AI & IOT

SMART MANUFACTURING SOLUTIONS FOR SMALL TO MEDIUM-SIZED BUSINESS

WORKSHOP REPORT
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TOPICS / SPEAKERS

- **Opening Remarks** - Dean Cammy Abernathy, Herbert Wertheim College of Engineering, UF

- **Nelms Institute: Helping Industry Succeed through Smart Technologies**, Swarup Bhunia, PhD, Director, Nelms Institute for a Connected World, University of Florida

- **Multi-functional Integrated System Technology (MIST) Center**, Toshi Nishida, PhD, Director, University of Florida

- **NSF Center for Big Learning,** Joel B. Harley, Deputy Director, University of Florida

- **Responsible and Secure AI**, My T. Thai, PhD, Associate Director, Nelms Institute for a Connected World

- **Emergent IoT Technologies: Approaches and Limitations for SMEs**, Sandip Ray, PhD, Department of Electrical and Computer Engineering

- **ROI from AIoT: Unlocking the Benefit & Value of Smart Manufacturing**, Allen Carlson, Regional Director, I-Station Sarasota County
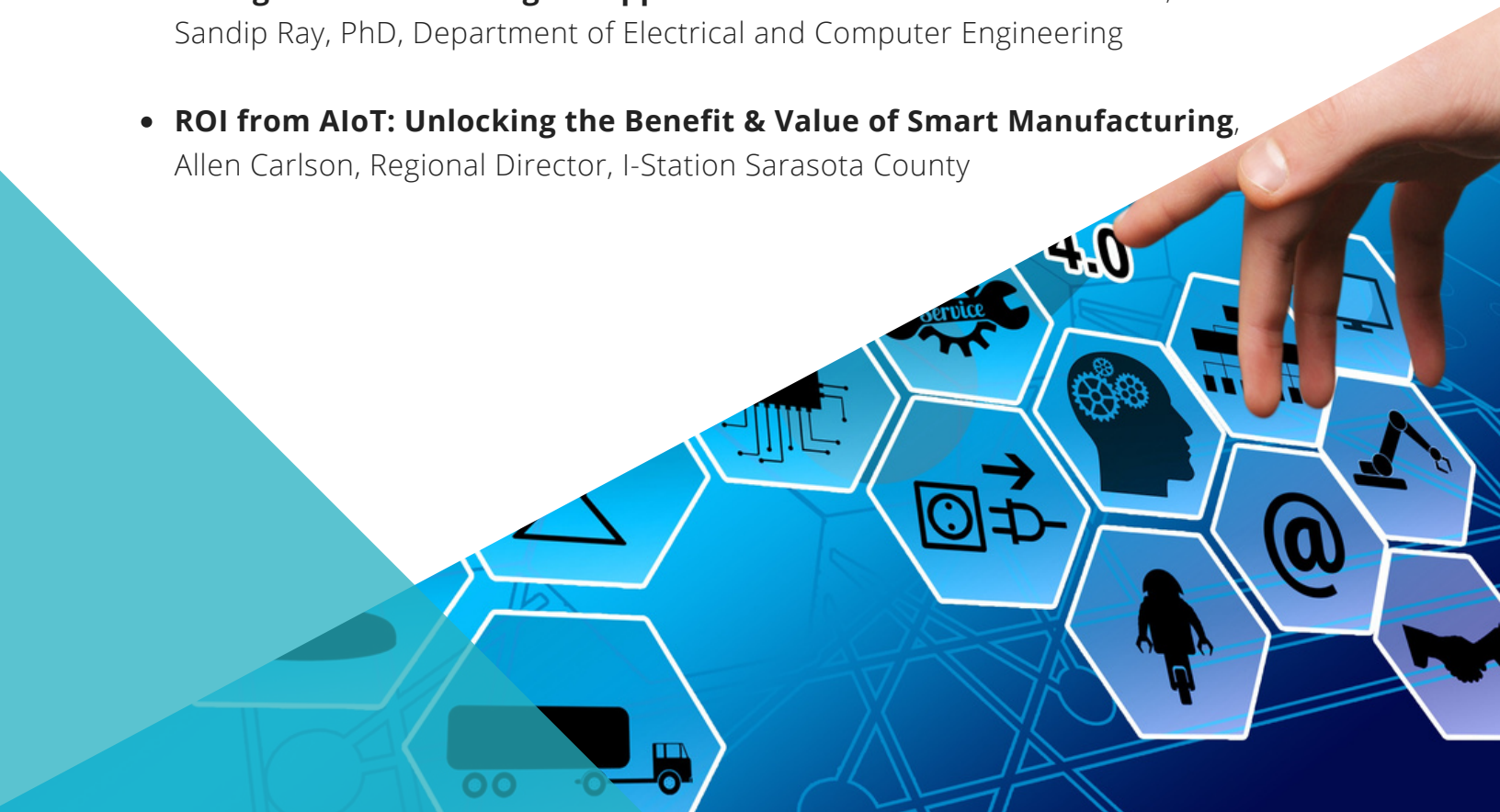
PARTICIPANTS

76 people attended the workshop. Of these approximately 28 were from industry, and the remainder consisted of researchers and other individuals interested in AI & IoT. Forty people participated in the breakout groups, five of which identified as 'industry professionals.' The majority of participants stayed for the talks, suggesting an interest in the topic.

