

AGRICULTURAL TECHNOLOGY RESEARCH PROGRAM



ENGINEERING TOMORROW'S POULTRY AND FOOD PROCESSING INDUSTRIES

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MISSION STATEMENT

To promote the economic growth of Georgia 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.

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The Year in Review

Fiscal Year 2005 was an exciting and productive year for the Agricultural Technology Research Program (ATRP). While it will certainly be remembered as the year that the new Food Processing Technology Building was completed and dedicated, it will also be remembered as a year in which a number of leading edge technology development initiatives began reshaping the way in which future processing and production systems will support the needs of agribusiness and poultry operations.

Our ongoing efforts to develop a portable biosensor to monitor and control microbial contamination in processing operations proved the perfect foundation for initiating a new thrust in the animal disease screening area. Working as part of a research consortium that successfully secured a U.S. Department of Agriculture (USDA) CAP (Cooperative Agricultural Project in Animal and Plant Security) Grant on "Prevention and Control of Avian Influenza (AI) in the U.S.," ATRP's biosensor research group teamed with the Southeast Poultry Research Laboratory (SEPRL) of USDA in Athens, GA, on studies aimed at developing and optimizing AI assays for use on the biosensor. This groundbreaking work promises to deliver a field deployable detection device that will provide those collecting samples with results while the animal is still in their control.

ATRP's recent successes in developing an array of innovative imaging systems for process screening and control applications have led to a number of new thrusts on emerging imaging concepts that promise to broaden the value of on-line imaging to processors. Recent 3D imaging research has delivered innovative ways of merging 3D shape data capture with 2D quality grading data capture using the same imaging cell. In addition, field trials have begun showing the value of emerging infrared camera technologies in screening and controlling cooking operations, and system development efforts are nearing completion on another non-visible light imaging concept to enhance package safety screening.

Our Taylor vortex UV (ultraviolet) disinfection research is revealing the strength of this concept as a replacement for conventional chemical disinfection on in-process water recycling circuits. In addition, it is showing itself to be a valuable competitor to thermal pasteurization in disinfecting marinades, brines, and fruit juices due to its potential ability to reduce the negative impacts of pasteurization on product quality.

And our smart processing and augmented reality efforts are likewise generating excitement. Ongoing studies to improve the ability of robotic systems to take high pressure washdown together with efforts to produce dynamic handling and processing systems that deliver robotic flexibility and performance without a robot are drawing the attention not only of food processors, but also of robot manufacturers. Meanwhile, our laser-based augmented reality research is demonstrating new ways to streamline communication between digital databases and humans on the processing floor.

But without question the high point of FY 2005 was the opening of the new Food Processing Technology Building. This new home to the Agricultural Technology Research Program was completed in March and dedicated May 19 in a ceremony attended by over 100 invited guests. At the ceremony, Georgia Governor Sonny Perdue, University System of Georgia Chancellor Thomas Meredith, Georgia Tech President Wayne Clough, and Georgia Poultry Federation President Abit Massey all praised the public-private partnership behind the construction of the facility and extolled the important role this facility will play in future technology exploration and innovation for this important economic sector. Representatives from 17 companies whose donations helped to underwrite the construction of the building were recognized at the ceremony. In addition, a group of local science fair winners from a neighboring elementary school got a chance to see this state-of-the-art research facility up close along with the governor as part of the first group of visitors to tour the newly dedicated facility.

As we look ahead to FY 2006, let me take this opportunity to thank all of our supporters and partners who helped make FY 2005 a truly memorable year.



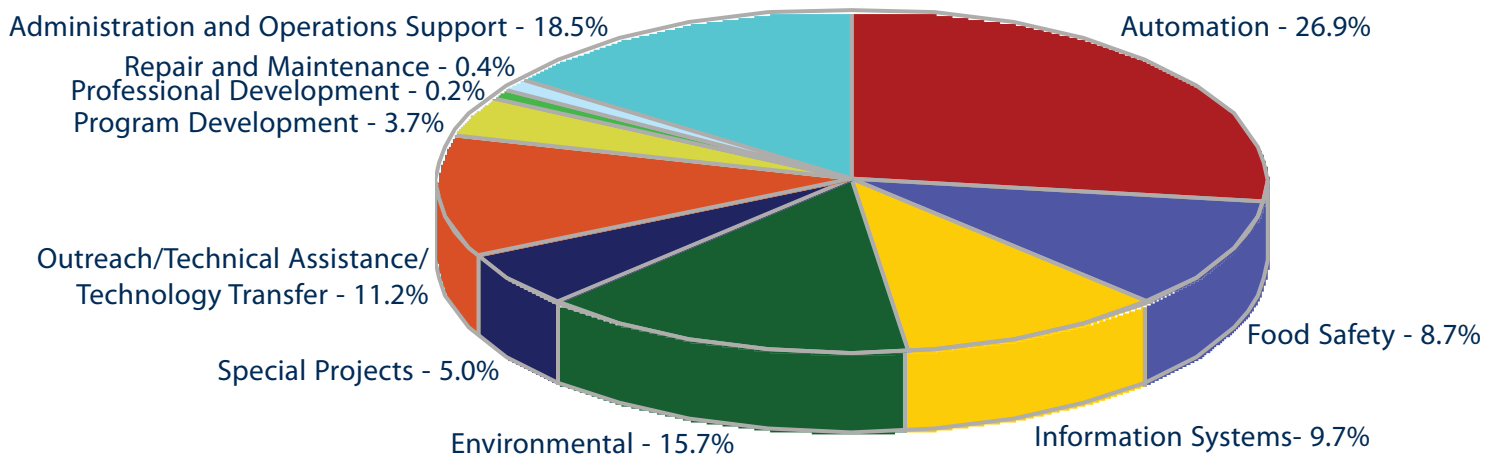

Financial Summary

Fiscal Year 2005 marked the third consecutive year of state funding cuts due to tight economic conditions. Overall, the program has been forced to absorb a 15% funding reduction over this span, and in response, reduced the slate of research projects implemented in FY 2005 and relied even more on industrial partners to help support some of the underwriting of prototype hardware.

