliant-fingers. The effort led to an optimized design of rotating fingers that can handle three birds per rotation at a speed of 20 rpm. A pair of prototype rotating hands were developed and successfully tested with live birds at the University of Georgia (UGA).

Second, the control algorithm that synchronizes the motion among the pallet (on which the singulated live bird sits), the rotating hands, and the shackle was developed. The natural reactions of the birds to the synchronized controlled motion were studied experimentally with live birds at UGA. Experimental results showed that by reducing the number of rotating fingers and by synchronizing the drum motion with the incoming birds, the birds' escape behaviors (as they enter the grasper) were minimized.

Third, the design concept of an integrated pallet was developed. The pallet incorporates a means to minimize variations of the initial feet locations and a gripping mechanism that was optimized to shackle both legs of the birds.



Finally, the prototype system was tested experimentally on a smaller number of birds using the pallet/shackle that was designed to transfer the forward-facing birds. The results have been very encouraging; of the 16 tests, 14 out of 16 birds hung by both legs.



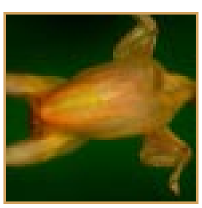
The Computer-Vision Systemic Screening System project teamed with a matching FoodPAC project to complete development of a small footprint, ruggedized imaging cell for determining systemic defects on the kill line. The goal of the effort this year was to construct and install a second-generation imaging cell and to field test the new design in a continuous plant operation in an effort to speed commercialization of the system.

Computer-Vision Systemic Screening System

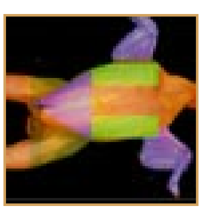
Construction of the revised prototype was completed in late summer 2001 with placement and startup on the kill line at Gold Kist's Carrollton, Georgia, facility in October 2001. Over the next several months, the system was run continuously while being studied for reliability, accuracy, and marketability.

From a reliability standpoint, the design has been outstanding. The system failed to function on only a few occasions over the entire test period, and in each case, the failure was due to either human or plant support error rather than a hardware or software problem.

From an accuracy standpoint, the project team used a variety of methods to study the accuracy of the screening process. While a complete accuracy evaluation could not be performed (because of statistical and logistical impediments), the evaluations completed did indicate that the system was operating at a level consistent with that of human sorters screening for systemic defects. More testing is planned, however, to more fully define the advantages this system offers over manual screening operations.



Finally, from a marketability standpoint, suggestions were made by Gold Kist management to add features to the system to help improve its overall value to the company. These features included the detection of broken wings, bruising, empty shackle counts, line speeds, and mishung birds. These new features were added to the system and received a strong statement of support, when after sufficient evaluation of their value to the operation, Gold Kist ordered a second system for the other kill line at the plant; that system was added in June 2002.



On a second marketing front, the Chinese ban on paws, in January, precipitated interest in the system as part of an automatic systemic bird and paw screening and removal system. The project team made several presentations on the potential of the Systemic Imaging System to be used with a kickoff device to remove all systemic defective birds (paws and all) before the hock cutter. A business partnership was initiated with Meyn Poultry Processing to provide an integrated system, and several proposals are currently being evaluated by poultry processors.

ATRP initiated efforts to develop a Dynamic Automated Cone Loader for deboning operations. To automate this task, there are three main thrusts to the project. First, a vision system must be developed to "see" the bird and the end-effector. Second, a grasping system must be developed to grasp the raw product. Finally, the dynamic vision control software must be integrated onto a robotic platform (initially using an ABB research robot) to perform the task.

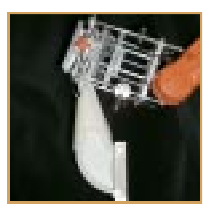
Dynamic Automated Cone Loader

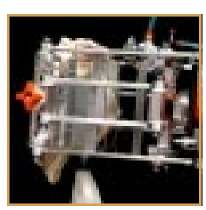
One of the most difficult tasks is identifying whether the carcass is resting on the conveyor breast up or breast down. This is important because the carcass must be placed with the correct orientation on the cone. To date, this problem is still posing a challenge. In preliminary tests, therefore, only breast down carcasses have been used (which occurs about 70% of the time in the plant). In this case, the vision system has been able to recognize the relative position of the carcasses (i.e., identify the neck and the wings) fairly effectively. The grasping points are then identified and relayed to the controller.