WHY PEOPLE CAME & SAMPLE QUESTIONS

"I WOULD LIKE TO KNOW MORE ABOUT AIOT FOR START UPS."

**"WHILE DESIGNING AI DO YOU CONSIDER 'HUMAN SYSTEM ENGINEERING'?
IF YES, WHICH STREAM OF ENGINEERS GIVE INPUTS ON HUMAN SYSTEM ENGINEERING?"**

"I AM HERE TO SEE WHAT AI & IOT SOLUTIONS ARE TO BE PRESENTED AND UNDERSTAND HOW THEY MAY APPLY IN THE AUTOMOTIVE MANUFACTURING INDUSTRY."

"FROM A MANUFACTURING PERSPECTIVE, BENCHMARKING EXISTING BEST PRACTICES IS OFTEN A CONVENTION. WHERE SHOULD ORGANIZATIONS GO TO SEE THE EXISTING BEST PRACTICES?"
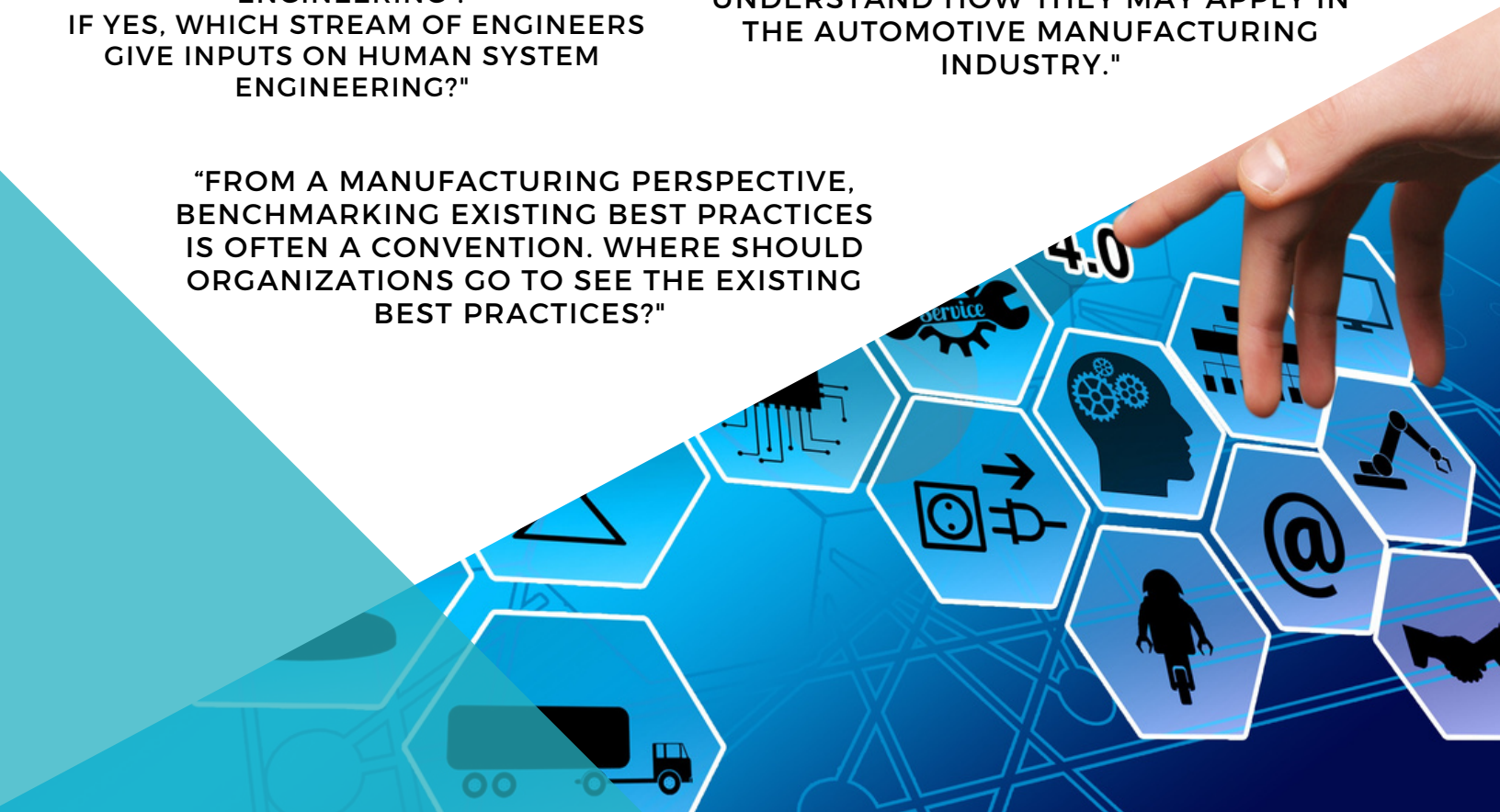
THEMES

Several interrelated themes emerged from the workshop as follows:

- Trust in the capability of technology is an issue for manufacturers
- Costs associated with AI adoption and anticipated difficulties can hinder adoption
- Knowledge and awareness **are** prerequisite**s** for implementation
- The right type**s** of workers are needed for successful adoption
- Investment and support would faciliate adoption of technologies

INDUSTRY INPUT

Q&A. Where are you along the path to smart manufacturing / full automation?

