



NEW MOBILE HANDHELD FEATURES to BRIDGE THE SUPPLY CHAIN & IOT

By Advantech®

The increased application of mobility devices in today's supply chain solutions gives leading logistics providers the ease of real-time data access to elevate the service quality among customers, business partners, and carriers. As has been broadly discussed in the industry, a new stage of advancement will be driven by the Internet of Things (IoT), and will unlock the potential for the mobile handheld to offer a valuable data highway in both directions. But it's what's in the next developmental phase of the mobile device itself that will soon advance data acquisition to a point where innovation will keep pace with today's supply chain ambitions.

Let's face it, we love to zap information off of things -- scanning a barcode, beaming a NFC message, or as mundane as acquiring a Bluetooth device's signal. Part of the enthusiasm with today's mobile devices is the ease of getting data from a simple swipe, settings change or scan motion. This speaks to the ease of mobile devices and what rapid data acquisition inputs can bring to the warehouse facility and next shipping touch-point. Moreover, these advancements can bring new models and transformative business process to the warehouse, and

operational data to IoT projects on the enterprise side. To start down this path, designers can overcome current supply chain handheld technology limitations and engineer new methods to access and enrich IoT data that originates from the hands of warehouse personnel. Here we will dive into both traditional and new data formats on the horizon in next generation supply chain handhelds and tablet PCs, namely:

1. The use of RFID input in the facility
2. The use of Optical input in the facility
3. The use of Infrared (IR) thermal reading in the facility
4. The use of Vehicle CAN Bus in detachable fleet management systems

While exploring these formats, we should keep in mind that Automatic Identification and Data Capture (AIDC) plays a huge role as the technology ensures the data is also parsed and is automatically uploaded to the cloud. Recent innovative approaches in AIDC hold that a handheld device's role is not to simply

acquire single-unit data through a scan, but to transmit and associate that data within a larger business process framework, such as within a shared inventory application the management layer in the cloud. It's AIDC's job to make the handheld the custodian of that data pass.

RFID

In the early adoption stages of wireless handhelds in supply chain process - roughly over the last decade - a barcode input peripheral plugged onto an iPad was quite a breakthrough. Since then, expanding industry-specific market solutions ensure we're no longer bound by off-the-shelf solutions. For example, the Android operating system has shown a new flexibility and interoperability. Android devices work well with peripherals such as multiple scanner formats, new acquisition, such as near field communication (NFC) and an ease in integrating Radio-Frequency Identification (RFID).

As barcode labels had shown their data management advantages, manufacturers and shippers began searching for a swifter solution, offering dynamic data flexibility and a quicker read. This led to the implementation of RFID. This format poses a new IoT frontier for supply chain solutions integrators and in-house designers.

However, handheld RFID applications are being called upon to do much more. Shippers are re-tooling to standardize on RFID traceability all through the supply chain. This "inter-company RFID integration" means that an organization collaborates with its supply chain partners to implement RFID technology through its supply chain network. The recent RFID mandates from Wal-Mart, Target, Metro Group and other retailers are good examples of an inter-company RFID process.



Many of us in the industry are already hearing of mandates from management and IT teams to begin the onboarding RFID integration projects associated with this collaborative resource management among their partnered companies in the supply chain. To this end, handheld applications are enabling RFID use in an expanding way to aid worker data acquisition for this process.

RFID tag use is forecast to remain an adequate solution for goods traceability for the next half-decade, since it is efficient and remains cost-effective for a location engine to pass information to warehouse management systems (WMS) from RFID scans.

Optical (Camera) Input

Many forms of optical data acquisition have been a part of supply chain technology and its processes for the past 10 years, including the QR code. But Optical Character Recognition, often abbreviated as OCR, brings new opportunities for innovation. It is a conversion of images of typed, handwritten or

printed text into digitized text, and can be acquired through camera on a handheld device. These functions endow a handheld to "read" text, quite similar to human recognition. It can then be assigned into a correct data field and transmitted to the management layer on the cloud. The ability for transport & logistics software vendors to combine AIDC and OCR offers a new level of process streamlining. In one example, a solution enabled by a handheld camera's optical data integration all but replaced the manual form entry task by letting the handheld do the leg work via optical scan. One scan acquires all the relevant information on a multi-field shipping document, automatically parsing it, and compiling it for wireless uplink to the cloud.

