TAGGING COMPONENTS IN THE TEST COMPLEX AREA

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• Working on autonomous underwater vehicles for international RoboSub competition
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• Hope to be working on robotics or spacecraft after I graduate
• Why tag components differently?
  • Various methods are in place to tag different components, but not every component is tracked
  • Variance in method can make it difficult to obtain component information and identify discrepancies
  • Time and resources are spent on component localization and verification

• Previous work of RA10 interns:
  • Researching more efficient asset tracking methods
  • Investigating cost effective ways to localize components
  • Past interns identified using QR codes as a potential solution
• Consolidate component information by planning the integration of QR codes
  • Research best method for tagging components in B2 Test Stand area

• Further investigate current efforts for tracking components
  • Research current NASA projects with similar tracking efforts
  • Look at possible funding that can be secured for the project
WHY QR CODES?

• QR Codes can hold more information than a barcode
  • Accepts up to 30% damage and still readable
  • Does not require separate device to be scanned
    • QR Codes can be read via phone or tablet

• Compare to RFID technology:
  • Less expensive and more reliable than RFID tags
  • Does not get affected with metal surrounding a component
RESEARCH

• Tagging
  • Researched types of label printers and tags that could be used in addition to previous work of interns
    • Etching metal tags, etching on part itself, sticker labels
  • Investigated tagging methods that don’t rely on Wi-fi
  • Looked into other technology (Bluetooth Low Energy beacons)
  • Also researched integration of GIS with QR codes

• NASA Standards
  • Identified NASA standards for using Data Matrixes for component identification, similar to how QR codes are used

• Current Practices
  • Identified current tracking methods: paper tags, metal tags, RFID tags, barcode stickers, Data Matrix engravings
  • Some components like valves are not tagged
A1 TEST STAND
Various practices used to track components:

- Paper Inspection Tag
- Bent Metal Tag
- Aluminum Tag
- Adhesive Barcode

Pictures from Shelby Meredith
• Met with S3 PDLM team that was working on securing funding for tagging (secured 9/26/18)
  • Used Mi-fi device as a proof-of-concept for tagging and scanning without Wi-fi
• Updated the [SSC Component Scanning wiki page](#) with research of tags, printers, and NASA standards
• Trained on how to use laser etching machine (located at Component Processing Facility (CPF)) and generate QR codes
• Created metal QR code tags and tagged B2 and E3 Test Stand areas
• Identified and updated components on DDMS Windchill, including default pictures of components, as well as their serial number (SN), and locator number (LN)
• Created 29 metal tags with QR codes for B2 Test Stand Liquid Oxygen Replenish Pump area
  • 13 tags were not applied due to component missing or being installed at a later time
• Also tagged ~15 items at E3 Test Stand area
• Tagging process for metal tags:
  • Identify serial number (SN) of part
  • Create QR code on laser etching software using the SN
  • Laser etch metal tag with generated QR code
  • Identify component in the field using its locator number
  • Attach its corresponding tag and link the QR code number to the part instance on DDMS
• General process for scanning:
  • QR code is scanned and device is brought to DDMS part instance page
  • User can then navigate DDMS page to view different component information
  • If no QR code is linked to a part instance, then user can apply one and link it to the instance

• Current tagging efforts are led by S3 PDLM team (Wendy Holladay, Kenneth McCormick)
Recommended tagging plan:

- Laser etching QR codes into metal tags temporarily whenever possible
- Once label printer gets ordered, tag QR codes with sticker labels depending on size and shape of component
  - Multiple labels can be used if needed to scan easily
  - The rest of the components can keep metal QR code tag
- Link QR codes to Windchill DDMS after QR code is printed/etched and physically tagging it as quickly as possible
- Send group teams to tag existing components frequently
Recommended future endeavors:

- Obtaining laser etching machine
  - Current laser etching machine is at CPF, which will be moved by March
- Continue tagging test complex area
  - Getting locator numbers of other components to continue efforts
  - Collaborate with technicians for locators to tag components in place that are hard to reach without proper equipment
- Integration of localization with QR code tags on components, along with Maximo data
REFERENCES

• “Component Scanning” Wiki page
• “Equipment Tracking Final Overview and Recommendations” by Jonathan Britt
• “Accessing Windchill Component Data via Scanning Tagged Components” by Tom Lipski
• “Tracking Part Kits” by Shelby Meredith
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