

Research Internship Information Collection for Credit Evaluation

Note: Please submit research internship information to the CLIC office (shabkirk@ualberta.ca) by August 31st.

Research Internship Name: (Include name and level)

Intelligent Manufacturing, Industry 4.0 and Robotics Research Internship Program

Chinese Host University and Department: (e.g. Nankai University - Mechanical Engineering)

Harbin Institute of Technology - Mechanical Engineering

Eligibility Requirements: (e.g. Is the research internship only open to certain disciplines? Is it for undergraduates or graduates? Is it only open to third or fourth year students?)

Available for both undergraduate and graduate students in the field of mechanical engineering

Research Internship Description: (a general description of the topic of the project and research context)

The Intelligent Manufacturing, Industry 4.0 and Robotics Research Internship Program is provided for students interested in the courses and research work in Mechanical Engineering of Harbin Institute of Technology. There are two options, Course-based Program and Research-based Program. The students can take the courses in the field of Mechanical Engineering in English. The graduate students will join the research groups in Intelligent Manufacturing, Industry 4.0, Robotics, etc.

The details of the project description are in the attachment.

Research Internship Objectives: (a description of the learning outcomes that are expected)

The internship aims to train students to be “research-based, individualized and elitist” leaders in the field of Mechanical Engineering which is one of the top Engineering disciplines in China. The internship will give students a strong knowledge background in the field of Mechanical Engineering, artificial intelligence development and market needs in China, as well as the opportunities to work with outstanding Chinese students.

Student Roles and Responsibilities: (what exactly will the student be doing)

1. The students may select the courses with credits. (Course- based Program)
2. The students may join the research group to do research work with Chinese students under the guide of the supervisors. (Research-based Program)

Hours per week: (how many hours will the student be working the lab per week?)

1. The students in Course- based Program are not required.
2. The students in Research-based Program are required at least 30 hours per week for lab work.

Grading: (the evaluation method used for grading students)

1. The students in Course- based Program will be evaluated by the course achievement.
2. The students in Research-based Program will be evaluated by the supervisor.

Number of Internship Positions:

3-4 students per semester

Research Internship Location: (e.g. laboratory address)

No. 92 West Da Zhi St., Nangang Dist., Harbin

School of Mechanical Engineering, Harbin Institute of Technology

Research Internship Dates: (start and end dates)

February 28-June 30 or September 1- January 10, each year

Are the dates flexible: (yes or no)

The date for Research-based Program is flexible.

Supervisor(s) Name(s) and Contact Information:

Full Professors & Associate Professors in School of Mechanical Engineering, HIT

Administrative Contact Information (International Students Office):

Administrative office of School of Mechanical Engineering, HIT

Administrative Contact Information (Lab):

Ms. Dongmei Li

College of International Education, HIT

Prof. Jihong Yan, jyan@hit.edu.cn

Administrative office of School of Mechanical Engineering, HIT

Research Internship Code: (course code for the research internship at your university)

Website address:

HIT: www.hit.edu.cn

College of International Education: <http://StudyatHIT.hit.edu.cn>

School of Mechanical Engineering: <http://sme.hit.edu.cn/>

Host university application: (yes or no, if yes provide a link to the online application or copy of the application form)

Online Application: <https://hit.17gz.org/member/login.do>

Research Internship Credit: (how many credits are awarded for this research internship at your university?)

It depends on the study hours. One credit is awarded when successfully completing 16 hours study.

Tuition fee: 13000 RMB/semester (Scholarship sponsored)

Dormitory accommodation available: (yes or no) **yes**

Accommodations fee: **600 RMB/month** (Scholarship sponsored)

Additional fees: (field trips, etc.)

Insurance fee: **400 RMB/semester** (Scholarship sponsored)

Field trips arranged by the College of International Education are free.

