The Georgia Tech Research Institute’s (GTRI) Poultry Deboning Line Screening System is one step closer to making its way to processing plants. The initial steps of technology transfer are underway as Gainco Inc. has begun commercial testing of the system. The technology transfer arrangement enables Gainco, a Gainesville, Georgia-based equipment developer for the poultry, meat, and seafood processing industries, to use the automated vision-based system as part of its proprietary YieldScan™ Rapid Yield Analyzer.

The first of its kind for the poultry industry, Gainco hails the YieldScan™ as a revolutionary product that will take deboning line operations to new levels of accuracy and productivity in yield detection management. Yield detection involves measuring the amount of meat removed from a chicken frame during deboning, as well as the amount of meat left on the frame. This is extremely important to a poultry processor’s bottom line, because every bit of meat removed increases yield that, in turn, increases profits.

The patented imaging technology behind YieldScan™ was developed by GTRI researchers over a two-year period. The system employs a special illuminated cone and sophisticated software algorithms, which use a combination of a color image and the illuminated cone image to estimate the amount of remaining meat, known as yield loss. It can make these measurements in less than a second and has a high correlation with measurements performed manually.

“The uniqueness of the system is its use of internal illumination technology that enables many more bird frames to be evaluated rapidly,” explains Colin Usher, GTRI research scientist and lead developer. “This eliminates the need for scraping during the quality control process.”

The latter refers to the current yield measurement technique, where operators use a special knife to scrape the chicken frame for any remaining meat. This manual process, according to Usher, is not ideal for measuring yield as the amount of meat removed can vary among operators based on...
The Technology Transfer Challenge

Bridging the gap between university-based research and successful commercialization can be one of the more challenging aspects of technology transfer. Often times the basic research being conducted by academic and research faculty members is highly theoretical and deals with fundamentals of basic science and engineering. While it often requires significant resources and time to derive a meaningful scientific research discovery, it can also be costly and time-consuming to translate this discovery into the marketplace.

The Agricultural Technology Research Program (ATRP) benefits from being part of the greater Georgia Tech community, affording us access to world-class researchers and students across the entire campus and spectrum of disciplines. In addition, the program’s research faculty represents a wide array of academic backgrounds, which allows us to have a truly interdisciplinary focus. ATRP is organizationally housed within the Georgia Tech Research Institute, which is the applied research arm of Georgia Tech. As such, our mandate is to conduct applied research that brings to bear a broad spectrum of discoveries and new technologies to solve real-world problems.

Our industry stakeholders play a critical role in identifying these real-world problems, as we rely on their input to describe both the near-term and long-term critical needs within the industry. We then define the research activities in the program to address these needs by seeking technology-based solutions that provide tangible and useful outcomes. ATRP’s vision is to be the technology innovation and development provider that spawns a variety of technologies that can become viable products and solutions in the marketplace. As a result, we try to identify and select potential commercialization partners for the technology as early as possible in the development process. This provides them with an opportunity to become part of the development team and provide input on the technology design and functionality. We also engage end users throughout the development process, as their input and feedback is critical in developing the specifications for and maximizing the benefits of the new technology.

Over time, we have come to recognize that this three-way partnership between the ATRP team, the commercialization companies, and the eventual end users is essential for effective technology transfer. Having this early and consistent three-way engagement leads to much more successful research outcomes, and it provides a much smoother transition of the technology to the eventual commercial partners and commercial marketplace. So, we invite you to join us and become a technology transfer partner with the Agricultural Tech Research Program, as together we seek to develop technology solutions for the industry’s challenges.

To learn more about working with ATRP and the greater Georgia Tech research community, read the article, “Georgia Tech’s Contract Continuum Streamlines University-Industry Collaborations” on page 7.

Doug Britton, Ph.D.
ATRP Program Manager

Email any suggestions, comments, or questions to: poultrytech@gtri.gatech.edu
Researchers at the Georgia Tech Research Institute (GTRI) recently commissioned a dynamic filtration system capable of improved screening of poultry wastewater and other liquid streams with a variety of organic solids. The efforts result from a goal of achieving process water solids separations with one technology that can rival screens (medium and microscreening). Research has culminated in a provisional patent application.

“Some facilities see wastewater treatment as a mandatory cost, while others have looked for ways to extract or produce additional value, such as anaerobic processes that produce methane or water reuse,” says John Pierson, principal research engineer and project director. Pierson and his team started by looking at water reuse opportunities but with an additional focus on capturing potentially useful byproducts. “You realize that one option is to treat different process streams separately before these are combined in wastewater like scalers and chillers, but the underlying issue remains removing the finer particles or microscreening, since that is where the flux rate really starts to drop off,” explains Pierson.

