

# RAOP 2026 T3 - ON-SITE HARDWARE VALIDATION CHECKPOINT

NSF Robert Noyce Teacher Scholarship Program - RESS | Howard University AVRC Laboratory

Use all four completed platform laboratory reports and the embedded evidence.

## Purpose

This individual checkpoint consolidates evidence from the Qube-Servo 3, Aero 2, QArm, and QBot Platform reports. It measures hardware readiness, Simulink-to-hardware execution, input/output understanding, response interpretation, and classroom translation. Complete the form using your saved reports, screenshots, observations, and reflections.

### Participant Information

Educator Name

Participant ID

Date

Primary Group

RAOP Reviewer

### Instructions

1) Review each platform report. 2) Check only the evidence that is complete and visible. 3) Enter rubric ratings from 0 to 3 on Page 2. 4) Calculate the summary metrics on Page 3. 5) Provide brief, specific reflections. All responses should be evidence-based.

### A. Four-Platform Report and Evidence Completion Checklist (1 point per checked item)

| Required evidence in each finalized platform report                                | Qube-Servo 3             | Aero 2                   | QArm                     | QBot Platform            |
|------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Introductory hardware activity completed                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Next-level / advanced activity completed                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Introductory and next-level Simulink model screenshots inserted                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Introductory and next-level Scope / plot / output-response screenshots inserted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Observations and expected-versus-observed comparison completed                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Lesson learned and grades 6-12 classroom translation paragraph completed        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Report saved in the assigned folder and opens correctly                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Platform evidence totals (0-7):

 /7 /7 /7 /7

Overall evidence total:

 /28

Evidence completion:

 %

**Coding note:** Checked = 1; unchecked = 0. Evidence completion target: at least 80%. Strong evidence completion: at least 85%.

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*Rate demonstrated performance using the completed reports and observed hardware work.*

## B. Hardware Competency Rubric

### Rating scale

- 0** Not demonstrated or no usable evidence.
- 1** Completed with substantial assistance; explanation is limited or partly inaccurate.
- 2** Completed with minor assistance; explanation is generally accurate and supported by evidence.
- 3** Completed independently; explanation is clear, accurate, and evidence-based.

| Outcome / indicator to rate from 0 to 3                                                                                                                                                              | Qube-Servo 3                | Aero 2                      | QArm                        | QBot Platform               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <b>B1. Platform components and interfaces</b><br>Identified major components, sensors, actuators, power/communication interfaces, and the physical function of the platform.                         | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 |
| <b>B2. Safe connectivity and model execution</b><br>Established or verified connectivity, opened the assigned Simulink model, and ran the hardware activity safely.                                  | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 |
| <b>B3. Input-output and sensor-actuator understanding</b><br>Identified a commanded input, a measured output, the relevant actuator, and the sensor or feedback source.                              | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 |
| <b>B4. Response interpretation and guided inquiry</b><br>Explained the observed response, compared it with the prediction, and interpreted the effect of a changed parameter, command, or condition. | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 |
| <b>B5. Classroom translation</b><br>Proposed a realistic grades 6-12 learning objective, student task, and evidence students could collect using the platform or an adapted activity.                | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 | <input type="text"/><br>0-3 |

### Competency score calculation

Platform totals (0-15):  /15     /15     /15     /15

Overall competency score:  /60    Competency attainment:  %

### How this score will be used

For participant-level attainment, the minimum competency target is 70% (42/60). Strong attainment is 85% (51/60). For program reporting, RAOP may aggregate the percentage of educators meeting the target, average scores by platform and outcome, and common areas requiring follow-up. Individual results will be interpreted together with the report evidence and reviewer notes.

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Calculate the final metrics and summarize the most important evidence-based learning.

## C. Final Attainment Summary

Evidence completion:  /28 =  % Competency score:  /60 =  %

Overall attainment category (check one):

- ☐ Needs follow-up: competency <70% or evidence <80% ☐ Strong attainment: competency >=85% and evidence >=85%
- ☐ Meets target: competency >=70% and evidence >=80%

Strongest platform:

Platform needing most follow-up:

## D. Evidence-Based Reflection

1. Most important hardware or systems insight learned across the four platforms (3-5 sentences):

2. Give one specific example of how a commanded input or changed parameter affected the measured or observed response:

3. Which competency or platform skill should you continue practicing, and what support would help?

**Interpretation reminder:** Use the numeric scores together with the completed reports, screenshots, and written observations. A low score identifies an area for support; it does not by itself indicate unsuccessful participation.

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*Translate one platform experience into a feasible grades 6-12 activity and document support needs.*

## E. Classroom Translation Plan

Selected platform

Grade band

Subject / course

Learning objective (what students should understand or be able to do):

Student activity or demonstration:

Evidence students would collect, graph, compare, or explain:

Required resources and one realistic implementation constraint:

## F. Follow-Up Support and Verification

Support requested (check all that apply):

- |                                                                 |                                                                     |                                                      |
|-----------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> No additional support                  | <input type="checkbox"/> Hardware connectivity                      | <input type="checkbox"/> MATLAB / Simulink model use |
| <input type="checkbox"/> Inputs, outputs, sensors, or actuators | <input type="checkbox"/> Response interpretation / control concepts | <input type="checkbox"/> Classroom adaptation        |

Other support, unresolved issue, or recommendation:

### Completion and verification

- |                                                                   |                                                                                 |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <input type="checkbox"/> All four platform reports were reviewed. | <input type="checkbox"/> The completed T3 form is saved in the assigned folder. |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------|

Educator initials

RAOP reviewer initials

Review date