Title of Project: M-1iA CERT Cart Robot and Vision System

Department/Organization: Engineering Technology

Name(s) of Project Applicant(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Newcomer</td>
<td><a href="mailto:Jeff.Newcomer@wwu.edu">Jeff.Newcomer@wwu.edu</a></td>
<td>x7239</td>
</tr>
</tbody>
</table>

Principal Contact:

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Newcomer</td>
<td><a href="mailto:Jeff.Newcomer@wwu.edu">Jeff.Newcomer@wwu.edu</a></td>
<td>x7239</td>
</tr>
</tbody>
</table>

Amount Requested for Project

Proposed Budget:

1. Equipment total $32,003.16
2. Plus site preparation (not STF funded) + $0.00
3. Total Project Cost (spreadsheet total from part IV of this form, Total Project Budget) = $32,003.16
4. Less organization’s contribution – $6,000.00
5. Less site preparation – $
6. **STF Grant Request** = $26,003.16

PREREQUISITES

1. Review the policies (two) and procedure (one) below for using lab fees to purchase equipment. You may decide that this route is more effective for funding your proposal.
   
   • [POL-U1400.03 Establishing and Changing Course and Lab Fees](#)
   • [POL-U1400.04 Administering and Spending Course and Lab Fees](#)
   • [PRO-U1400.03A Establishing a Course or Lab Fee, or Changing the Amount or Purpose of an Existing Course or Lab Fee, Fixed or Variable](#)

2. Read the updated [STF Proposal Form and Instructions](#) on the Student Technology Fee website.

Important Notes:

• As of 2009-10, the Student Technology Fee Committee no longer accepts proposals for computer lab upgrades. Existing computer labs are now upgraded on a rolling schedule, and the Student Technology Fee continues to fund these upgrades.

• THE STF Committee will only accept **complete** proposals by the announced deadline. Every section of the proposal must be addressed.
I. Project Abstract

Give an overview of the existing environment, and summarize the items being requested. Briefly explain how the requested technology will:

- improve **student access** to technological resources, and/or
- enhance the **quality** of the student academic experiences through the use of technology, and/or
- increase the **integration** of technology into the curriculum.

This project proposes to purchase a M-1iA CERT Cart from FANUC Robotics (see attached sheets for details on the robot, the cart, and what is included). The equipment includes a small assembly robot with a vision system, off-line robot programming software, and training support. For $29,496 (plus tax) we will be able to obtain $338,825 of equipment and software. The equipment includes a style of robot that we do not have and a machine vision system, which we also do not have. It also includes a type of off-line robot programming software that we do not have. Moreover, the entire system is portable and can be brought to students, so it will not be stuck in one lab, but can be used to introduce students to robotics.

Obtaining the M-1iA CERT Cart will allow upper division students access to technology that we do not currently have in the form of a modern style of robot and machine vision, and it will allow us to introduce lower division students to robotics. These things will also improve the quality of students' education. Currently robotics is taught to students in ETEC 420 Manufacturing Automation and Robotics, and is not available to students before them. The students in this class will get an enhanced experience through access to the machine vision and different robot style. Furthermore, with this system we will be able to demonstrate robotics and machine vision to lower division students in ETEC 112 Introduction to Engineering, Design and Graphics. This is something that is not currently possible because it is neither practical nor safe to make any of our existing robots portable, it is not feasible to fit the ETEC 112 class in the robotics lab, and we do not have machine vision. So the upper division students will get enhanced experiences and access to equipment that is not currently available, and lower division students will get an introduction to robotics that is not currently feasible.

II. Relationship to STF Objectives and Impact on Existing Academic Programs

Describe your proposed project in detail. Tell us how it would provide positive benefits to specific courses or instructional programs.

1. From a **student perspective**:
   a. How would this project provide additional student **access** to technological resources?

      **It will provide upper division students access to technology that we do not currently have in the form of a modern style of robot and machine vision, and it will allow us to introduce lower division students to robotics.**

   b. How would this project broaden or enhance the **quality** of the student’s academic experience through the proposed technology?
By giving students the opportunity to work with modern technology that we do not have and by allowing us to introduce students to robotics earlier.

c. How would this project integrate technology into coursework?

All students who take ETEC 420 Manufacturing Automation and Robotics will get to work with the M-1iA CERT Cart. This will allow them to work with a style of closed-chain robot that we currently do not have, it will allow them to work with machine vision, which we also do not have, and it will allow them access to modern off-line robot programming software. ETEC 420 is required for Manufacturing Engineering Technology (MET) majors and is taken as an upper-division elective by students from other majors in the Engineering Technology Department.

All students who take ETEC 112 Introduction to Engineering, Design and Graphics will get to experience the potential of robotics and machine vision (though not program them). There will also be potential uses for projects including senior projects, but those will not occur as consistently as the other things.

2. From a faculty perspective, explain how this project will enhance your ability to help students meet their educational goals.

One of the great holes in our curriculum is our lack of equipment for machine vision. A smaller hole in our curriculum is that we do not have any closed-chain robots (we have articulated and assembly (SCARA) robots). So the upper division students will get the opportunity to work with modern technologies that are becoming more common, and this will only enhance their future opportunities and potential for success.