Solids separation using physical means (filters, sieves, membranes) is typically described in terms of a flux rate or the volume of water through the filter area in a particular time period. Over time, the flux rate decreases as solids build up on the separation surface, reducing the amount of filtered water passed each minute even though the pressure builds in the direction of flow.

For primary and secondary screens, water is usually sprayed on the screens to wash the solids off as these are collected. However, microscreening systems are typically closed so that higher pressures can be delivered to yield needed flux rates. These higher pressure systems, including micro- and ultrafiltration, require more energy.

During the development of the dynamic filtration system, researchers processed coffee grounds and yeast at chemical oxygen demand (COD) and total suspended solids (TSS) concentrations that are significantly higher than analogous values for poultry liquid streams. By doing this, they realized they could capture greater than 95 percent of solids with a cascade of 212-micron screens followed by 75-micron screens. With surrogate chiller water and then actual marination effluents, they captured more than 90 percent of the protein.

“The advantage of the system is that we can backwash at any time during processing based on pressure buildup or a decrease in flow or throughput. And the way the system works, we are always keeping particles concentrated but not entrained in the separation surface, allowing us to remove that material during filtering,” says Pierson.

The current prototype can process roughly one liter per minute, but researchers are designing a scaled-up device capable of flow rates useful for poultry processing. Additionally, researchers have tested the system with 2-micron and 0.22-micron filters, resulting in a concentration of pathogens in the processed liquid stream.

Moving forward the team plans to conduct tests to quantify floatable materials including fats, oils, and greases and examine chiller water and other poultry liquid streams. “We think we can build a system that uses one technological approach to remove solids and microbial contamination from the liquid stream. USDA water reuse guidelines remain our focus, but we think we can also either capture useful byproducts or produce a drier product to be sent to rendering,” says Pierson.

Funding for development of the dynamic filtration system is provided by GTRI’s Agricultural Technology Research Program (ATRP) with additional funding from the U.S. Poultry & Egg Association’s Harold E. Ford Foundation.
factors such as skill and fatigue, which can have an effect on the accuracy of the processor's statistical predictions. The process is also laborious and time-consuming, limiting the number of frames that can be evaluated.

“Yield management allows processors to monitor each deboning line’s performance in real time and set statistical process control points to identify when any particular line is deviating from the expected performance,” says Usher.

As a result, he explains, processors can quickly identify when a particular line is faltering and address the problem, potentially reducing yield loss and increasing revenue.

The system can also characterize yield loss for individual regions on the frame such as the left and right clavicle and left and right tender areas. These characterizations, notes Usher, could allow processors to identify which workers on the line are fatigued or are exhibiting a drop in performance, adjust worker rotation schedules and placement of workers to better optimize the deboning line, and determine when a particular worker is performing well enough to move from a training line onto a full-speed deboning line.

In a nutshell, YieldScan™ Rapid Yield Analyzer takes the subjectivity out of yield management and helps processors reclaim more high-value meat while also improving worker productivity.

“We are excited to continue our partnership with GTRI and leverage their expertise in advanced imaging systems development to bring this innovative product to our growing product line of engineered yield management systems,” says John Daley, Gainco’s director of sales and marketing.

Georgia Tech, UGA Team Awarded USDA Food Safety Research Grant

A team of researchers from Georgia Tech and the University of Georgia (UGA) has been awarded a three-year research grant worth $499,953 from the U.S. Department of Agriculture’s (USDA) National Institute of Food and Agriculture (NIFA). The grant is one of 35 awarded nationally under NIFA’s Agriculture and Food Research Initiative’s (AFRI) Food Safety program to improve food safety by helping control microbial and chemical contamination in various foods.

The Georgia Tech-UGA grant, “Efficient Capture and Preconcentration with Magnetic Microbeads for the Detection of Salmonella,” will explore the use of functionalized magnetic beads in a fluid channel for rapid detection of the pathogen in food and farm samples.

A key challenge in bioassays is the capture of a target pathogen from a complex food matrix, explains Dr. Peter Hesketh, principal investigator and professor in Georgia Tech’s School of Mechanical Engineering. The research team plans to use magnetic bead-based sampling for preconcentration of samples in order to improve detection sensitivity and avoid the need for enrichment during detection of Salmonella with a standard PCR (polymerase chain reaction) or cell culture assay. This type of sampling preconcentration could potentially reduce processing time and analysis costs, resulting in a new method for rapid, high throughput detection of foodborne bacteria.