In addition to recognizing the carcasses' position and orientation, the vision system also has to locate the relative position of the end-effector to the carcasses. This work has been completed. Maintaining grasp stability on the work piece during transportation is also a requirement of the end-effector.

In addition, the variation of the raw product's size, shape, weight, and orientation had to be considered in the design. A new end-effector was designed to grasp and manipulate the irregular and non-rigid raw product. The design was completed as scheduled, and a prototype device built.

The end-effector was extensively tested using real product donated by Tyson Foods in Cumming, Georgia. The tests showed that the end-effector's design worked very well for the size of birds tested. With these tasks complete, the project team began to implement the dynamic vision control software. This software provides the hand-eye coordination to the robot that is necessary to achieve this task and many others in a processing plant. The software was ported to and tested on the ABB research robot successfully.





ATRP's mobile computing system is designed to facilitate the collection of a variety of data throughout a production facility. This data-collection system is wireless and electronic, which allows for the data to be collected anywhere in a plant and for that data to be accessed in real-time to aid in controlling and optimizing the production processes being monitored.

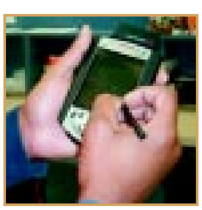
Mobile Computing System

The Mobile Computing System project saw the installation and implementation of Tech's mobile electronic data-collection system in Cagle's poultry processing plant in Perry, Georgia. The data-collection system uses commercial hardware components, custom software, and a human-computer interface design to create a robust HACCP data-collection tool.

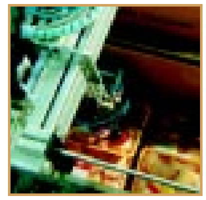
In addition, initial versions of custom software applications to allow a manager at the poultry plant to create data-collection procedures for use on the plant floor and create custom charts of data in the database were completed. Use of the software by plant personnel and an analysis of data-collection needs beyond HACCP data have led to the design and development of a more flexible and robust second version.

The second version is well on its way to completion and should facilitate the collection of multiple types of data (e.g., quality and operations data). The implemented system is withstanding the harsh poultry processing environment, and has enabled quality assurance personnel to electronically input a variety of HACCP data using commercial hand-held devices with wireless network connectivity.

Interest in the mobile electronic data-collection system has expanded, and preparations are beginning to install and implement the system in two other food processing plants supported by private funding.



The Robotic Case Packer project teamed with a matching FoodPAC project to complete development of a low-cost, pick-and-place, robotic tray-handling system. Two commercialization partners were added to the project team at the start of the year, Cryovac, Inc. and CAMotion, Inc.



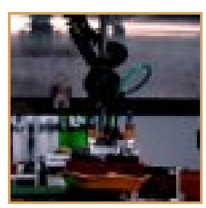
Robotic Case Packer

During the first seven months of the fiscal year, the project team completed the design and construction of a completely new case packer with a new, PC-based controller. The new case packer has three Cartesian, linear axes and a wrist rotation, just as the earlier case packer.

However, all four axes on the new machine have servo-electric drives; there are no pneumatic drives. Proprietary control algorithms and servo controllers from CAMotion are utilized to minimize the vibration of the machine, even though it is operating at speeds over 100 inches/second with accelerations over 6 g. The machine can pack #3 trays at a throughput of 49 to 54 trays per minute (<1.23-second average cycle time).