Project 1:

Action Recognition Based Human Action Monitoring Under Industry 4.0

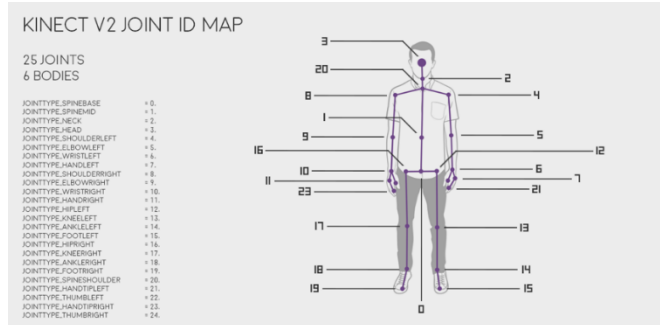
Contact Information:

Prof. Jihong Yan

Email: jyan@hit.edu.cn

Project Description and Objectives

With the introduction of intelligent manufacturing and smart workshops, the industry has begun a comprehensive innovation to improve its core competitiveness. At present, human beings cannot be completely excluded from the modern industrial production and they are an important influencing factor of efficiency and quality. In this project, a human action monitoring system will be established based on knowledge in machine vision and industrial engineering. First, choosing a reliable vision sensor and establishing a data acquisition and processing system are essential. Then, according to the real assembly line, establish assembly line basic actions



library to fill in the blank of the worldwide action library. Third, establish the action recognition model with CNN or other selectable method. Finally, based on the action classification model, an operator assembly action monitoring system need to establish with the function of action recognition in real time and wrong actions responding. Ultimately, a human recognition monitoring and wrong actions responding system will be established to improve production efficiency and quality fundamentally.

Eligibility Requirements

Interested students should have basic knowledge of coding, such as Matlab, python and so on and interest in machine vision.

Main Tasks:

Finish one research report.

Give one technical presentation.

Website:

Lab: <http://homepage.hit.edu.cn/yanjihong>

School: <http://www.hit.edu.cn/>

Project 2

Industrial Internet based multi-AGVs scheduling in shop-floor

Contact information:

Prof. Jihong Yan

Email: jyan@hit.edu.cn

Project description and objectives:

Enterprises aim to make products personalized concerning consumer requirements under the Industrial Internet environment. The logistics in shop-floor is more sophisticated due to the variability and complexity of products. Parts in workshops are delivered or transferred to workstation by various vehicles, for example forklift, crane, conveyor and automated guided vehicle (AGV). AGVs have been introduced to many different types of industry since its emergence in the 1950s and also developed into reliable and efficient equipment. It is critical to assure that AGVs are scheduled properly and efficiently to achieve the high performance of production system in intelligent shop-floor.



This project is aimed to develop an Industrial Internet based AGVs management system for shop-floor to support the construction of intelligent workshop. Wireless Sensors and controllers should be deployed for the precision and controlling of AGVs. Intelligent algorithms should be integrated for the task assignment and dynamic scheduling.

The objective of the internship is to contribute to our long-term project with some new idea and design based on what we are doing now.

Eligibility requirements:

Interested students should have basic knowledge of intelligent algorithms and be proficient in programming.

Main tasks:

Give one technical presentation.

Finish a report of internship.

Website:

Lab: <http://homepage.hit.edu.cn/yanjihong>

School: <http://www.hit.edu.cn/>

Project 3:

The Optimize Control of Robotic Manipulator in Kinematics and Dynamics Aspect

Contact Information:

Prof. Jihong Yan

Email: jyan@hit.edu.cn

Project Description and Objectives:

The robot industry, which was represented by robotic manipulator, has made a great progress in development, which has led to the infiltration in all walks of life, and also played an increasingly significant role in them. This period of development made the path optimization for robotic manipulator emerged as strategic and competitive directions for all kinds of research. Due to the endless innovation of algorithm or constraint condition by researchers, the manipulator improved itself more effectual. It is certain that the optimized manipulator operation not only improving the efficiency, but also saving massive costs, including time costs and energy costs. With the innovation on optimization control of robotic manipulator in Kinematics and Dynamics aspect, it will become one of the most influential changes in human life.



In this project, describe the motion functions of the robot joints by using mathematical modeling methods in the first place.

Then, establish objective functions on trajectory. Finally, seek out the optimum solution of objective function through optimized algorithms. The final research outcome of this project will achieve the robotic manipulator's optimization on Kinematics and Dynamics aspect.

Eligibility Requirements:

Interested students should have basic knowledge of robotic manipulator Kinematics and Dynamics.

Main Tasks:

Finish one research report.

Give one technical presentation.

Website:

Lab: <http://homepage.hit.edu.cn/yanjihong>

School: <http://www.hit.edu.cn/>