



INVITATION FOR BIDS
OFFICE OF PROCUREMENT & CONTRACTS

1. INSTRUCTIONS FOR BIDDERS

- a. Sealed bids will be received in the Office of Procurement & Contracts, Mississippi State University, for the purchase of the items listed herein.
- b. All bids must be received in the Office of Procurement & Contracts on or before the bid opening time and date listed herein. Delivery of bids must be during normal working hours, 8:00 a.m. to 5:00 p.m. CST, except on weekends and holidays when no delivery is possible.
- c. Bidders shall submit their bids in a sealed envelope.
 - i. Sealed bids should include the bid number on the face of the envelope as well as the bidders' name and address. Bids should be sent to: 245 Barr Avenue, 610 McArthur Hall, Mississippi State, MS 39762.
- d. All questions regarding this bid should be directed to the Office of Procurement & Contracts at 662-325-2550.

2. TERMS AND CONDITIONS

- a. All bids should be bid "FOB Destination"
- b. Bidders must comply with all rules, regulations, and statutes relating to purchasing in the State of Mississippi, in addition to the requirements on this form. General Bid Terms and Conditions can be found here:
https://www.procurement.msstate.edu/procurement/bids/Bid_General_Terms_May_2019_V2.pdf
- c. Any contract resulting from this Invitation for Bid shall be in substantial compliance with Mississippi State University's Standard Contract Addendum:
<https://www.procurement.msstate.edu/contracts/standardaddendum.pdf>

ITS Bid Number: 22-153

Opening Date: January 11, 2023 @2:00 p.m.

Description: Robots

Vendor Name: _____

Vendor Address: _____

Telephone Number: _____

Days the Offer is Firm: _____

Authorized Signature: _____

Name: _____

Title: _____

Item	Quantity	Description	Unit Price	Total Price
1	1	Collaborative Robot 3KG with Vision System		
2	1	Collaborative Robot 10KG		
3	1	Autonomous Mobile Robot		
		TOTAL		

As per attached specifications.

Package 1 Specifications

Initial Release
22 November 2022

Mississippi State University
Center for Advanced Vehicular Systems – Extension (CAVS-E)
153 Mississippi Parkway
Canton, MS 39046

Record of Change

REVISION	CHANGE	DATE	PAGE
None	Initial Release	11/22/22	

Table of Contents

1.0 Scope	4
2.0 Facility	4
3.0 Equipment Requirements	4
4.0 Contractor Requirements.....	7
5.0 Deliverables.....	7
6.0 Schedule	7

1.0 Scope

The Center for Advanced Vehicular Systems – Extension (CAVS-E) at Mississippi State University is expanding its capability to support high quality experiential-based training in a scaled-down Industry 4.0 (i4.0) factory environment. As part of this effort, CAVS-E is requesting bids for automation package. This will consist of two collaborative robots, vision system, and an autonomous mobile robot.

Minimum requirements for the equipment and installation are summarized in this document and are not intended to limit the configuration capabilities or services offered by potential suppliers.

2.0 Facility

This equipment would be housed in the quality lab of the CAVS-E location in Canton, MS.

3.0 Equipment Requirements

The following section describes the general requirements for the size, tolerance, and capabilities of the system.

The information listed here should be regarded as minimum performance requirements.

Package requirements below:

Collaborative Robot 1

- **Robot Arm and Controller**

This system should be manufactured by Universal Robots. It will be formed by an anthropomorphic robot arm, 6 DOF, controller unit and programming console. This module will include the following components and characteristics:

- Robot: minimum 6 shafts.
- Robot controller.
- Programming console.
 - Should utilize a graphical user interface via touch screen.
- The offline programming and simulation software will be available to download from the website for free.
- Should only require 120 VAC compatible power input to be fully functional.
- The characteristics of the robot model are as follows:
 - Collaborative operation: 15 advanced and adjustable safety functions. TÜV NORD certified safety device. Tested in accordance with standards: EN ISO 13849: 2008 PL d
 - Payload: 3 Kg.
 - Reach: 500 mm (min.)
 - Footprint: 128 mm in diameter.
 - Degrees of freedom: 6. Radius of action (x5) 360° and (x1) Infinite

- **Robot Tool**

This tool will be an end effector for the robot that consist of a gripper. This tool must be fully plug and play compatible with the collaborative robot, robot software, and robot interfaces. Should not require additional power supply or resources to function.

