



Worksheet for Senior Design Project Proposals: Collaboration with Industry

To assist in compiling the information on a proposed Senior Design project, please use this worksheet template to submit a one- to two-page description of the project.

Title of Project:

Date Submitted:

Name of Industrial Contact Person:

(include job title, contact info, e-mail address, and telephone number)

Abstract:

(Provide one- to three-paragraph description of the PROJECT, including anticipated tasks for the student team and expected outcomes.) **NOTE - Abstract examples from past projects are included for your reference on the next page.**

Engineering Background Needed for the Project:

(Please check all that apply. Each project team will have three team members and the engineering backgrounds of each can vary based on the needs of the project. In rare cases, and based on the amount of work, a four-member team may be formed. Weblinks are provided for each engineering discipline to assist in identifying the anticipated engineering background and skill sets needed for the project.)

- Biomedical Engineering – (<https://www.niu.edu/ceet/academics/interdisciplinary/bs-biomedical-engineering/index.shtml>)
- Electrical Engineering – (<https://www.niu.edu/ceet/academics/electrical-engineering/bs-electrical-engineering.shtml>)
- Mechanical Engineering – (<https://www.niu.edu/ceet/academics/mechanical-engineering/bs-mechanical-engineering.shtml>)

Applications:

(e.g., provide a list of anticipated industrial applications of the proposed design)

Industry Sector:

(e.g., DIAGNOSTICS, INSTRUMENTATION, etc., etc.)

Advantages:

(e.g., EXPECTED BENEFITS over existing technology(ies) such as automation, miniaturization, reduced cost, new information, etc.)

Stage of Development:

(e.g., Proof of Concept, Prototype, etc.)

Status of IP:

(e.g., None, Provisional Filed, Patent Pending, etc.)

Please submit each one page completed worksheet(s) to:

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Title of Project: Mistake-Proof Arbor and Shaft Assembly

Abstract:

Presently there are two arbors used in the assembly of drive shafts. One has the 3/8 thread and the other a 5/16. Currently there is no preventative measure in place except for part segregation to keep the operator from incorrectly using the wrong arbor. It is possible to inadvertently mix in a 5/16 arbor with a 3/8 at the upstream operations or a 3/8 arbor in with a lot of the 5/16 arbors. The desired solution would be one in which there is a device in place to check each arbor as it is assembled to the drive shaft to ensure the correct arbor is used each time. If the device detects the incorrect arbor the assembly machine will not cycle. If the correct arbor is detected, the machine will then cycle. The system must be integrated into the existing machine and PLC system.

Title of Project: Multi-Part Vision System Counter Prototype

Abstract:

Presently there is no accurate way to verify counts of assemblies going into boxes. Weigh counting becomes problematic as the pallet and cardboard weights very greatly and it is not feasible to setup scales at each workstation and maintain their calibration. The count of parts going into the boxes is manually maintained by the operators. The hourly job rotations also contribute to the opportunity for count errors of parts going into the boxes. The desired solution would be a system that utilizes a vision system or some other part recognition system to identify the part as it is placed in the box by the operator and count up until it is reset by the operator. The system should be mobile and be able to set up at any workstation and should be easily programmed and calibrated by the operator by first taking a picture of the desired assembly and then set to begin counting. As the box layer is filled the counter should count each part placed in the box. When a new layer of cardboard is placed in the box the system should retain its count for that layer and then begin counting again for the next layer. The system should be able to record layer by layer what is in the box and the total count in the box. The system should have some kind of visual display / counter that shows the count per layer, the total count in the box and the pieces per hour being assembled. System should be robust and have some kind of floor mount system. It would be preferred that the system look into the box from overhead. In addition, missing components is the single largest quality issue in the factory. Another goal would be to create a process and tools to reduce / eliminate the missing components in the warranty bag for the consumer. The process would need to work with each SKU and ensure the correct parts are installed as well as all the parts. Scales, pic sensor, vision, all are acceptable solutions.

Title of Project: Contributions of Thoracic Motion to Cervical and Shoulder Range of Motion in Patients Suffering from Cervical or Shoulder Pain Symptoms

Abstract:

Pain with cervical rotation may be caused by limitations of motion at the thoracic spine as end range cervical rotation can cause movement down to the fourth thoracic vertebrae. Researchers have found that reduced mobility at the cervicothoracic junction was a risk factor for neck pain and that high-velocity, low-amplitude thrust manipulations (HVLATM) of the thoracic spine has been shown to decrease pain and increase cervical motion in individuals suffering from cervical pain and limitation. However, this is not validated this concept and the ability to directly assess and determine the contributions of thoracic spine motion to cervical pain remains difficult. Special clinical tests that use this concept have yet to be assessed for reliability and validity in the clinical evaluation of the thoracic spine in patient that suffer from cervical pain and motion limitations. A measurement device is needed to accurately measure thoracic spine motion and how this motion relates to the range of motion of the cervical spine and shoulder in order to help determine the contributions of the thoracic spine to these motions and help to validate the theoretical constructs involved in

treating the thoracic spine in patients suffering from cervical and shoulder pain.

Title of Project: Development of an Electronic Stethoscope for the Continuous Detection of Bowel Sounds

Abstract:

A Neonatal Intensive Care Unit (NICU) provides care for infants in constant need of supervision. Currently, respiration, heartbeat, blood pressure, and oxygen saturation are displayed on a bedside monitor. There is a need to develop a continuous monitoring of bowel sounds as another vital sign, in order to assess intestinal health and to titrate feedings. There are currently no bowel sound recorders or analyzers in NICUs and normal values are not available for premature babies at differing gestational and postnatal ages. Yet, newborn babies frequently have feeding disorders, some which are quite serious. The goal is to develop a sensor to be attached to the infant's abdomen along with a monitoring system for signal reception, filtration, analysis, and display. The anticipated result is promoting better feedings and to also avoid dangerous life-threatening illnesses that threatens newly born infants. Current design barriers have been centered around the attachment of the sensor and the complex processing of the biosignal, where the elimination of unwanted noise and better signal processing are desired.