

TAGGING COMPONENTS IN THE TEST COMPLEX AREA

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ABOUT ME



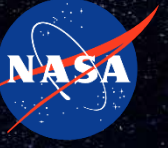
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San Diego State University
Mechanical Engineering Senior

- Working on autonomous underwater vehicles for international RoboSub competition
- FIRST Robotics Competition Alumni
- Hope to be working on robotics or spacecraft after I graduate

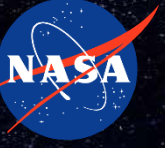


INTRODUCTION



- 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

OBJECTIVES



- 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?



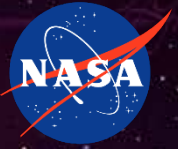
- QR Codes can hold more information than a barcode
 - Accepts up to 30% damage and still readable
 - Does not require separate device to be scanned
 - QR Codes can be read via phone or tablet
- Compare to RFID technology:
 - Less expensive and more reliable than RFID tags
 - Does not get affected with metal surrounding a component



RESEARCH

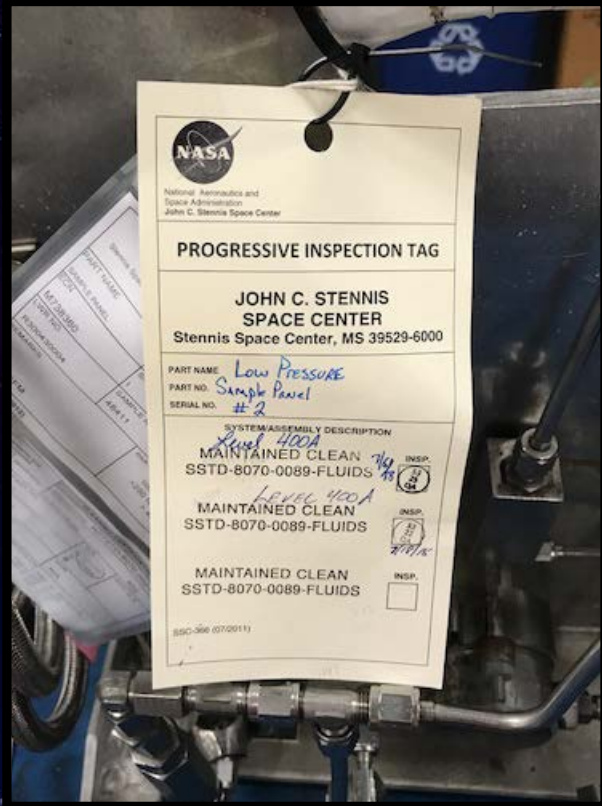


- Tagging
 - Researched types of label printers and tags that could be used in addition to previous work of interns
 - Etching metal tags, etching on part itself, sticker labels
 - Investigated tagging methods that don't rely on Wi-fi
 - Looked into other technology (Bluetooth Low Energy beacons)
 -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

APPROACH



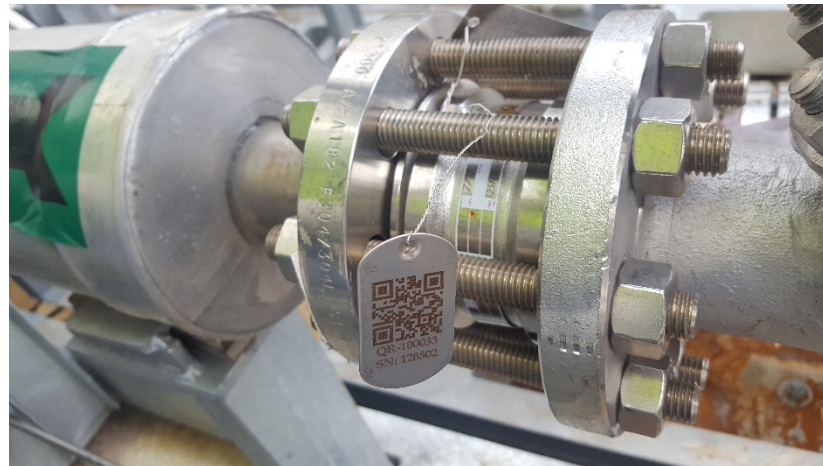
- Met with S3 PDLM team that was working on securing funding for tagging (secured 9/26/18)
 - Used Mi-fi device as a proof-of-concept for tagging and scanning without Wi-fi
- Updated the [SSC Component Scanning wiki page](#) with research of tags, printers, and NASA standards
- Trained on how to use 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)