In all, six major project initiatives were undertaken in four research focus areas in FY 2005: advanced automation technologies, food safety technologies, environmental engineering and management, and information systems technologies. In addition, monies were set aside for outreach and technical assistance/technology transfer, one special project, professional and program development, administrative and operations support, and repair and maintenance functions.

Over 60% of the FY 2005 program budget was channelled toward research. In addition, over 40% of the remaining program budget was channelled toward outreach and technical assistance/technology transfer and special projects.

FY 2005 BUDGET MIX: \$1,574,394



Industrial Partnerships

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

Poultry Advisory Committee (FY 2005)

Vernon Owenby, Tyson Foods, Inc. – Chair

Steve Bass, Pilgrim's Pride Corporation

Delane Borron, Gold Kist Inc.

Bill Crider, Crider Poultry, Inc.

Barry Cronic, Columbia Farms

Richard Curvin, Gold Kist Inc.

Kevin Custer, American Proteins, Inc.

Mark Ham, Cagle's Inc.

Guy Hinton, Wayne Farms LLC

Wayman Hollis, Hall Equipment Co., Inc.

Richard Jamison, Perdue Farms

Mike Lacy, University of Georgia

David Massey, Tyson Foods, Inc.

Gene Parets, Gainco, Inc.

Ron Rogers, Wayne Farms LLC

John Seibel, Claxton Poultry Farms

Steve Smith, FMC FoodTech

Jamie Usrey, Stork Gamco Inc.

Phil Wilkie, Kings Delight

Joel Williams, Mar-Jac Poultry, Inc.

Ex Officio:

Mike Giles, Georgia Poultry Federation

Abit Massey, Georgia Poultry Federation

James Scroggs, Georgia Poultry Laboratory Network

J. Craig Wyvill, Georgia Tech Research Institute

Industrial collaborators help provide direction and support to the specific research projects undertaken. They also participate directly in research projects by providing access to industry facilities for data collection and systems testing and contributing in-kind and cash support on an as-needed basis.

Industrial Collaborators (FY 2005)

Intelligent Cutting and Handling System

Gold Kist Inc.

Tyson Foods, Inc.

Automatic Intelligent Transfer System

Stork Gamco Inc.

3D Imaging Technology

Gold Kist Inc.

Tyson Foods, Inc.

Advanced Environmental Systems

American Proteins, Inc.

Gold Kist Inc.

Wayne Farms LLC

Advanced IT Systems

Durand-Wayland, Inc.

Gold Kist Inc.

U.S. Poultry & Egg Association

Biosensor Enhancement and Evaluation

Gold Kist Inc.

Tip Top Poultry Inc.

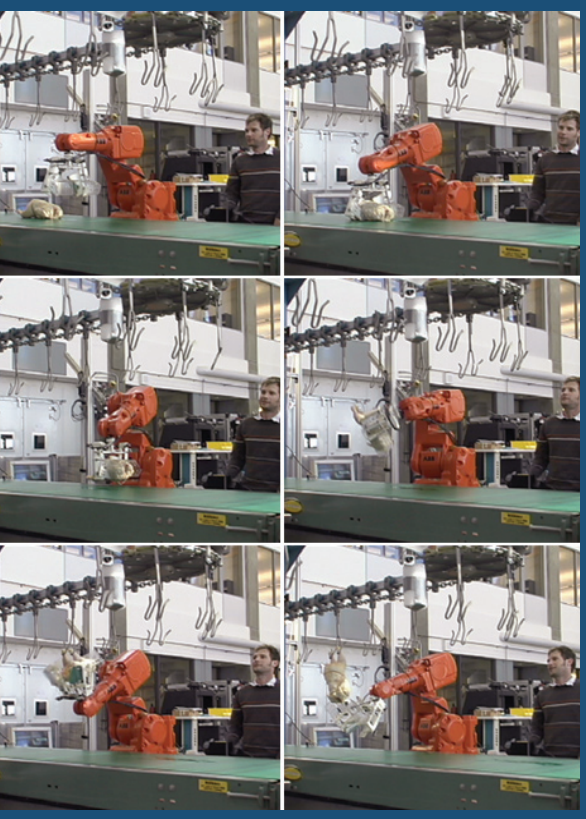
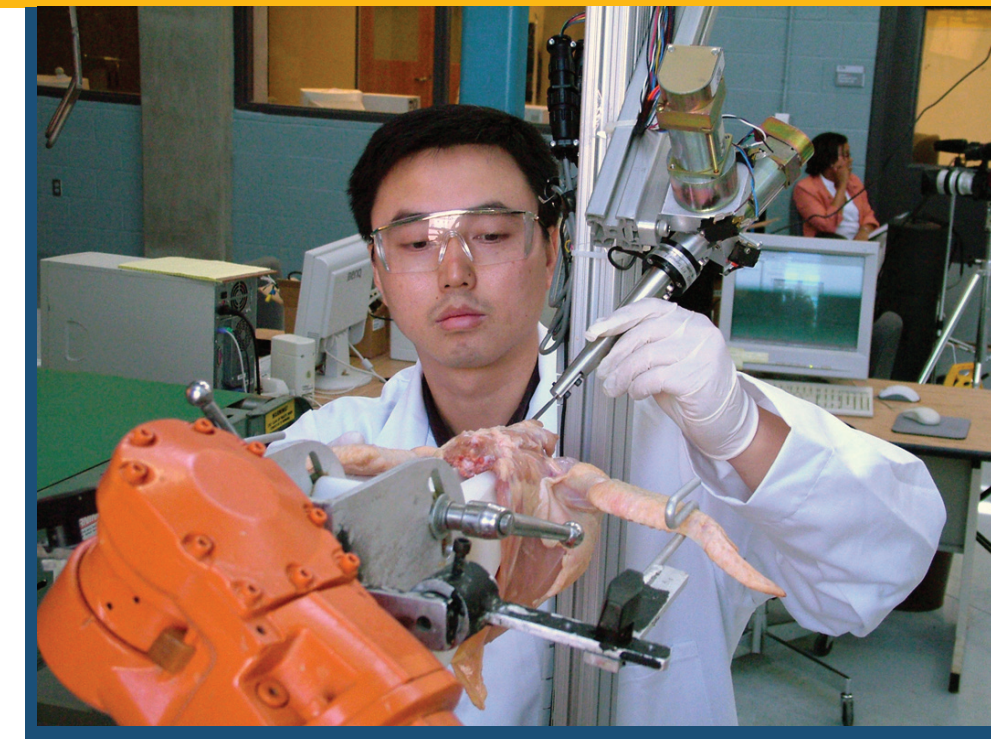
Wayne Farms LLC

Intelligent Cutting and Handling System

Researchers continued work on the development of advanced control algorithms to perform meat cutting tasks in real time while adapting to the anatomy of each bird. To achieve this goal, the research team focused its work on two areas: the development of a simple cutting device to allow for the testing of advanced control algorithms and the development of the control algorithms themselves.