Dr. Hesketh will work alongside co-principal investigators Dr. Alexander Alexeev, Georgia Tech School of Mechanical Engineering; Dr. Jie Xu, Georgia Tech Research Institute Food Processing Technology Division; and Dr. Marilyn Erickson and Dr. Walid Alali, University of Georgia Center for Food Safety.

Established under the 2008 Farm Bill, AFRI is NIFA’s flagship competitive grants program and has five challenge areas — food safety, global food security, childhood obesity prevention, sustainable bioenergy, and climate adaptation.

The goal of AFRI’s Food Safety program is to protect consumers from microbial and chemical contaminants that may occur in the food chain, from production to consumption. This year, the program focused on developing effective mitigation strategies for antimicrobial resistance, understanding the physical and molecular mechanisms of food contamination, and improving the safety of fresh and fresh-cut fruits and vegetables. In addition, the program addressed critical and emerging food safety hazards to help prevent contamination and outbreaks.
Researchers Explore the Use of Mobile Robotics to Monitor Bird Well-Being in Poultry Growout Houses

BACKGROUND

Poultry growout houses require daily monitoring to ensure bird health and proper house operation. Current practices require growers to walk through multiple houses several times a day. During these walks, the growers observe the birds’ movements and energy levels and even listen to their vocalizations. They also inspect feed/water and ventilation systems and remove cadavers. These activities are crucial to ensuring the well-being of the birds. However, as one may imagine, they are also time-consuming. Could an automated monitoring system be the answer? Researchers with the Georgia Tech Research Institute’s Agricultural Technology Research Program are exploring the use of small, low-cost unmanned air and ground robots to monitor conditions within the growout house.

PROJECT OVERVIEW

The initial concern for the researchers is to first do no harm, explains Colin Usher, project director and senior research scientist. Therefore, the primary goal of the project is to explore the impact on animal well-being caused by operating robotic vehicles in the growout house. The researchers are also investigating the feasibility of using various sensing modes to extract information from the environment to both control the vehicles and provide information to the farm manager. They are collaborating with fellow researchers in the University of Georgia’s (UGA) Department of Poultry Science.

AIR AND GROUND ROBOTS

The team has outfitted commercially available air and ground robots with 2D and 3D sensors/cameras. These robots were recently operated in an experimental growout facility at UGA’s Poultry Research Farm in Athens, Georgia. Video and audio data was collected on 500 birds for a full growout cycle (6 weeks) in a miniature-scale house.

The researchers developed and are currently analyzing a set of metrics that allows for quantitative analysis of bird reactions. These metrics include average avoidance distance, flight response, and recovery time. The avoidance distance metric is the average distance of the birds from a stimulus such as the robots or a human. Flight response contains data such as the average speed a bird runs away from a stimulus, as well as how far away the birds exhibit a reaction. The recovery time metric involves calculating mass of motion and determining how long it takes before the birds resume normal behavior after a stimulus leaves. All of these metrics are calculated for each robot and for humans.

INITIAL RESULTS AND NEXT STEPS

According to Usher, preliminary results indicate that there is not a negative impact on the birds due to the operation of the robotic systems when compared to their reactions to humans. The graph below illustrates the average distance metric over the 6-week growout cycle with the air, ground, and human stimuli. Here, the data indicates that the birds are more comfortable with the robotic systems than with a human in the growout environment.

Armed with the confidence that the operation of robotic systems is not detrimental to bird well-being, the researchers are preparing to enter the next phase of the research effort. Phase 2 efforts will focus on three separate development goals: (1) develop and test autonomous routines to allow the robots to navigate a poultry house environment, (2) develop sensing systems to inspect equipment and birds, and (3) design and develop manipulators and a robotic system capable of carrying out various tasks.

“The goal of such a system would be to reduce the requirement of a human entering a poultry growout house as much as possible,” says Usher.

Combined Distance Data

[Graph showing combined distance data for different stimuli over weeks]
A Poultry Story: 60-Year History Is a Fascinating Tale

BY MIKE GILES — PRESIDENT, GEORGIA POULTRY FEDERATION

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The history of the poultry industry over the past 60 years is a fascinating combination of innovations in genetics, nutrition, animal health, food safety, and processing technology. What brings this history to life for me though are the stories about the early poultry pioneers who took great risks to build companies from scratch.