Another limitation in our curriculum is that we have not been able to introduce students to robotics and its potential early in students’ academic careers. With this mobile system we can safely and easily bring robotics into any classroom (something that is not feasible with our current robots), so we can introduce our entering students to robotics with this equipment. In theory we could even introduce students coming for the Compass to Campus program to robotics. Given that some expect robotics to be a huge area of job creation in the near future (http://www.optoiq.com/articles/2011/11/robots-will-create-more-than-one-million-jobs-by-2016.html), it can only be of benefit to our students to be aware of the potential of robots and other automation tools such as machine vision.

3. Will other departments be involved with this project? If so, please describe.

No other departments will be formally involved, but in addition to students in the Engineering Technology Department, ETEC 112 is required for students in the Manufacturing and Supply Chain Management program, and somewhere between 30-40% of students who take ETEC 112 end up majoring in a department other than Engineering Technology.

4. Has any part of this project previously been funded by the Student Technology Fee?

No ☒ Yes ☐ Please describe:

In 2000 the STF funded the purchase of an articulated robot for the ETEC 420 lab (a robot that we still use), but that is independent of this request.

III. Utilization

1. Please list the anticipated number of times and duration per each use—per quarter or per academic year—that the proposed technology would be used by students. The committee is
looking for the **total student hours** and the **total number of unique students** who would use the technology in that time period. Explain how you arrived at this utilization.

This system will become part of the lab for ETEC 420, so those students will get multiple opportunities to work with the various systems on the M-1iA CERT Cart. I foresee there being three or four formal labs using this equipment, and there is great potential for project work too. The class averages ~20 students per year (although this is likely to increase due to our growing enrollment), and labs are 2 hours each, so this will be at least 120 student hours of close use with the equipment each year.

The system will also be demonstrated for the ETEC 112 students as part of the day when they are introduced to the Manufacturing Engineering Technology program (part of the introduction to engineering portion of the course). This course is taught 4 times each year to 60 students (and it’s almost always full), and the program talks are 1 hour, so if the robot is used for half of the time (and the students will want more) this will be another 120 hours of student interaction with the equipment each year.

These numbers do not include any project work or outreach that is done with the equipment.

### IV. Total Project Budget

This section details the estimated cost of the project. Include costs that would be covered—by your department or another source—for ongoing costs such as personnel or operating expenses.

To assist you in preparing your budget, please consult with relevant campus support departments (ATUS, Purchasing, Space Administration, etc.). For more information about these contacts, see the beginning of “**II. STP Proposal Form and Instructions**” on the STF website.

Please complete all of the following sections (attach Excel spreadsheet for any additional details).

**Note:** Spreadsheet totals should match the projected budget figures on page 1 of this proposal. (See box on page 1.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Item Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1iA Training Cart MH2 &amp; Certification Package</td>
<td>1</td>
<td>$29,496.00</td>
<td>$29,496.00</td>
</tr>
<tr>
<td>Shipping (taxable)</td>
<td></td>
<td>$0.00</td>
<td>(included)</td>
</tr>
<tr>
<td>Tax (8.5%)</td>
<td></td>
<td>$2,507.16</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$32,003.16</strong></td>
<td></td>
</tr>
</tbody>
</table>
We recognize your proposed budget as an estimate. Final funding for successful projects will be established after thorough technical review; some costs may need adjusting due to price changes. The STF Committee may impose special conditions on a project; see the STF Program Overview.

1. What funding or contributions are available from your department or other sources?

Note: “Contribution” is defined as a monetary contribution. A vendor discount, for example, is not considered a contribution.

The Engineering Technology department will contribute $6,000 for this project. It will enhance our introduction to engineering course and some of our outreach activities.

2. Could this project be divided into discrete elements that could be funded separately?

Note: A “no” response to this question creates an “all or nothing” proposal. That is, if the STF Committee decides against funding your entire proposal, it will not consider any elements for partial funding. If elements of a proposal could be funded separately, the applicant is responsible for prioritizing these elements before submitting the proposal.

No ☒ Yes ☐ Please summarize and prioritize project segments with cost estimate for each segment.

This is an integrated package offered to us at a tremendous savings. When you include the 26 seats of software, we are getting $338,825 worth of equipment and software (plus free shipping) for $29,496 (plus tax). See the attached sheet for details.

3. Are lab fees charged for any of the courses that will use this equipment?

No ☐ Yes ☒ If yes, please note: The total funding requested from the Student Technology Fee must reflect the amount collected from course fees for equipment replacement and/or equipment acquisition. All proposals asking for course fees will be reviewed by the Academic Budget Office.

There are already course fees associated with both ETEC 420 and ETEC 112. Both courses have flat fees to contribute to the department's computer replacement program, and ETEC 420 has a variable lab fee to cover the cost of materials used during the course. This proposal would not alter the course lab fees for either course, and neither course's existing lab fee would be appropriately used in contributing to this project.