A 2-axis servo control manipulator serves as the cutting device. During testing, the bird was placed on a 6-axis research robot that performed a preprogrammed set of motions to simulate a bird on a cone.

The 2-axis manipulator uses a force-torque sensor to determine forces at the knife, and the controller adjusts the path of the knife accordingly. The design proved very capable of performing the scapula cut for a wide variety of bird sizes.



The team also developed, assessed, and tested control algorithms (cutting models) that can accurately predict the cutting forces regardless of the knife parameters (sharpness, velocity, and cutting angle) and the material being cut (meat, ligament, or bone). This will not only improve the yield, but also allow operators to optimize the cutting system to maximize the cutting efficiency with respect to the time consumed and task performed. The compressive and shear forces generated in cutting were initially tested using a potato, but were quickly expanded to meat in later experiments.

A companion research effort to develop a smart rehandler for the chiller area was also undertaken. The project focused on controls development to pick up a moving carcass and to synchronize its transfer to a moving shackle line.

Both efforts teamed with the 3D imaging project in introducing 3D data for manipulator control.

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Automatic Intelligent Transfer System

Research efforts continued toward developing a system for transferring live birds from a moving conveyor belt to a moving shackle line. The project team developed new methods for integrating the processes of grasping birds from a moving conveyor, correcting their orientation, and loading both feet of the grasped bird accurately onto the mechanical inverter for subsequent shackling and humane killing.

The team also designed and built an overhead conveyor to transport a number of equally spaced graspers (each of which consists of a pair of rotating hands) and developed a mechanism to grasp a bird

from a moving conveyor. Once the bird is grasped by its body, the mechanical hands continuously cradle the bird for the subsequent handling processes (reorientation, loading onto the pallet, shackling of both legs, and locating the head for the humane killing step).

The research team also designed a vision-guided magnetic actuator to correct the orientation of the grasped bird and improved the vision system algorithm so that it reliably determines the bird orientation within a period of 1 second (less than the cycle time of the mechanical inverter). Within this period, the vision algorithm completes the calculation and sends an actuating signal to the magnetic actuator to correct the bird orientation.

Finally, the mechanical inverter was modified to accurately locate both legs of the grasped bird for shackling. The modification provides a means to locate the head of the grasped bird.

Birds' reflexes to each of the processes mentioned above were further studied at the University of Georgia's experimental processing plant.



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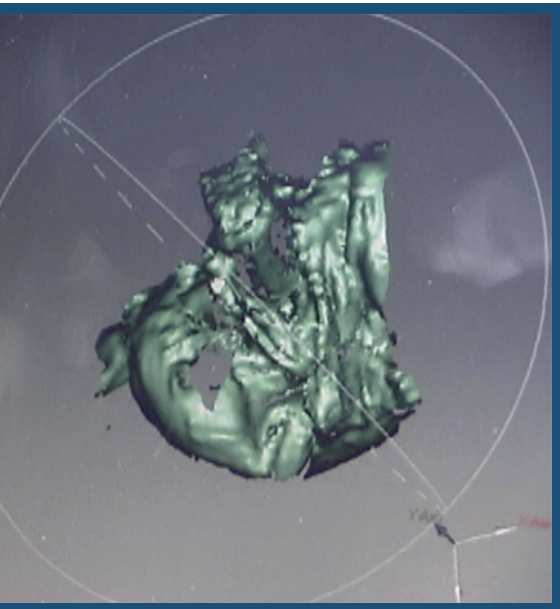
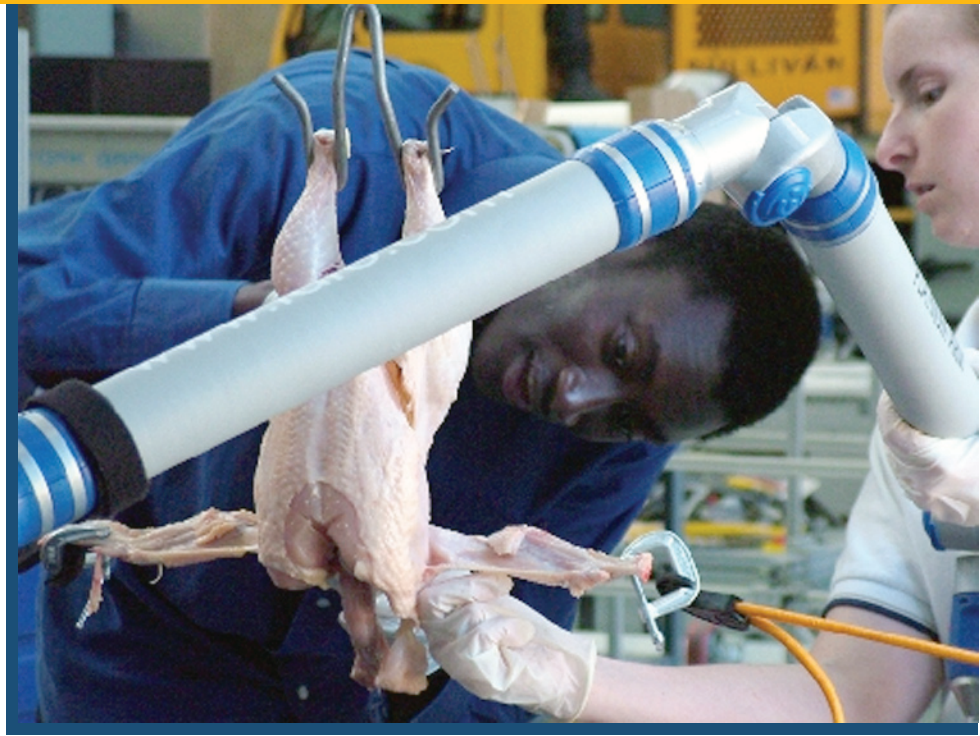
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3D Imaging Technology