Thomas Carlyle, a 19th century philosopher and writer, said “the history of the world is but the biography of great men.” The same can be said for the men and women who played an important role in the history of poultry in Georgia and the rest of the United States.

I’ve been fortunate to work with and learn from Abit Massey, longtime president of the Georgia Poultry Federation. Abit now serves as president emeritus and is a great storyteller in his own right. He knew many of the Georgia poultry pioneers firsthand, and often on our rides together to Atlanta, I have had the pleasure of hearing him retell the stories that he heard first from others about the early days of the “modern” poultry industry in Georgia.

I might get into trouble for “naming names” and leaving someone out, but the Georgia surnames are familiar to everyone in the poultry industry — Arrendale, Austin, Bagwell, Brooks, Bruce, Burruss, Cagle, Cleveland, Crider, Cromartie, Folger, Fries, Harrison, Hatfield, McCranie, Strickland, Sutherland, Tucker, Ward, Wilson, and many others too numerous to name.

For those of you who haven’t heard it yet, I would like to share my favorite story about how an early poultry company got its start. Around 1940, Mr. Julius Bishop, a graduate of the University of Georgia, was working as a clerk in the Athens post office when 300 baby chicks arrived. As was apparently common back then, the chicks carried a COD tag with a fictitious address, a tacit the sender hoped would yield a few dollars if a buyer materialized.

Mr. Bishop and Postmaster J.R. Myers called the feed and seed stores, but nobody wanted to buy this shipment of chicks.

The next morning it was clear that someone needed to take ownership of the chicks soon or they would not make it. Bishop told the Postmaster that “these chicks aren’t worth a cent apiece.” Myers said, “well, you just bought them for a cent apiece.” Bishop said he didn’t have a place to raise the chicks much less three dollars to buy them.

Bishop would later say it was the best favor anyone ever did for him in his life. He borrowed a dollar and a half from a friend who paid the rest, and Bishop temporarily moved the chicks into an empty bedroom of his house. He built a “Louisiana Brooder” in his backyard. When they were grown, he sold the chickens to his neighbor Hubert Bell of Bell’s Food Store chain. After that flock, he built more brooders and soon had 3,000 chickens in his backyard.

Mr. Bishop’s backyard business would grow into Bishop’s Hatchery and Athens Poultry Co., which has evolved over the years through different owners, and it continues to operate as the Pilgrim’s Pride location in Athens, Georgia. Just think of the many millions in payroll dollars and farming opportunities made possible by a chance meeting of wayward baby chicks and a man willing to take a business risk!

The 1950s was a time of dramatic growth and improvements in the poultry industry. Bird genetics and nutrition were making rapid strides, and entrepreneurs across the nation were taking risks and building businesses that would evolve into the vertically integrated industry that we are familiar with today.

In a 1956 University of Georgia Extension publication entitled “Georgia’s Broiler Industry,” Arthur Gannon, Extension Poultryman — a title you don’t hear often nowadays — wrote that Georgia broiler production in 1956 would exceed 1955 by 20 percent or more. It’s hard to imagine that kind of growth and what all it would take to support it in terms of infrastructure, feed capacity, breeder flocks, etc. Stories like Mr. Bishop’s were being repeated in one form or fashion in dozens and dozens of ways throughout Georgia and the nation during this period of rapid growth.

In 1955, the average live weight of a broiler chicken was 3 pounds with a feed conversion rate of 3:1. Gannon’s 1956 publication made the argument that the stage was set for dramatic growth in the decades to come. Gannon was right about that.

Per capita chicken consumption at the time was 22.7 pounds, while total red meat consumption was 161 pounds per person. Gannon wrote that “some have predicted that we can double the consumption of broilers.” That prediction came true too, but it went on to triple and quadruple from there.

It is a safe bet that in the coming decades we are not likely to see the dramatic growth that our industry experienced in the last half of the 20th century . . . but who knows? Even the most optimistic observers in the 1950s probably would not have predicted what has been accomplished over the past 60 years.

At any rate, there will be new stories to tell, perhaps not as colorful as the ones from the 1950s, but important stories nonetheless. Shoot me an e-mail at mike@gapf.org if you have a story you would like to share about the early days of the poultry industry. I’ll file it away and promise to retell it down the road every chance I get.
INDUSTRY ENGAGEMENT

Georgia Tech’s Contract Continuum Streamlines University-Industry Collaborations

Strong industry partnerships have been the driving force behind the success of the Georgia Tech Research Institute’s Agricultural Technology Research Program (ATRP). For the past four decades, ATRP has worked with Georgia’s poultry, food processing, and agribusiness sectors to develop new technologies and adapt existing ones for specialized industrial needs. Transitioning as many of these technologies from R&D prototypes to commercial products is a top priority of the program.