TAGGING



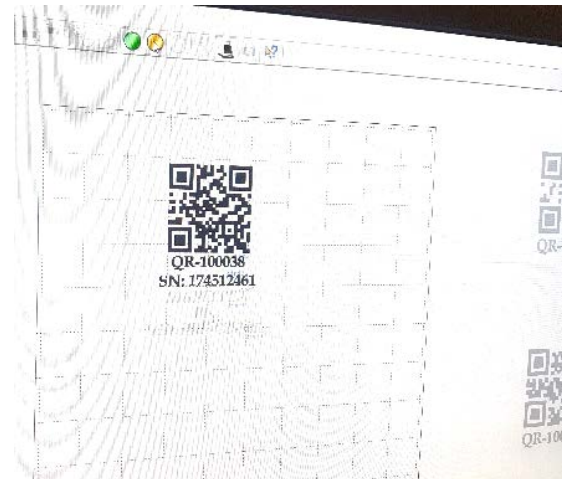
- Created 29 metal tags with QR codes for B2 Test Stand Liquid Oxygen Replenish Pump area
 - 13 tags were not applied due to component missing or being installed at a later time
- Also tagged ~15 items at E3 Test Stand area



TAGGING



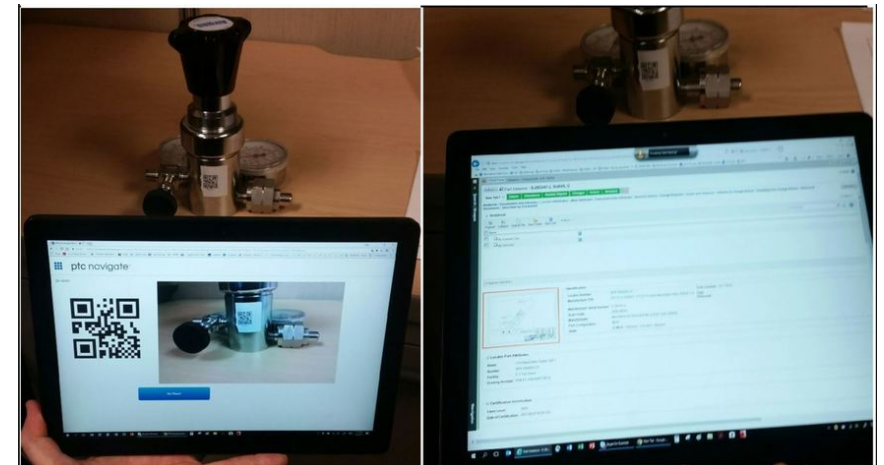
- Tagging process for metal tags:
 - Identify serial number(SN) of part
 - Create QR code on laser etching software using the SN
 - Laser etch metal tag with generated QR code
 - Identify component in the field using its locator number
 - Attach its corresponding tag and link the QR code number to the part instance on DDMS



TAGGING



- 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)



CONCLUSION



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

RECOMMENDATIONS



Recommended future endeavors:

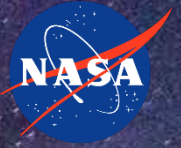
- Obtaining laser etching machine
 - Current laser etching machine is at CPF, which will be moved by March
- Continue tagging test complex area
 - Getting locator numbers of other components to continue efforts
 - Collaborate with technicians for locators to tag components in place that are hard to reach 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

SPECIAL THANKS



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