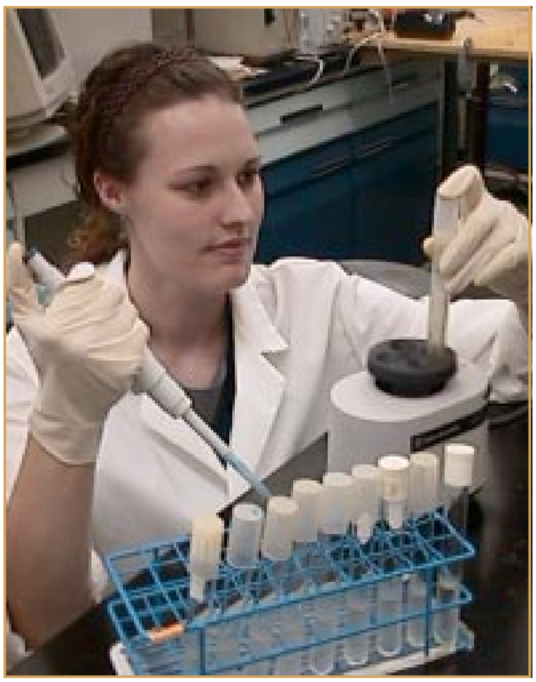
The design team also completed construction of a new conveyor system suitable for a weigh/price/label line, including a mechanism to exchange a full case for an empty case in less than 1 second.

In May, the prototype was moved to the development facilities of Cryovac where endurance testing was scheduled for the summer. Planning for an in-plant trial of the case packer at a poultry plant is under way and is expected to be completed in the fall of 2002. Cryovac and CAMotion have both expressed a strong interest in commercializing the system.



The Environmental Research project addressed processor water use and quality, wastewater capacity, and air emissions problems.

Water Use and Quality Wastewater Capacity and Air Emissions



Water use studies focused on designing an experimental approach that will allow researchers to accurately measure poultry carcass parameters that cause pathogens or fecal material to adhere. Additionally, the research team worked to define methods for improving bird washing.

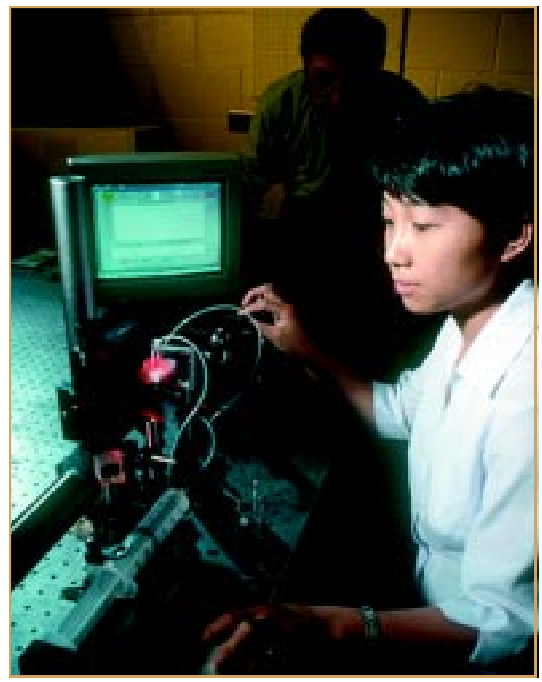
Researchers also worked to update WaRP© The Water Auditor software to add features such as a historical database, querying or comparison capabilities, and ease of importing or exporting to spreadsheets.

Wastewater capacity efforts focused on antioxidant use and residual material toxicity in DAF skimmings (secondary nutrient protein or SPN). Anaerobic digestion assays were analyzed to determine the acute or short-term effects of unused antioxidants on biological pre-treatment systems. A short-term toxicity was noted after 5 days; however, the bioreactors recovered. Carbon dioxide production was significantly higher than reference systems; therefore, longer term or chronic toxicity studies are needed to confirm effects on pre-treatment systems and possible nuisance odor implications.

Subsequent air emissions work was conducted at the rendering facility and a separate cooking operation. Efforts included assessing EPA Method TO-11A as a means for measuring potential nuisance odors. Researchers sampled scrubber inlets, exhaust stacks, various locations around facilities, and separate wastewater operations. The approach appears to provide a lower cost method for screening suspected points or areas of odor sources and quantifying objectionable or nuisance odors; however, further work is needed to evaluate variations between sampling days.

