BREI AT A GLANCE
Internet of Things

Everyone knows what the Internet is, so what is the Internet of Things? The Internet of Things (IoT) describes the interconnection and data exchange of physical objects with sensors, software, or other technologies with other devices and systems over the Internet. From consumer-based applications like smart homes and wearables to industry solutions like driverless forklifts, IoT is everywhere and is changing the way both consumers and businesses interact and utilize Internet-enabled devices. When happening in a manufacturing or industrial process, it is referred to as the Industrial Internet of Things (IIoT). Think of the Internet of Things as the conduit through which all of the Industry 4.0 technologies connect for maximum impact and useful system integration. You can help your businesses understand the Internet of Things by sharing some of the following information with them.

Webinars, Videos or Podcasts to Share

- Technically Iowa Podcast, The Internet of Things with John Deere
- The Industrial Internet of Things / Industrial IoT Solution / How it Works | IoT Explained
- Beginner's guide for IoT

CIRAS Webinars on Demand:
- IoT in Manufacturing - Common Sensors and their applications

CIRAS Industry Technology Video
- Industrial Internet of Things

Cut & Paste Text for Your Next Newsletter

The Internet of Things – Tying it all Together

The Internet of Things (IoT) is a network of things, intelligent computers, and systems that are connected to the internet to collect and share data. A 'thing' can be any physical object or device that is capable of transmitting data, from consumer products like smart refrigerators to sensored manufacturing equipment like robots. "Things" measure various conditions and send those data points back to gateways to be moved to the cloud where it is aggregated and processed with other data and then shared with end users in a useful way.

The application of IoT in the manufacturing industry is called the Industrial Internet of Things (IIoT). Equipment with sensors gather thousands of data points per minute. The IIoT sensors send data back to a gateway, edge device, or platform in real-time. These robust devices operate and respond as data is generated, enabling cutting-edge technologies like Machine Learning, Machine-to-Machine (M2M) Communication and Artificial Intelligence (AI).

Breaking it Down

A complete IoT system is made up of four separate components that work together to deliver the desired output.

1. Sensors/Devices. Sensors or devices collect data from the surrounding environment. Sensors may measure motion, temperature, humidity, pressure, weight, vibration, visual elements, and sound. Multiple sensors can be bundled within one device or piece of equipment.

2. Connectivity. Once the data is collected, it is sent to a cloud infrastructure (an IoT platform) with the help of wireless and wired networking technologies (e.g. Bluetooth, Wi-Fi, Cellular Networks, LPWAN, Ethernet).

3. Data Processing. Once the data gets to the cloud infrastructure, it is stored, analyzed, and processed securely using a Big Data Analytics Engine. This analysis can be as simple as checking whether or not the temperature reading on an AC or heater is within an acceptable range, or as complex as ensuring a driverless forklift can maneuver around people and the shop floor. The processed data is then used to perform immediate actions that turn the physical devices into smart devices.

4. User Interface. The last step involves notifying the end user about the action through an email, text, notification, or alert sound triggered on their IoT application. Depending on the complexity of the IoT system, the user can then either

leave the automatically performed action intact, proactively check in on their IOT system, or manually perform an action in the system. For instance, if a user detects some changes in a robotic process, he or she can remotely adjust the process via an IoT app installed on a phone!

BREI Discussion Starters for Your Visits with Local Businesses

1. Tell me about how you are taking advantage of the Internet of Things (Your sensored equipment and the data they collect and share)?
   a. What do you (or do you want) to monitor? Why do you (or do you want) to monitor this?
   b. What devices do you (or do you want) to connect? What information do you need from your devices?
   c. Who will use the data? The more important question is not "who" but "will" they use the data?
   d. How will the infrastructure be setup? What is your plan for maintaining the infrastructure?
   e. What security will you have in place?
2. Are any of your customers or suppliers requiring you to be connected?
3. Have you been connected with an IoT Solutions provider that is meeting your needs?

Internet of Things (IoT) Referrals to Share

Public sector service providers for your businesses:

- CIRAS offers assessments and assistance with cost benefit analysis, process improvements and integration planning, among other services. CIRAS provides education and engineering support with:
  o Assessment and opportunity identification of current processes
  o High level design of IoT subsystems
  o High level system integration assistance
  o Assistance with automation hardware and sensor selection
  o Facilitated connections to system integrators who can assist with implementation.

IoT Solutions Vendors:

- Thompson, Sioux City, Ireton
- Interstates, Sioux Center
- DMC
- Pepperl+Fuchs

Disclaimer: This is not meant to be a comprehensive list of service providers

Additional Resources and Reading for You or Your Businesses

- ✓ What is the industrial internet of things (IIoT)?, an article from *Trend Micro,* describes IIoT and its security challenges.
- ✓ Industrial IoT News, an online news site for articles related to IIoT; also hosts the annual Industrial IoT Conference.
- ✓ Industrial Internet of Things (IIoT), a short article from *TechTarget*. Includes a list of vendors. *TechTarget* also offers a downloadable IoT Implementation Guide for Businesses.