Participants noted that a number of industries, such as rail companies, are already implementing AI models and reporting improvements. Many are using plug and play devices and implementing simple models to eliminate downtime and increase productivity.

Tiffany Nguyen, a Reliability Engineer with Microsoft, gave examples of several of these plug and play solutions, including BrainBox, which is used in buildings and "supports various third-party sensors, e.g., cameras, and runs AI models on the data collected by these sensors"; Devkit, which is used as "a starting point to train the AI model"; and, Azure Percept, a platform with added security for developing AI solutions.

AI and automation are also being employed in the agriculture and fish industry. In these industries, the focus is on "how to use automation to accelerate the growth and distribution in the fish industry" and "how to mitigate the sea-life damage as well." In these sectors, more sensors are being used to collect more data while algorithms are being used to learn from data and find optimal cost-effective solutions.

"80 PERCENT OF IDEAS FOR ENERGY SAVING AND WASTE PRODUCTIONS ARE PLUG AND PLAY."

-CRISTIAN LAIL-HACER, UF

INDUSTRY INPUT

Q&A. What types of AI or IoT solutions is your company or sector looking for or need right now?

AI needs vary across industries. One participant noted the need for "good quality screening using AI models, models that are easy to apply to existing problems, and using 5G technology." In agriculture, marine and ecological sectors, greater investment in more sensors is needed, as are more algorithms to speed up this process, in order to learn "the best and optimal practices for dealing with marine water, freshwater, and estuaries", and to better understand the potential environmental and economic impacts of AI and IoT.

Despite "the limitless potential of AI," data collection and IoT platforms to collect data don't exist right now, according to one participant.

Other AI / IoT solutions and information companies are looking for right now:

- How automation can be applied to manage daily tasks.
- How companies can use AI to predict problems before they happen.
- How AI can be used to design manufacturing processes.
- How to make the case for investment and decisions to replace 'manpower" with robotic equipment.
- Where and how to save money and recover investment in technologies.
- Cost and maintenance of AI machines.

"COMPANIES NEED TO KNOW WHERE AND HOW TO SAVE MONEY AND RECOVER INVESTMENT."

INDUSTRY INPUT

Q&A. What's holding you back from implementing Ai solutions?

Smaller companies report being held back by a lack of knowledge around what AI and IoT technologies can do for their operations, and how to implement them (see above). For example, an employee of a small electronics manufacturing company acknowledged a need to learn more about IoT, and how it might help his company or sector perform better. One participant noted that more 'plug and play' options could help companies increase AI and IoT adoption.

When it comes to implementation, companies have to be able to quantify savings. "Companies need to know where and how to save money and recover investment." Companies must also be able to justify investment and decisions to replace human workers with robotic equipment. The cost and maintenance of AI machines is viewed as a barrier to implementation as well.

Inadequate investment in research at all levels -- national, federal government, industrial -- is a factor in some sectors. "Investment in marine science has been modest compared to other industries ...The opportunity here in Florida is greater but overall, the support and funding are limited in the fish industry for implementation."

"AI IN MANUFACTURING HAS SEEMINGLY BOUNDLESS POTENTIAL. BUT TODAY'S REALITY IS THAT IT ISN'T WIDELY ADOPTED, ... WHY DO YOU THINK THAT IS? COST? COMPLEXITY? MISUNDERSTANDING?"

NEXT STEPS

A significant barrier to broad adoption of AI solutions by small manufacturers appears to be a lack of understanding of the technology, how it works, how it improves productivity, solves problems or reduces costs. A participant in the student / researcher breakout groups noted that there's "no trust in the technology due to the black box idea of an AI", as well as concerns about startup and replacement costs of smart machines and data security. Even with access, companies still face a shortage of talent to adopt and adapt AI solutions to address their priorities.

Helping manufacturers understand the data science behind AI technology, as well as associated costs and benefits of implementation, might help accelerate broader support and adoption among small to medium-sized manufacturers. By providing insight about how the technology works, UF could help build greater trust in the models and resulting business insights produced, thereby fostering adoption and greater industry- academia collaboration.

While this workshop was successful in starting a conversation between industry-academia, additional networking and conversations are recommended to better understand the current landscape, uncover the in-depth needs, barriers and constraints of small-to-medium-sized manufacturers, and build greater understanding of and trust in AI capabilities and business results. A number of strategies could support this effort, e.g., exchange visits to manufacturing facilities and university labs for more in-depth conversation around the challenges facing manufacturers. Technology testing opportunities and education and awareness initiatives, as well as mentoring and direct support, are also helpful not only in showcasing UF's capabilities in AI/ IoT solutions and workforce development but to demystify the data science and build confidence in AI / IoT specifically among smaller manufacturing companies.

THANK YOU!