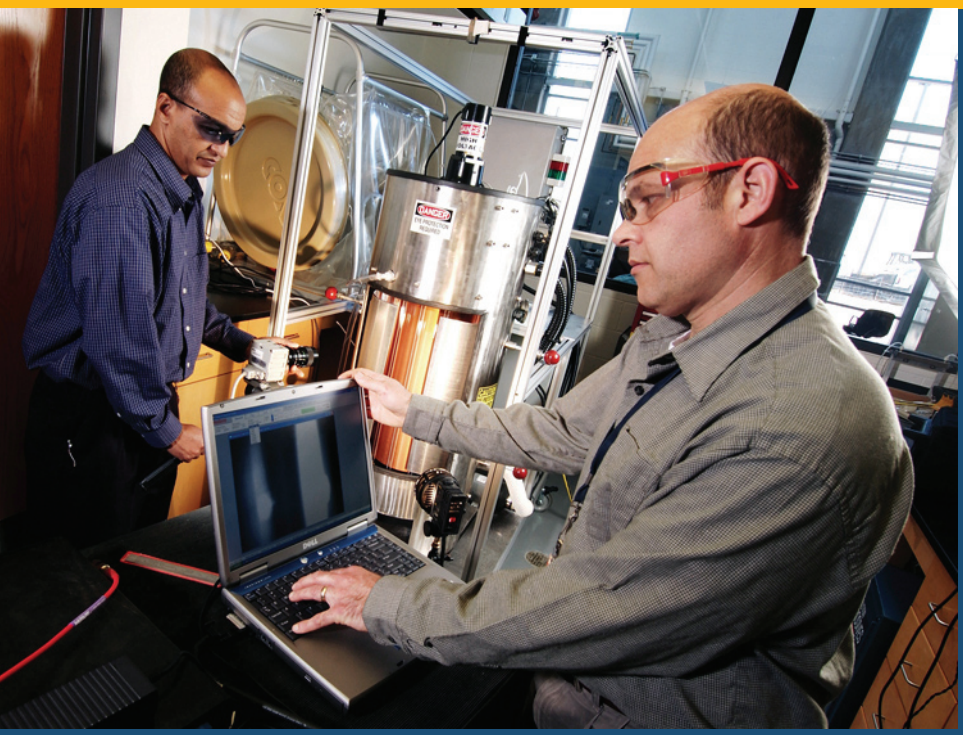
The design of next generation automation to enhance processing efficiencies, especially in second processing, requires the further integration of sensors that will allow equipment to recognize product variability for process control. These applications span the gamut from handling and cutting to sorting. The work performed on this project investigated and developed techniques for 3D sensing for machine guidance. Additionally, researchers explored the possibility of using other sensing modes such as IR (infrared) and UV (ultraviolet) for process control.

Researchers demonstrated the ability to extract and use 3D information from a 3D stereo imaging system for two applications. The first involved a prototype work cell for loading WOGs (carcasses without giblets) leaving the chiller. For this application, the research team needed to be able to locate the presence of a WOG in a viewing area and to determine its orientation (whether or not it was up, down, or on its side). The team also focused on determining the position of the legs as well as the body centroid. With this information, the team was able to direct a robot to reliably grasp the bird and place it on a shackle. The second application focused on a deboning development prototype that used external features to estimate the position of internal locations (for example, joints and tendons) that are key to effective deboning.

In addition, the research team developed a structured lighting system for analyzing the height profile of belt-conveyed product in correlation to a visible image. This will be useful, for example, in estimating core temperature where an estimate of product thickness is needed by thermal models. Researchers have also evaluated the use of ultrasonics for height profile analysis.



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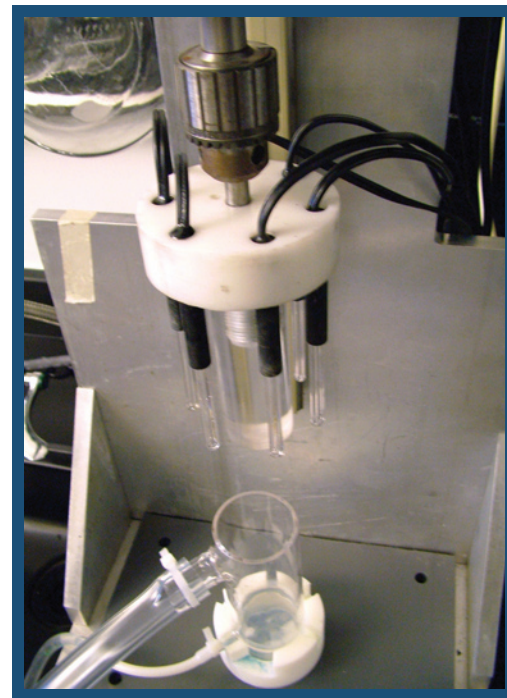


Advanced Environmental Systems

Environmental research continued to focus on technology innovation to facilitate water reuse and to improve wastewater pretreatment. Chiller and scalding overflows periodically obtained from a variety of processing plants were characterized to assess typical bacterial loadings, chlorine content, suspended solids, and turbidity. For chiller overflows, the goal was to establish the economics of filtration needed to optimize UV (ultraviolet) disinfection. For scalding overflows, researchers focused on determining the filtering requirements needed to optimize energy extraction and nutrient removal.

Industry familiarity with traditional chlorine-based chemistries highlights several opportunities and challenges for poultry and food processing applications. Researchers worked to determine the presence and concentrations of chlorine species and other anions that result from combining traditional chlorine-based treatment methods (e.g., hypochlorite, sodium chlorite, and chlorine dioxide) with ultraviolet light, electrolyzed oxidation (EO) water, and fluid hydrodynamics control. The research team's goal was to establish key compounds associated with chlorine-based chemistries and optimize compound formation through novel approaches and technologies that involved the Taylor vortex UV advanced disinfection system. Work focused on establishing its effectiveness in disinfecting chiller water recycle and assessing opportunities for disinfecting storm water.