ATRP's Biosensor project made significant progress during FY 2002. The aim of this project is to develop a pathogen detection and quantification system that will assist the poultry industry in making process control decisions in a timely manner.

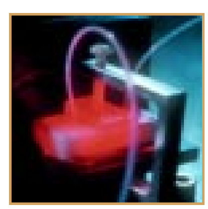
Biosensor
for Rapid Microbial Detection



During this past year, the project team designed a standard protocol for *Salmonella* detection, and many of the immunoassay parameters were examined and optimized. At present, the team has achieved good reproducibility of results in laboratory measurements of *Salmonella typhimurium* control samples, with detection of as few as 5,000 cells/ml in less than 1 hour. The team has also examined the use of pre-formulated and dried sensor chips, an advance that will make commercial implementation of the technology much more feasible.

Recent experiments have explored the effect of sample matrix on the assay results using samples of chiller water from a poultry processing facility. The team also designed, built, and tested a prototype biosensor with new optical and mechanical systems, making it more stable, quicker to set up, and easier to operate. An inexpensive USB detector was incorporated, allowing instrument control and data collection using battery power and a portable laptop computer. All of this investigation and refinement have led the development closer to its goal of commercializing a new tool for efficiently controlling microbial levels in plant operations.

This technology promises detection sensitivity greater than that of current genetic or immunoassay techniques and a rugged design to allow its use in on-line process control. Further testing and refinement of the biosensor will allow the addition of other pathogen species in either a single or multi-assay format and the creation of a stand-alone, field-use package.



Special Projects

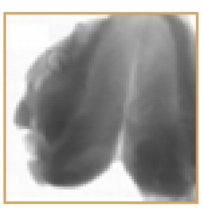
X-ray Support

Bone detection is still a major concern to the industry, and an x-ray support project was instituted to coordinate activities in this area.

Specifically, an x-ray imaging system, donated to the program by Spectral Fusion Technologies, was set up and operated to provide ATRP with the ability to acquire x-ray images to support research in techniques to enhance bone-detection approaches.

Most of the activities under this special project centered on setting up the system and getting certification to operate it safely. Soon after startup, however, the system was used on a FoodPAC project to develop a prototype system designed to fuse x-ray and visible images with the goal of enhancing overall detection accuracies. The system allowed the FoodPAC project team to acquire x-ray images on product with visible fan bone defects. During in-plant tests, the system acheived a detection rate of 88.37% and a false positive rate of 5.76%. Current computation speed facilitates processing of 60 parts per minute on a single processing line.

The program now has the ability with the system to evaluate and conduct other research efforts in the use of x-ray in support of quality and product enhancement. Researchers believe the system will provide significant benefits to the poultry industry in terms of reduced processing costs, improved inspection performance, and increased throughput.



Process Control Strategies in Poultry Processing Plants for Major Foodborne Pathogens

This initiative focused on identifying points in processing operations where automatic, on-line microbial monitoring techniques can be used to improve process controls under HACCP. The team first met with a technical advisory committee made up of industry and university food safety experts and identified likely areas where microbial level changes might prove useful in defining ways to change operational controls.

The committee identified several areas in the first processing section of the plant that included the Scalder, the New York Rinse, the final Whole Bird rinse stations (pre-chill), the Chiller, and Post Chill. The project team then made arrangements with the project's industrial partner, Gold Kist, to draw samples from these and other potential sites at Gold Kist's Carrollton, Georgia, processing plant. The team went to the plant on two separate days (at approximately 3-week intervals) to obtain samples from five different locations in the facility. Gold Kist personnel oversaw collection of all samples. Then each sample was analyzed at Georgia Tech.

The Tube-Dilution Spread-Plate Method was used to determine viable populations present in each of the samples. The team used selective and/or differential agar plates (without enrichment) to determine the populations of the following pathogens: *Salmonella/Shigella*, *E. coli* (Generic), *Campylobacter jejuni*, and *Listeria monocytogenes*, and "total bacterial count" on a general medium. The results showed that total pathogen counts are very low in the areas measured.