- **Robot Base**

This should support the robot in an upright operational position so that the robot can be used on a horizontal surface. This base should also aid in portability. It should be constructed of 8020 extruded aluminium or equivalent, and lightweight.

Collaborative Robot 2

- **Robot Arm and Controller**

This system should be manufactured by Universal Robots. It will be formed by an anthropomorphic robot arm, 6 DOF, controller unit and programming console. This module will include the following components and characteristics:

- Robot: minimum 6 shafts.
- Robot controller.
- Programming console.
- Should utilize a graphical user interface via touch screen.
- The offline programming and simulation software will be available to download from the website for free.
- Should only require 120 VAC compatible power input to be fully functional.
- The characteristics of the robot model are as follows:
 - Collaborative operation: 15 advanced and adjustable safety functions. TÜV NORD certified safety device. Tested in accordance with standards: EN ISO 13849: 2008 PL d
 - Payload: 10 Kg.
 - Reach: 1300 mm (min.)
 - Footprint: 190 mm in diameter.
 - Degrees of freedom: 6. Radius of action (x5) 360° and (x1) Infinite

- **Robot Tool**

This tool will be an end effector for the robot that consist of a gripper. This tool must be fully plug and play compatible with the collaborative robot, robot software, and robot interfaces. Should not require additional power supply or resources to function.

- **Robot Base**

This base should be on caster wheels allowing the robot to be supported for practical use and easily moved.

Vision System

- **Camera**

- Resolution: minimum 2.3 MP or 1600x1200
- Image Type: Monochrome and Color
- Acquisition Rate: minimum Color 30fps
- Lens: additional lenses available
- Lighting: additional lighting available
- Connectivity: IO Capability, Ethernet Port
- Protection Rating: minimum IP67
- Protocols: Ethernet/IP, PROFINET, Modbus TCP, TCP/IP
- Color Detection: must be able to detect change in color
- Part presence: must be able to detect if part is present or not
- Part position: must be able to determine part position and communicate to collaborative robot so it can adjust for part pick and place.
- Quality confirmation: must be able to detect differences in part features i.e., diameter, length, angle.
- Data Storage: internal and expandable storage capability

- **Lenses**

- Additional lenses as needed to be able to cover a range of focal lengths to achieve part position and quality confirmations.

- **Lighting**

- Additional light as needed to be able to detect color differences and to achieve quality confirmations.

- **Supporting Software**

- All supporting software needed to program and test vision system.

Autonomous Mobile Robot

- **Robot System**

It will be formed by an autonomous mobile robot, with integrated cameras, lights, speaker(s), and safety sensors.

- Footprint: 580x800 mm
- Payload: 250 kg
- Speed at full payload: 2 meters /sec
- Active operation time with payload: 13hr
- Compliant with: EN61000-6-2, EN61000-6-4, (EN12895), CE, EN1525, ANSI B56.5, ANSI R15.08
- Communication: 2.4 GHz 802.11 g/n, 5 GHz 802.11 a/n/ac.
- Integrated camera system with below requirements:

- Field of view height: 1800 mm
- Field of view distance in front of robot: 1200 mm
- Field of view horizontal angle: 114°
- Field of view minimum distance in front of robot for ground view: 250 mm
- Sensor requirements:
 - Safety laser scanner system provide 360-degree coverage.
 - 8 (min.) proximity sensors.
- Light requirements:
 - Indicator lights on four sides, eight signal lights (two on each corner)
- Speaker requirements:
 - Must have speaker to play audible tones.
- Safety Requirements:
 - Eight safety functions according to ISO 13849-1.
 - The robot stops if a safety function is triggered.

4.0 Contractor Requirements

The contractor shall deliver the system as defined in Section 3.0 and will assemble the system on site.

5.0 Deliverables

This section summarizes the products and/or services that are expected to be provided by any prospective company submitting a bid for this purchase. Please itemize quotes included in any bid submissions where possible. Deliverables for this purchase shall include:

- Collaborative Robot 1 and supporting software and infrastructure
- Collaborative Robot 2 and supporting software and infrastructure
- Autonomous Mobile Robot supporting software and infrastructure

6.0 Schedule

System to be furnished 30 days ARO. Please include estimated lead time and schedule for fabrication, delivery, installation, and training after receipt of PO.