Wastewater capacity studies assessed the impact of scalding overflows on total effluent quality. In this area, studies centered on scalding overflow concentrations in an effort to develop advanced pretreatment processes that will remove chemical/biochemical oxygen demand as energy and capture nitrogen and phosphorus as a concentrated fertilizer.



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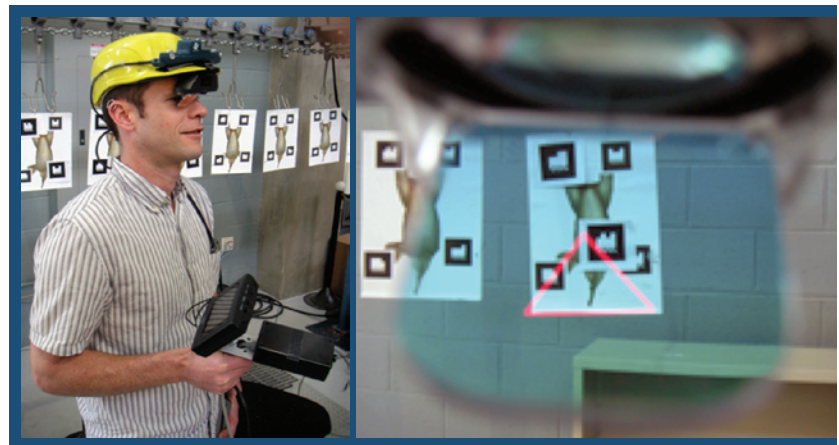
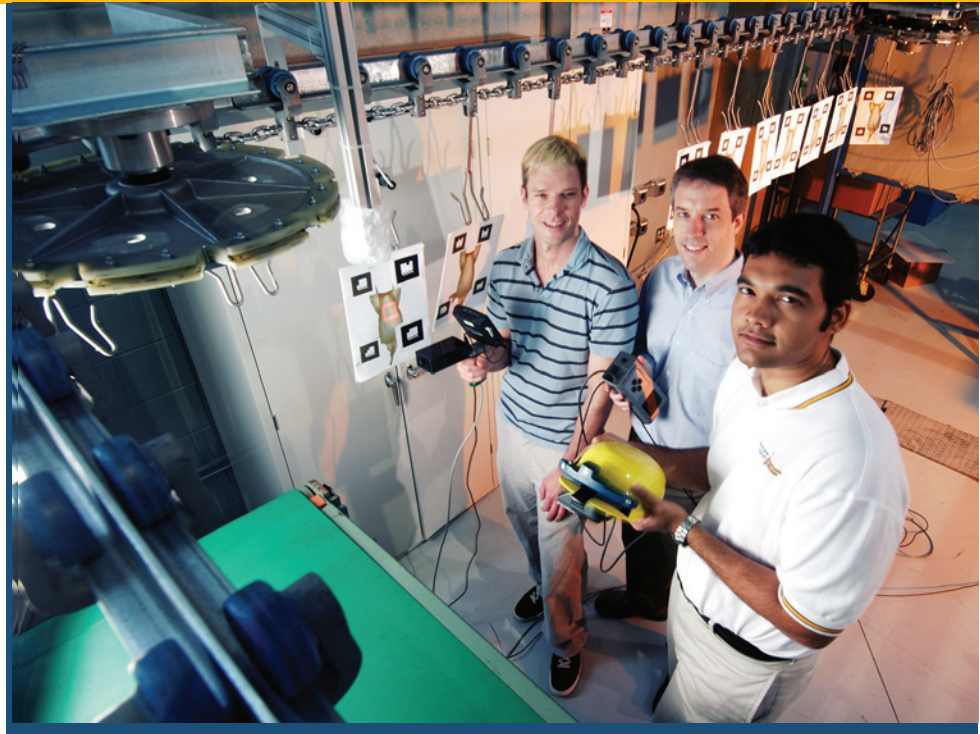
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Advanced IT Systems

Advanced information technology research activities were distributed among four areas: augmented reality, plant process technology and development, RFID (radio frequency identification) tag technology, and bird tracking and process modeling.

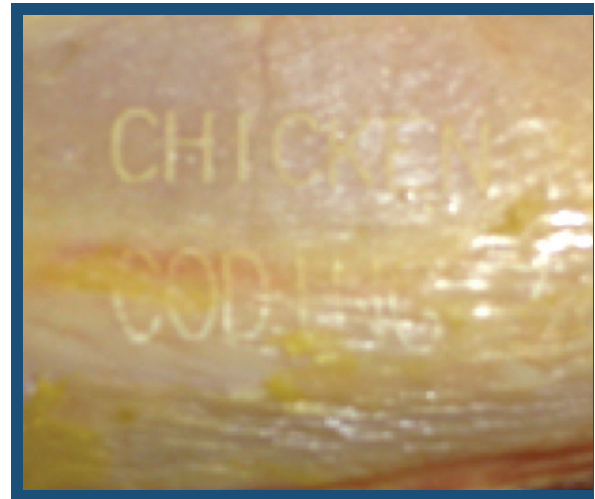
Augmented reality research focused on improving communication between inspectors and plant trim personnel by supplementing or replacing existing verbal and hand gesture communication with two new technologies. The first system uses a laser to overlay a graphic on each bird indicating what trim actions are required. In the second system, a head-mounted display and camera are integrated with a position tracking system to identify where the trimmer is looking and then overlay trim information onto that real-world view. In both cases, the trimmer can take appropriate action based on the augmented information. The development and integration of these technologies into poultry processing is very challenging, but it presents a significant opportunity as processing becomes more automated and data capture by such technologies as computer vision delivers more real-time information that can be used by line personnel. Full prototype systems of both technologies were developed and built followed by laboratory testing and evaluation.