ATRP continued an active Technology Transfer and Outreach program. Subscriptions to the *PoultryTech* newsletter remained steady, with a slight increase in new subscribers. ATRP research projects continued to receive external press coverage, particularly the systemic screener, which was featured in *Food Engineering, Photonics, Research Horizons* (a Georgia Tech publication), and *Poultry Times*; the biosensor was featured in *Poultry International*.

Technology Transfer and Outreach

The entire Agricultural Technology Research Program was featured in a full-length article for Georgia Tech's *Alumni Magazine*. This gave the program much needed exposure to a significant number of alumni and supporters. The *ATRP Annual Report* was published with a new streamlined format, while the website received a major enhancement, including incorporating a more corporate-like identity, updating project streaming videos, and revising links to better connect visitors to articles and information located in outside sources.

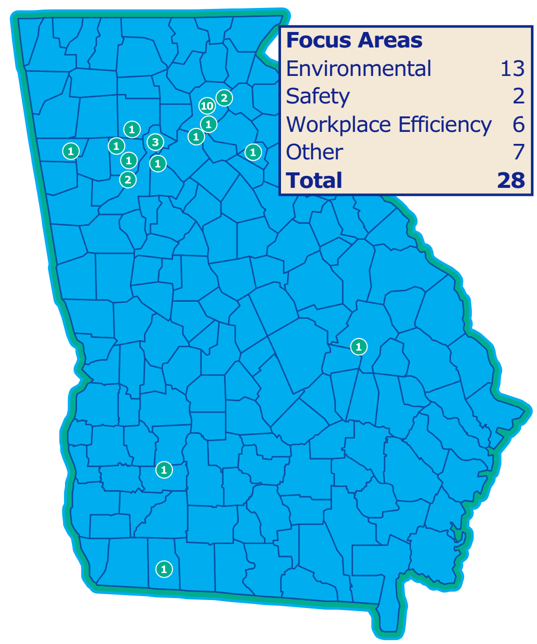
The program once again participated in the International Poultry Exposition, the Georgia Poultry Federation Spring Meeting, and the Night of Knights, preparing exhibits for all three. The Poultry World exhibit was officially opened in its new home (a permanent structure resembling a miniature poultry house) at the Georgia National Fairgrounds in Perry, Georgia. The Georgia Poultry Federation received an Award of Excellence for the exhibit from the American Society of Association Executives. In conjunction with the Georgia Poultry Federation, the National Chicken Council, and the National Turkey Federation, ATRP hosted the 2002 Safety Workshop for the Poultry Industry, attracting more than 60 safety professionals from across the United States.

Through special state funding, ATRP engineers are able to provide engineering technical assistance at no charge to the Georgia poultry industry.

Technical
Assistance

Designed to help companies and individuals who do not otherwise have access to engineering expertise, this program draws upon engineers and consultants from the Georgia Tech community in a variety of specialized areas, such as automation, waste management, ergonomics, economic impact, and plant safety and health.

Twenty-eight Technical Assists were provided this past year to firms and individuals across the state. These assists ranged from simple inquiries regarding information or help needed to address a problem to extensive on-site consultation, in which researchers collected data and provided a full report of their findings and recommendations. The program uses input from these assists to gauge situations calling for new research initiatives.



Focus Areas	
Environmental	13
Safety	2
Workplace Efficiency	6
Other	7
Total	**28**

Albany (1)
Athens (1)
Atlanta (2)
Cairo (1)
Cumming (3)
Duluth (1)
Flowery Branch (1)
Gainesville (10)
Lula (2)
Marietta (1)
Oakwood (1)
Rockmart (1)
Stillmore (1)
Tucker (1)
Woodstock (1)

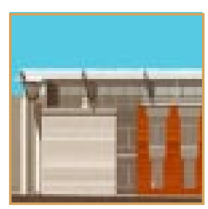
Georgia Tech's Food Processing Technology Research Facility project moved ever closer to reality this past year with the completion of the preliminary design phase of the project and the securement of additional industry and state support to complete fund raising for Phase I of the project.