The Georgia Tech Office of Industry Engagement’s Contract Continuum offers four contracting mechanisms that make it easier for industry to engage with university researchers at any point in the R&D process, from early stage research to product launch. These straightforward research agreements also streamline the contracting process for companies and reduce intellectual property negotiation times.

Read on to learn more about the contracting mechanisms, and for more information on working with ATRP, e-mail Doug Britton, ATRP program manager, at doug.britton@gtri.gatech.edu.

For more information on Industry Engagement at Georgia Tech, visit www.industry.gatech.edu

BASIC RESEARCH AGREEMENT
Explore fundamental challenges in a technical area
As one of the nation’s top research universities, Georgia Tech is committed to conducting basic research that advances our fundamental understanding of the world. This form of research is typically driven by scientific questions that lay the foundation for technological progress. When Georgia Tech collaborates with industry via a Basic Research agreement, the industry partner has the opportunity to license the resulting intellectual property (IP). These early collaborations are often the foundation for new products that spur business growth for a company.

APPLIED RESEARCH AGREEMENT
Identify solutions to real-world challenges
The Applied Research agreement enables Georgia Tech researchers to help industry partners explore the viability of a technology and overcome practical challenges. Under an Applied Research agreement, the company pays a defined fee to gain access to IP that is generated during the project. The company obtains rights for exclusive access to the IP for a specified period of time within a defined field of use. This enables industry partners to develop and launch a product with very low risk, gaining a first-mover advantage. After the exclusivity period is over, the company can 1) extend the exclusive rights or 2) convert to a non-exclusive license.

DEMONSTRATION AGREEMENT
Improve an existing technology
For industry partners working on product development, the Demonstration agreement enables Georgia Tech researchers to help a company improve existing technology. The Demonstration agreement offers a straightforward and advantageous intellectual property policy for industry partners. Simply put, when a company introduces background IP under a Demonstration project, the company shall have exclusive rights to any improvements at no additional cost. For companies that have licensed a Georgia Tech innovation, any improvements to the licensed IP shall be incorporated into the terms and conditions of the original licensing agreement.

SPECIALIZED TESTING AGREEMENT
Test new and existing products
Georgia Tech offers expertise and state-of-the-art equipment that can be leveraged in the final stages of development to test products and help a company ensure that they are market-ready. The Specialized Testing agreement provides a cost-effective and secure way for companies to access this equipment without making a large capital investment. This work is often instrumental in enabling a successful product launch. The Specialized Testing agreement also offers a straightforward intellectual property policy for industry partners. The sponsoring company will own all test results.
National Chicken Council Launches New Website Highlighting Poultry Production

The National Chicken Council (NCC) has launched www.ChickenRoost.com, a new website that features information on issues such as animal welfare, food safety, environmental stewardship, antibiotic use, and the modern partnership between farmers and chicken companies.

The site was developed as a follow-up to last year’s inaugural Chicken Media Summit hosted by NCC and the U.S. Poultry & Egg Association, where 30 members of mainstream, social, and trade media toured every aspect of how chicken is produced and processed today, from the hatchery to the feed mill, farm, and processing plant.

The website features a “Day in the Life” video on a chicken farm, and allows consumers to share and access content via social media including Facebook, Twitter, Pinterest, and YouTube. The goal is to form a better dialogue with consumers, get them more involved in food production, and answer their questions about chicken production and chicken products.

In addition to featuring farm-to-fork details about chicken production, food safety, and animal welfare, the site also focuses on nutrition, citing chicken as the cornerstone of a healthy and balanced diet, as well as a Kids Zone section with quizzes, trivia, and other information.

SAVE THE DATE

NATIONAL SAFETY CONFERENCE FOR THE POULTRY INDUSTRY

National Safety Conference for the Poultry Industry
August 18-20, 2014
Destin, Florida
Hilton Sandestin Golf & Beach Resort

The conference is designed specifically for poultry facility and corporate safety personnel, as a three-day event with key presentations on important industry topics and updates on government policy. Other highlights include breakout sessions for discussing best practices and current challenges, as well as networking and knowledge exchange opportunities with other safety and health professionals.

Registration opens June 23, 2014. To register, visit www.uspoultry.org/educationprograms

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www.facebook.com/ATRP.GTRI

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