The plant process and RFID tag research involved investigating how the poultry industry is currently using these technologies and identifying potential performance issues impeding greater use. The objectives of the plant process research were to understand the capabilities of existing process control software packages such as Infinity QS and Wonderware, and identify opportunities for research and development within these frameworks. With RFID technology, there are still some underlying technological hurdles that must be overcome in order for it to be successful on a broad scale. These include the reliability of writing to the tags (failure rates), the robustness of the tags to physical and environmental effects (are they tough enough to survive in the plant environment), and their ability to work with products that contain high concentrations of water, among other things. Cost is certainly a major consideration as well, and the logistics of managing the information is no easy task.



The goal of the bird tracking research was to explore novel ways of tracking a bird all the way through the plant from slaughter to pack out. This would enable actual process yield determinations rather than aggregated results or sampling estimates. Laser marking, which has been used in fruit, was one of the major targets evaluated for this purpose. However, the efficacy of this approach does not appear promising as the bird flesh is not rigid enough to hold the marking. It still remains an interesting concept that may have limited potential in select tracking applications where the viewing angle and lighting can be optimally controlled.



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Biosensor Enhancement and Evaluation

Researchers continued the development of a rapid, robust, and rugged immunoassay for foodborne bacteria; initiated tests of field-collected process water samples; and began design and fabrication of a multichannel sensor module that can be implemented as a process control tool within the poultry processing environment.

Investigation of the sensitivity, selectivity, reproducibility, and regeneration capability of the immunoassay for both viable and nonviable *Campylobacter* was carried out in collaboration with Dr. Mike Doyle (University of Georgia). Proof-of-principle experiments using a commercially available antibody also demonstrated detection of *Listeria monocytogenes*.

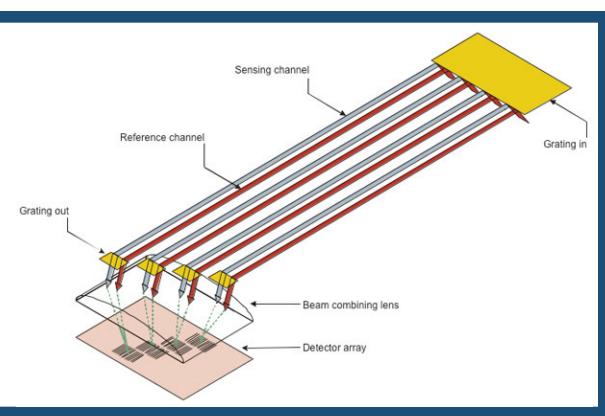
In partnership with Gold Kist, a field-collected sample (scalding and chiller water) assessment was performed. Results of both unspiked and *Campylobacter*-spiked samples were compared to total plate count and specific pathogen assays. Characterization of the chemical composition of the samples was done to determine the impact of sample medium on the biosensor results. Filtering and sample treatment protocols were also assessed. Even the most turbid and heterogeneous samples were amenable to biosensor testing without clogging or biofouling, providing results in under an hour,

although the specific data are still being correlated and evaluated.

Development of a next generation prototype incorporating a new optical and mechanical design, as well as new software, was carried out with and supported by AIMS Technologies (Oak Ridge, TN). This work also involved design of 4-channel and 8-channel multi-interferometer waveguide chips, based on a novel staggered gratings design, that will broaden and simplify assay development and use.

Finally, modeling of fluid flow within the flow cell to quantify the impact of diffusion of bacteria from the sample solution to the sensor surface was performed. This was used to investigate new flow cell designs that can be used to decrease the boundary layer that hampers mass transport or increase turbulent flow within the flow cell.

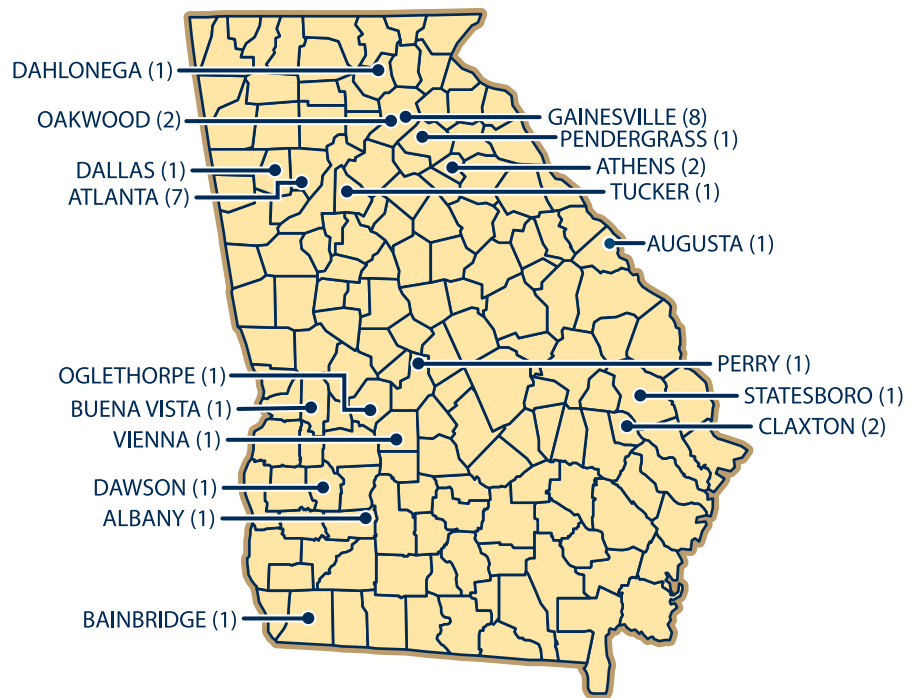
Midway through FY 2005, the research team also successfully secured external grant funding, as part of a multi-university research consortium, to explore the use of its biosensor as a portable screening device for avian influenza.



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Technical Assistance

Thirty-four technical assists were provided to firms and individuals in the poultry industry 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 on their findings and recommendations. The program uses input from these assists to gauge situations calling for new research initiatives.