Food Processing Technology Research Facility at Georgia Tech

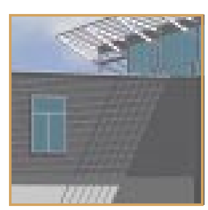
At the start of the fiscal year, the project was approximately $1 million short of the needed funding to begin construction of Phase I of the design. Through the continued generosity of Georgia Tech's industrial partner base, five new sponsors made pledges totaling $475,000 in FY 2002. These new sponsors were Tyson Foods, Cryovac, Crider, BOC/Thinkage, and Meyn. They joined the project's other 10 corporate sponsors, Gold Kist, ConAgra, Cagle's, FMC FoodTech, Mar-Jac Poultry, Claxton Poultry Farms, American Proteins, Wayne Farms, Seaboard Farms (now part of ConAgra), and Stork Gamco, in providing nearly $1.5 million in support for the project. Additional funding support was also secured from the state of Georgia through a coordinated effort with the Georgia Poultry Federation. The remaining funding needed for Phase I was secured from interest earned on university monies being held in support of the project.

With funding firmly in hand for Phase I, the architects were able to proceed with preliminary design in September 2001. This effort has added additional detail to the schematic design approved last spring and has moved the project to the point where contract documents can soon begin to be assembled for the construction bidding process. The schedule currently calls for the Phase I structure to break ground in January 2003.

The Phase I facility will be a 35,000-square-foot structure with laboratory and office facilities for research and development in the areas of automation technology, information technology, and environmental systems. A 50-seat auditorium and meeting facilities that can be used by industry and vendor groups will be included as well as a lower lobby outfitted with interactive computer kiosk systems to entertain and inform school and visitor groups about the growing role of technology in the poultry and food processing industries.



Phase II, which will be completed at a later date, will house additional laboratory and office facilities for human factors, food safety, and bioprocessing research.



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The five-year goal of the Agricultural Technology Research Program (ATRP) at Georgia Tech is to continue to provide state-of-the-art applied engineering research and service to the poultry industry. The research program will continue to focus on automation, information technology, environmental, and safety areas, while service activities will continue to concentrate on broad information dissemination and one-on-one general assistance.

ATRP Five-Year Plan

Automation/electronics research studies over the next five years will begin focusing more heavily on integrated automation systems. These technologies offer major opportunities to further enhance productivity in the poultry industry. Research is also needed in developing advanced sensor technologies. With computerized process control rapidly emerging in the industry, information management is another area where better technology development is needed to address the specific demands of the industry.

Information technology research studies will expand their focus on enterprise integration and internal support services. Wearable computers will continue to form the backbone of efforts to link operations across the factory floor. In addition, work will begin toward developing artificial reality tools to assist in transferring information for dynamic support and training.

Environmental research studies will continue to focus on emerging technologies that help to reduce water usage and waste generation. Furthermore, these studies will focus on enhancing our understanding of how operations work and ways to further optimize them. Water usage is an area that has experienced rapid growth in recent years as plants turn to additional product-rinsing steps to control product microbial quality. Minimizing this additional water demand is essential as water resources continue to be squeezed around the state. Waste minimization also continues to be a national focus area, and the poultry industry has an opportunity to further enhance its image as an efficient user of resources.

Safety research will continue to take two paths. Personnel safety research will focus on continuing to find ways to reduce the risk of worker injury. The current research into risk quantification is a bold initiative and one that should pay dividends for years to come. The industry needs a better scientific base for assessing the true risk of injury. Product safety research, on the other hand, will attempt to develop technologies to improve control over process and product quality. The development of novel HACCP control technology has become a major new program thrust area.

Finally, ATRP will continue to actively support industry needs through its technical assistance program and will use newsletters, seminars, research reviews, topical reports, research reports, technical papers, and articles in industry trade publications to transfer its research findings. The program will also work to promote a better understanding of and appreciation for Georgia's dynamic poultry industry and will work to promote the increasing opportunities for engineering and technical careers in the industry.

FY 2002
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