Optical handheld input also offers a boon for Intelligent Loading applications. Using a handheld's optical input and specialized software, 2D and 3D vision can create an Augmented Reality view for warehouse workers, enabling the dock to customize loading to fit confined



Optical AIDC in Document Scanning
All info on the shipping document is captured and parsed – in ONE scan.

Barcode scanned

Address info captured

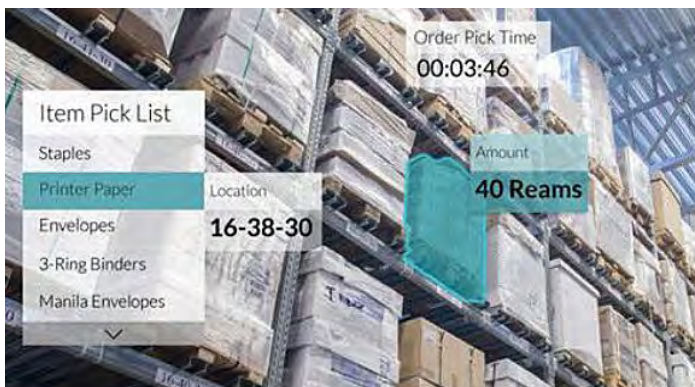
Checkbox entry captured

Entire document scanned and stored

Integration of an inter-company RFID solution must take a collaborative approach with all of its supply chain partners. This way it can create meaningful and unbroken traceability through the supply chain network.

warehouse space with speed and accuracy. A sufficiently equipped handheld's 3D vision ability can read volume from a camera capture of a box and perform the necessary logistics calculations needed for optimal loading in real time. With this method, drivers can scan multiple packages at once and the handheld screen's augmented reality view instructs them what package to pick and place next, to optimize a trailer load.

In addition, there is a variety of data possibilities once optical reading is combined with IoT data. The model can extend to the recognition of objects to present pertinent information for each package. A mobile device's IoT connectivity to the cloud can post back the critical business data to render it on the handheld's screen. As with one example, labeling can be programmed to appear next to packages in a set of inventory viewable on a worker's screen, to quickly reveal items to pick right away for LTL goods routing or expediting.



Optical recognition can extend IoT data visualization. A mobile device can scan an inventory row and compile per-unit data in terms of location, ship, size and content, all traceable and accessible on the management layer, and rendered by augmented reality.

Infrared Thermal Reading (IR)

Most of the wireless inputs already mentioned may sound conventional can be seen in more advanced facilities. One function less explored is the use of infrared (IR) reading. With new supply chain handhelds equipped with these readers, the device's IR laser scan is used by dock employees to read temperatures on-the-fly.

A next wave development in AIDC, refinement can be used to record and update valuable Incoming Quality Control (IQC) logs to ensure the company remains in compliance with food supply chain regulations and maintain logs in accordance with data preservation requirements.



Infrared Temperature Reading involves a handheld's laser alignment on a target for a precise temperature reading. A Cold Chain monitoring integration using AIDC transmits the data to the cloud.

With this new data type, supply chain software and hardware can combine to offer unified temperature and image data for an infallible identification relationship. A successful IoT software integration can ensure this information can transmit from the dock to the backend office through WiFi or 4G LTE. Developers can leverage the handheld or tablet provider's application programming interface (API) or software development kit (SDK) to develop the solution more rapidly.

Incoming quality control inspections can be greatly enhanced by rugged handhelds and tablets that feature a variety of input types. Having RFID barcode scanning, camera, and temperature reading on one system can free staff to rapidly acquire practically any required IoT data type.

Not only does infrared reading capability enable important temperature data for complying with food regulations, but saves staff time with an easy aim-and-press solution and guards against false or fabricated records.

Vehicle CAN bus data

In the transport side of the supply chain mix, there are new possibilities to explore once the handheld or tablet is docked inside the truck cab or forklift. A much relied upon technology, OBD, or On-board Diagnostics, is the network within the vehicle to provide the self-diagnosing status of the various vehicle subsystems. It is most commonly accessed through CAN bus network wired within the vehicle.

From fuel monitoring to preventative maintenance, engine data coupled with IoT holds the key to managing a fleet manager's expenses and is necessary for providing the warnings to stop costly vehicle failures and misuse. It can be extended to provide temperature sensor connectivity in refrigerated ("reefer") trailers and more.