FY 2005 ATRP Technical Assistance (34 total)

Environmental	12
Safety	12
Workplace Efficiency	4
Other	6

Special Project

ATRP initiated one special project in FY 2005. The project focused on developing a test protocol for evaluating the common range of detection accuracy for commercially available metal detectors over a range of products and metal fragment types. The work was initiated at the request of Gold Kist. The protocol development was undertaken by Dr. Brani Vidakovic, a professor in Georgia Tech's School of Industrial and Systems Engineering, working closely with ATRP staff, Gold Kist, and four major metal detector equipment manufacturers. The protocol will be used to secure extramural funding to conduct testing and to generate a performance efficiency guide.

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Technology Transfer

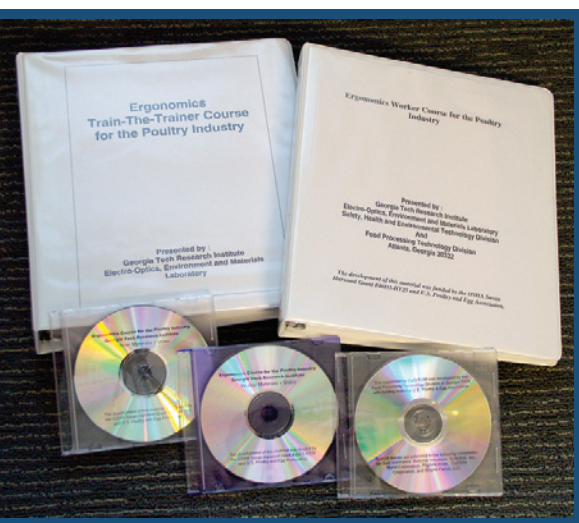
ATRP continued an active technology transfer program. Three issues (Environmental, Safety, and Automation) of the program's newsletter *PoultryTech* were published; two articles (1 from the Automation issue and 1 from the Safety issue) were reprinted in *Poultry International*. Subscriptions to the newsletter totaled more than 1,500 subscribers, including more than 240 subscribers from foreign countries. Two feature articles focusing on Emerging Technologies (Biosensors and Water Recycling/Reuse Systems) were written for WATT PoultryUSA. The FY 2004

Annual Report was published, and the ATRP website was further enhanced by refining its corporate-like design and updating project videos.



ATRP 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 held for the fourth year in its new home (a permanent structure resembling a miniature poultry house) at the Georgia National Fairgrounds in Perry, with Georgia Tech supporting the Georgia Poultry Federation in helping coordinate volunteers and in continuing to update the displays in the exhibit. In conjunction with the Georgia Poultry Federation, the National Chicken Council, and the National Turkey Federation, ATRP hosted the 2005 National Safety Conference for the Poultry Industry in Ponte Vedra Beach, FL, attracting 125 safety professionals and exhibiting vendors from across the United States.

The program also provided coordination support for a major safety training initiative funded by the Occupational Safety and Health Administration (OSHA) and the U.S. Poultry & Egg Association. The training program focused on developing video material and training modules on effective ergonomic techniques predicated around OSHA's Poultry Ergonomic Guidelines. ATRP coordinated the video shoots and set up the first four train-the-trainer training sessions in Atlanta, GA (2 sessions held), Baltimore, MD, and Fayetteville, AR. In all, more than 200 trainers attended these sessions, and more than 11,000



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Publications and Presentations

Trade Publications

Stewart, J. September 2004. Non-contact temperature monitoring in poultrymeat processing. *Poultry International*. 43(10):30, 32.

Wyvill, J.C. August 30, 2004. Moving emerging technology into mainstream. *Poultry Times*. LI(18):4, 9.

Wyvill, J.C. and D.S. Gottfried. September 2004. Biosensors: Speeding up the detection of pathogens. *WATT PoultryUSA*. 5(9):30-32, 34.

Wyvill, J.C. and J.A. Pierson. December 2004. Water recycling & reuse: Flood of recycling technologies. *WATT PoultryUSA*. 5(12):40, 42, 44-49.

Wyvill, J.C. and D.S. Gottfried. February 2005. Biosensors: Speeding up the detection of pathogens. *Poultry International*. 44(2):20, 22, 24, 26.

Journal Articles

Rajaraman, S., H.-S. Noh, P.J. Hesketh, and D.S. Gottfried. 2005. Rapid, low-cost microfabrication technologies toward realization of devices for dielectrophoretic manipulation of particles and nanowires. *Sensors and Actuators B*. In press.

Conference Proceedings

Lan, C.-C. and K.-M. Lee. 2005. Generalized shooting method for analyzing compliant mechanisms. *Proceedings of the 2005 IEEE ICRA, Barcelona, Spain, April 18-22*. On CD-ROM.

Socha, K.G., G.V. McMurray, W.D. Holcombe, and H. Lipkin. 2004. Design of a compliant end effector for grasping non-rigid materials. *Proceedings of the International Conference on Intelligent Manipulation and Grasping, Genoa, Italy, June 30-July 2*. pp. 253-258.

Lectures and Presentations

Bodurow, C.C., D.P. Campbell, D.S. Gottfried, J.M. Cobb-Sullivan, J. Xu, and K.C. Caravati. 2005. A low-cost, real-time optical sensor for environmental monitoring and homeland security. *Environmental Protection Agency, Science Forum, Washington, DC, May 16-18*.

Doyle, M., T. Zhao, and D.S. Gottfried. 2005. Development of waveguide immunoassay for *Yersinia pestis*. *U.S. Food and Drug Administration, Extramural Grants Annual Meeting, College Park, MD, May 10-11*.

May 10-11.

McMurray, G.V. 2004. Calibration free vision guided robotic control. *Robotics Industry Association, Machine Vision for Robot Guidance Workshop, Nashville, TN, October 5*.

Stewart, J.M. 2004. Future technologies. *U.S. Poultry & Egg Association, 2004 Information Systems Seminar, Myrtle Beach, SC, July 28-30*.

Wyvill, J.C. 2004. An overview of GTRI's food research activities and an update on FoodPAC. *Georgia Power Company, Atlanta, GA, August 31*.

Wyvill, J.C. 2004. Emerging technologies for improved food processing safety and quality. *Georgia Association for Food Protection, Atlanta, GA, September 14*.

