



Company Information

Company Name	<i>Schaeffler Group USA</i>	Date Submitted	<i>05/06/2022</i>
Project Title	<i>AI Gesture Input for Gauge Measurements (SG_GESTURE)</i>	Planned Starting Semester	<i>Fall 2022</i>

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

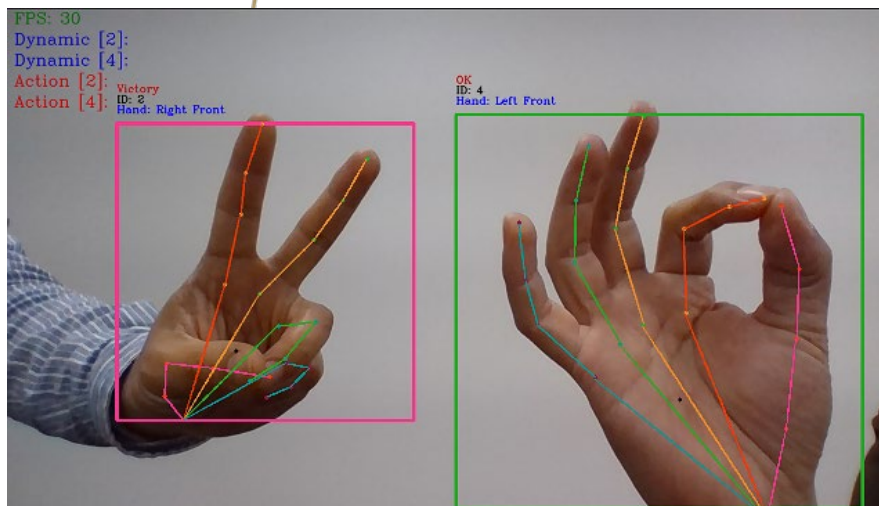
Discipline	Number	Discipline	Number
Mechanical	1	Electrical	2
Computer	3	Systems	

Company and Project Overview:

Schaeffler Group is a multinational corporation that supplies engineered components to automotive, aerospace and industrial sectors. Recently, Schaeffler has accepted a significant number of E-mobility projects and is rapidly pivoting into the electric vehicle business.

Some notable customers of the Cheraw 1 plant are Ford, General Motors, ZF and Stellantis (Chrysler). Some of the components made at the Cheraw 1 location are Cage Guided Needle Roller Bearings, Finger Followers, Pins, Axles, Shafts and Needle Rollers

This project's main objective will be to implement a touchless interface to a needle grinding workstation to allow the operator to confirm a quality check using a series of hand gestures.



Project Requirements:

UNC Charlotte students will select and implement a touchless interface (gesture) software to be used with the manual gauge stations in the needle grinding area. The students will have design freedom for this project. Software should be able to integrate with an Arduino in order to capture and upload information to a cloud. Schaeffler can support the purchase of software.

The camera/interface system will need to be able to:

- Verify that the operator has used a “V-block” roundness gauge.
 - o Operator should then be able to give an OK/not OK input using a gesture.
- Verify that the operator has used an OD (outer diameter) gauge.
 - o Operators should then be able to give a compensate up/compensate down input using a gesture, as well as gesture to the system how many microns they have compensated up or down.
- Record and send information to a server using discrete IO/Arduino.
- Activate Andon light when check has not been completed on time

Technical skills required for this project are, but not limited to: CAD design, software selection and integration, cloud server integration, wiring, wire diagrams, Arduino programming, technical writing, safety integration, process understanding, print reading, manufacturing principles and communication. During the project, the students will have access to our local manufacturing plants for idea generation and benchmarking. During the idea generation phase, students will be able to see the needle grinding machines and quality check stations

Expected Deliverables/Results:

- Implemented gesture interface on one grinding work station at the Cheraw 1 plant
- CAD models of all components
- BOM of all components
- Wire diagram for electric circuits



- Final version of programs/code
- Work instructions for how to use the system
- Integration should be complete in the plant before the design expo.

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. Schaeffler will take possession of the equipment after the conclusion of the 2nd semester Senior Design Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- CAD design
- Software selection and integration
- Cloud server integration
- 3D printing
- Arduino (or similar) programming
- Technical writing
- Safety equipment and circuit selection
- Travel to the Schaeffler Cheraw, SC plant. Mileage to be reimbursed per ISL purchasing procedures.