The onboard CAN bus network was expanded by the Automotive Engineers standard SAE J1939, which enables use for other communication beyond the standard OBD messages. J1939 uses physical identifiers that can be used by fleet solution designers to assign IDs for specific functions or data sources.

Most tablet manufacturers offering a vehicle dock peripheral don't supply a connection to allow the mobile system to acquire vehicle data, instead relegating the vehicle dock to only supply Ethernet, power and maybe USB for keyboard operation. But once integrated, CAN bus data functionality can enable a connected tablet PC to send IoT sensor data from the engine or temperature monitors in a refrigerated trailer to quality monitoring applications automatically, updating via WiFi and 4G LTE. Considering the potential benefits of fleet management, preventative maintenance and

cold chain monitoring, most of today's systems fall short of the opportunity to turn a vehicle mounted tablet PC into a true IoT data gateway.

New Advancements in Mobile Vehicle Dock I/O



Harnessing vehicle intelligence can begin at the rugged tablet PC's docking peripheral. Advanced I/O connectivity on the vehicle dock can acquire the necessary data for IoT applications.

Due to the FMCSA regulation requiring commercial drivers to have electronic logging devices (ELDs), a popular form factor for this logging is by a detachable handheld in the cab. Whether for ELD process, or considering the proliferation of mobile tablets in every stage supply chain in general, there will be increased need for the common handheld to bridge data to the partner network to convey vehicle status along with driver hours logging. This is another area where CAN bus data can facilitate.

With transportation providers striving to further ensure cost effectiveness, an all-in-one approach to in-vehicle computing will likely swing the balance toward one onboard system. Vehicle data can be expected to be made accessible for mobile solutions, considering IoT's objective to connect to

more business critical data. Therefore rugged supply chain tablet PCs will soon be marketed with CAN bus connectivity, so that they can acquire and send both supply chain process data, and now also vehicle data, to the enterprise.

What else is in store?

There could be a number input types on the horizon from other industries that can soon become available for supply chain operations. For example, voice command software seen in the scientific and healthcare solutions could allow for hands-free interface with the tablet PC in warehouse and logistics activities.

Voice commands can help a worker on the dock easily select from a list of pallet types or pick size while remaining hands-free. In a warehouse example, voice commands to a mobile vehicle-mounted tablet PC can free drivers from the distractions of the keypad while driving or operating a forklift.

For every-day tasks, warehouse staff can use voice commands to launch inventory applications and conduct hands-free file searches on their mobile devices. It can greatly enhance interactions in motion control, such as with a picking robot. Considering the potential use of mobile devices in handheld control for robotic cranes and automated guided vehicles (AGVs), a verbal “stop” command is an example of a nice go-to.

Conclusion

Businesses are ramping up adoption of IoT and next generation supply chain solutions due to accelerated needs to be both profitable and ensure future competitiveness.

With updated handheld PCs, the company's dock and warehouse employees can handle receipt, cross-dock, putaway, pick, replenishment, packing, dispatch, stock taking with speed and accuracy. This information can now be derived from a variety of data sources including barcode, RFID,

optical, and thermal records, all posting back to the management layer in real-time.

This translates to profound revenue gains for software designers and integrators of IoT solutions for supply chain applications. As was mentioned in regards to input types, there are a lot of avenues for integrators and software providers to create data solutions and deliver competitive advantage for IoT data-hungry applications.

It will be the companies that innovate with the goals to meet the next enterprise objective that will be successful in the broadening supply chain technology field, as long as they simultaneously design the actual product from end user's perspective. That's why Advantech places the highest priority on meeting both challenges in every logistics system they make.

10%+ Increase in Productivity & Cost Efficiency

- Rugged Industrial-Grade Designs for harsh warehouse environments
- WiFi and 4G LTE for real-time connectivity the Cloud
- Logistics software support with APIs
- Support for Windows® 10 or Android® OS



AIM-68

10.1" Rugged Tablet

Corning GG3 Glass LCD with multi-touch PCAP control, with WiFi, 4G LTE, and Modular expansion for broad I/O options



PWS-472

5" Industrial-Grade Handheld Terminal

Android OS, WiFi, Onboard 1D/2D barcode scanner, Options for RFID, 4G LTE, and thermal Infrared (IR) reader

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