V. Impact on Existing Resources

The proposal should address your project’s potential impact on existing resources. Special attention should be given to impact on data transmission networks (e.g., sources accessed, networking equipment, etc.), and personnel (e.g., staffing, administrative support, faculty support, etc.).

Any proposal that includes the replacement of computers should specifically address the feasibility and cost effectiveness of upgrading the computers rather than replacing the computers.

1. Describe how existing equipment is used. Contrast this to projected use if your project was funded.

Existing robots are used for the ETEC 420 lab. Students are given multiple opportunities to work with each type of robot. Early labs are straightforward to given students the opportunity to learn the basics of the robot, and later labs are more sophisticated and involve aspects of design as well as robot programming. The use of the existing robots will not change, but the addition of this technology will allow for students to work in
smaller groups so that each student has more direct time working with and programming each robot. It could also allow us to more reasonably handle larger enrollments, which may be on the horizon due to the increased number of majors in the MET program. The lab is and will remain a key and integral part of the ETEC 420 class.

There are currently no robots or similar technology introduced in the ETEC 112 class.

2. Is similar equipment or technology available elsewhere on campus—such as the Student Technology Center, Classroom Services, Video Services, Western Libraries, a college lab? If so, please describe why the existing equipment does not meet the needs outlined in this proposal.

   No.

3. If this project involves the replacement of equipment:
   a. Describe the “before and after” configuration changes. A spreadsheet reflecting these changes may be attached.

   **We will not be replacing any existing equipment.**

   b. Describe the costs and benefits of replacing vs. upgrading (if applicable).

   N/A

4. Will this equipment be available to students outside your department?

   No ☒ Yes ☐ If the proposed technology would be used by students outside of your department, please describe how they would gain access, how the availability of the equipment would be publicized, the hours/week when the equipment would be available, and any costs that would apply.

   **There may be opportunities to use or demonstrate this equipment outside of the department (say for outreach), but students will not be able to come and check the equipment out or use it independently for projects unless they have taken the ETEC 420 course.**

5. Does this project involve the check-out of equipment to students?

   No ☒ Yes ☐ If yes, please discuss whether or not the Student Technology Center could be assigned this task.

6. Does the department have adequate operating funds to provide ongoing maintenance and support?

   No ☒ Yes ☐ Please describe.

   **While our operating budget has shrunk along with everyone else's during these times of budgetary woes, we still have been able to maintain our equipment, and foresee that this will remain true in the future.**

7. Does the department have adequate personnel funds to provide ongoing staff support for this project?

   No ☒ Yes ☐ Please describe.
Although some of our staff are now part-time due to budget reductions, we still have adequate expertise on our technical staff to maintain this equipment.

VI. Space and Site Information

This section addresses any space alteration or site preparation necessary for the proposed project. Site alterations include painting, holes in walls, security systems, carpeting, construction, lighting changes, or conversion of a lab or office.

Special Note: If this project requires any site preparation, or if this project uses any space not currently under your department's control, you must submit a draft proposal to Space Administration by November 22, 2011. Space Administration and Facilities Management will conduct a site survey and respond back to you concerning project feasibility, cost, and schedule. The site survey response must be included in the final project proposal.

Proposals for projects that involve any site preparation will be considered only after the required site surveys by Space Administration and Facilities Management have been completed.

1. Location for installation of equipment or technology.
   ET 304

2. Would site modification be required?
   No ☒ Yes ☐ If yes, please describe (electrical, air, painting, lighting, security, network access, etc.).

   The site is going to be renovated this summer as part of a minor capital project. The renovated room will have space and utilities for the M-1iA CERT Cart in addition to the other robots and equipment that now exist in the lab without any additional modifications.

3. Would this project use space not currently assigned to your department or area?
   No ☒ Yes ☐ Please describe.

VII. Project Schedule

This section describes your overall implementation schedule. Project awards will be announced by the end of spring quarter. It is anticipated that projects will be substantially completed by the end of the calendar year. If there is any site preparation involved, please align your project schedule with the schedule provided by Space Administration and Facilities Management.

If the money is awarded we will contact FANUC about obtaining the equipment, and we will have it as quickly as the purchasing process allows, and will plan on using it in ETEC 112 during the fall 2012 quarter. There will be no site preparation required.

VIII. Constraints

This section should list any external or internal factors that could affect your project schedule, project objectives, or the project budget (e.g., if external approval is required for curricular changes, or if funding must be received by a certain date).
1. Please describe any constraints to this project.

There are no constraints on this project other than funding.

IX. External Funding

This section must be completed for any projects over $100,000. For project budgets of this scale, the applicant should investigate opportunities for obtaining external funding for all or part of the proposed project.

1. Describe the external organization(s) able to provide funding in support of this project.

   N/A

2. Describe the funding cycle for these requests (submission dates, projected award dates).

   N/A

3. Indicate the amount of external funding that would be requested.

   N/A

4. In cases where joint funding is requested, what will happen if the Student Technology Fee award is made and the external grant is not awarded?

   N/A

5. Has a grant proposal already been submitted for all or part of the proposed Student Technology Fee project?

   N/A