Wyvill, J.C. 2005. Dynamic process control in poultry processing and the technology tools helping to make it possible. *Poultry Science Department, University of Georgia, Athens, GA, March 21*.

Wyvill, J.C. 2005. GTRI's food processing technology research. *Siemens Corporation, Atlanta, GA, March 29*.

Wyvill, J.C. 2005. An overview of food processing research at GTRI, *Italian Study Exchange Group, Dunwoody Rotary Club, Atlanta, GA, April 19*.

Wyvill, J.C. 2005. The food processing technology building at Georgia Tech: driving technology innovation. *Georgia Poultry Processors Association, Atlanta, GA, April 19*.

Wyvill, J.C. 2005. An overview of Georgia's food processing industry and its growing technology needs. *Technology Association of Georgia, Atlanta, GA, May 20*.

Xu, J. and D.S. Gottfried. 2004. Rapid and quantitative *Campylobacter* detection using an interferometric biosensor. *International Association for Food Protection, Annual Meeting, Phoenix, AZ, August*

Food Processing Technology Building at Georgia Tech

Georgia Governor Sonny Perdue officially dedicated Georgia Tech's new Food Processing Technology Building in a ceremony held May 19, 2005. The state-of-the-art facility houses more than 36,000 square feet of laboratory and office space dedicated to the development of new and emerging technologies for the food processing industry.

"Innovations are making lives better and moving industry forward," said Governor Perdue. "This facility will be a great place to develop the future of food processing and test prototypes of products that people will want, and will help Georgia grow jobs in the value-added agricultural fields."

The facility contains offices and research laboratories for automation, information, and environmental technology development; a 4,370-square-foot high-bay prototyping area; a 48-seat auditorium; a large conference room for industrial and organizational meetings and events; and an interactive lower lobby exhibit highlighting the growing role technology is playing in food and poultry processing operations.

The new building serves as headquarters for the Food Processing Technology Division of the Georgia Tech Research Institute (GTRI), the nonprofit applied research arm of Georgia Tech. The division conducts significant industrial research under two major programs: the Agricultural Technology Research Program (ATRP) and Georgia's Traditional Industries Program for Food Processing, which is managed through the Food Processing Advisory Council (FoodPAC).

Abit Massey, president of the Georgia Poultry Federation, spoke of the industry's long-standing relationship with ATRP. "This is the most exciting day ever for the Georgia Poultry Federation, which has had more than a 30-year relationship with the program. The program benefits all aspects of industry, and is a classic example of a public-private partnership."

"The completion of the Food Processing Technology





Building marks the start of a new era for Georgia's food processing research activities," said J. Craig Wyvill, division chief. "The building is expected to serve as a cornerstone for multidisciplinary research and development that creates innovative new technology designs for the food industry."

"We want this facility to be a focal point also for joint university collaboration and for collaboration with technology companies wanting to expand or initiate efforts focused on the food industry," added Wyvill.

In addition to its main focus of driving technology innovation, a major

goal of the facility is to foster outreach and educational activities that introduce the community and educational groups to the food processing industry. A special highlight of the ceremony was the attendance of 30 science fair winners from nearby Centennial Place Elementary School, a theme school for science, mathematics, and technology. The students joined the Governor for one of the first tours of the building.

Other officials who spoke at the ceremony were University System of Georgia Chancellor Thomas Meredith and Georgia Tech President Wayne Clough. The Reverend Dr. Cameron Alexander, pastor of Antioch Baptist Church North, delivered the invocation. GTRI Director Steve Cross served as master of ceremonies.

The ceremony was attended by more than 100 guests, including agri-business executives, state and local officials, university researchers, and community leaders.

The \$7.3 million facility was funded through state-issued bonds and private sources that included pledges and donations from 17 corporate donors. It is the first new GTRI facility to be built in more than 20 years, and marks the completion of the first phase of a two-phase construction project. A campaign is already under way to raise an additional \$3 million needed to construct the Phase II addition, which will add 10,000 square feet for offices and laboratories for human factors, food safety, and bioprocessing research.



Agricultural Technology Research Program: Five-Year Plan

The five-year goal of the Agricultural Technology Research Program (ATRP) at Georgia Tech is 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.

Automation/electronics research studies over the next five years will focus heavily on integrated, “intelligent” automation systems. These systems offer major opportunities to further enhance productivity in the poultry industry. They incorporate advanced sensors, robotics, and computer simulation and control technologies in an integrated package and tackle a number of unique challenges in trying to address the specific needs of the industry. Research will also continue in the area of computer vision. As a leader in this exciting research field, the program has already introduced several commercially viable designs. Work has also begun focusing on the emerging areas of stereo 3D, IR (infrared), and UV (ultraviolet) imaging concepts. These technologies, perhaps more than any other, offer the potential to revolutionize the way in which processes are controlled and optimized.

Information technology research studies will continue focusing heavily on streamlining the flow of information among machines, people, and the integrated enterprise. Efforts to work with statistical process control and database management concepts will continue, as will studies to enhance the performance of emerging tracking tools such as RFID (radio frequency identification) tags. The program will also continue to develop practical augmented reality tools capable of simplifying the dynamic transfer of information among production workers, databases, and processing equipment.

Environmental research studies will continue to focus on emerging technologies that help to reduce water usage and waste generation. Improved recycling technologies, in particular, will continue to be pursued to assist not only in recycling water, but also in recycling marinades, brines, etc., thereby reducing their impact on waste treatment operations. Studies will also continue focusing on enhancing the program’s understanding of how waste is generated and how to more effectively remove it from air and water streams. And finally, efforts will expand into the area of value-added byproduct recovery.

Safety research will continue to take two paths. Personnel safety research will focus on finding new ways to reduce the risk of worker injury. The research previously conducted into ergonomic risk quantification demonstrated the value of technology in addressing this challenge. The industry needs a more scientific base for assessing and controlling injury, and the program is committed to helping with this pursuit. Product safety research, on the other hand, will continue to focus on technologies to improve control over process and product quality. The program’s efforts to develop an innovative biosensor have been groundbreaking and are transitioning into exploratory studies designed to use it and other such sensing technologies as screening and control systems for microbial intervention and water recycling processes.

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 and expertise. 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.

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