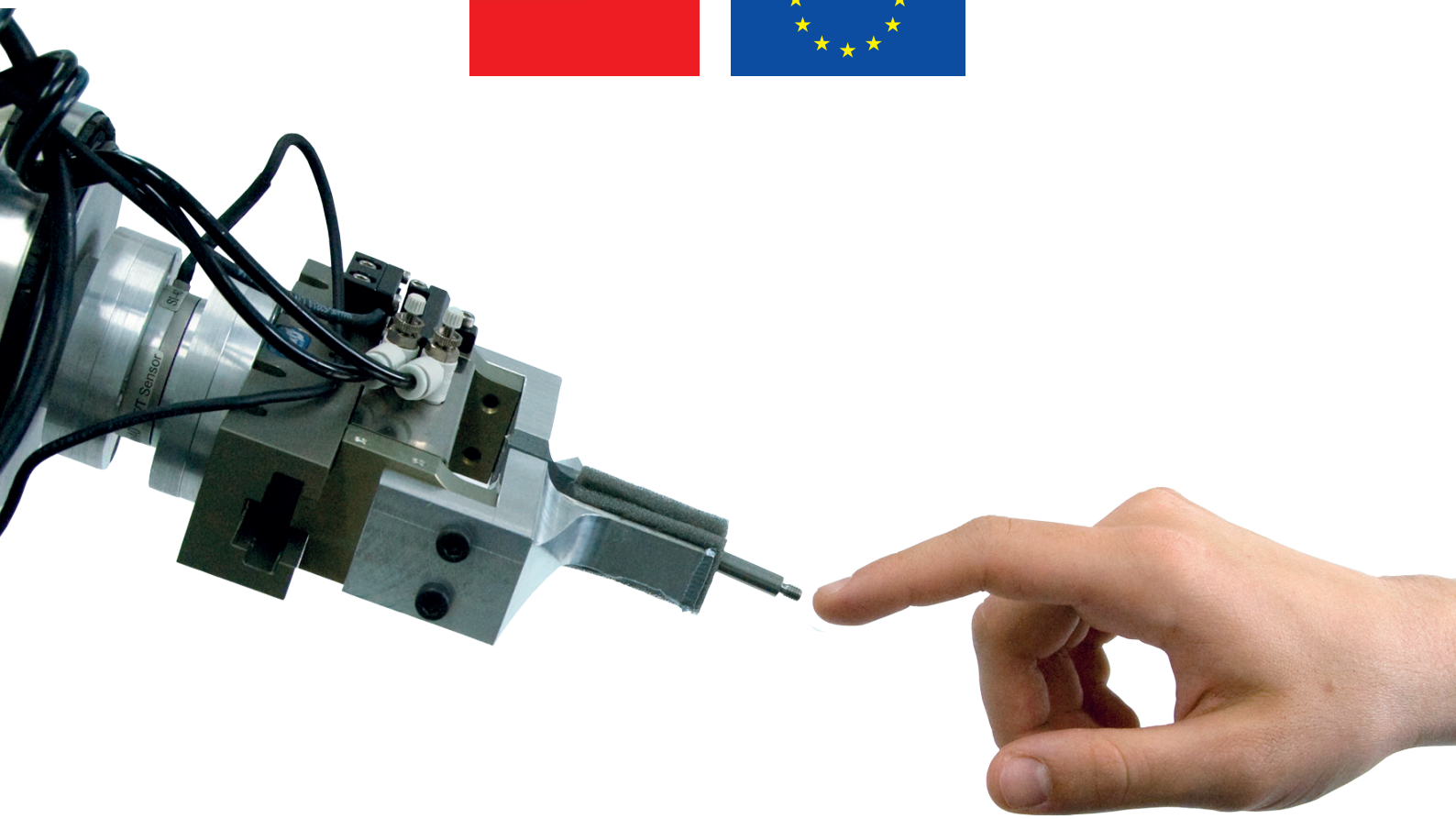
ECHORD

European Clearing House for Open Robotics Development

Robotic Research Institutions and Equipment Manufacturers in Taiwan



ECHORD

SEVENTH FRAMEWORK PROGRAMME

Technische Universität München

ECHORD – A European success story in robotics on its way to becoming a global brand

In July 2007, when I started the initial discussions with the European Commission about the possibility of advancing European robotics research through a unique new approach, one which involved major interaction between academia and industry, we agreed that this goal was indeed desirable because Europe had a very strong robot industry, significant world-class research potential, as well as technological knowledge spread throughout Europe.

The problem, however, was that, in the past, finding common ground between robot manufacturers and research institutions had been difficult, especially when it came to setting the future direction of robotics research. This was one of the recurring themes in the discussion in Europe, and a new type of cooperation was desired.

After taking a closer look at the (few) cooperations that had taken place between privileged robot manufacturers and research institutions, we found that successful cooperations became technology transfer success stories only when (i) a concrete problem was both relevant to a manufacturer and at the same time scientifically interesting to researchers, (ii) the specific competences of both sides were really challenged, (iii) the manufacturer provided state of the art equipment so that the researchers' work was carried out on the manufacturer's equipment – and the results could be demonstrated on their robots.

Due to the importance of the availability of state-of-the-art equipment, we prepared a comprehensive report and brochure on equipment and components from European suppliers, which has been updated very frequently. It has served as a very attractive platform for small companies to make their products known to a much bigger community than they had been exposed to before. This brochure can be downloaded from the ECHORD and ECHORD++ websites.

We have also prepared an overview brochure on robotics research groups in Europe. Its first revision was still rather limited in the number of groups covered, but it has grown considerably over time. It has developed into a very useful and valuable reference for everybody interested in robotics and related fields – and it will continue to be revised on a regular basis.

In February 2013, the European Commission organized a workshop to investigate robotics research cooperation with Taiwan. As a result of the discussions following this event, the idea of a Taiwan Edition of this overview brochure was born. This would enable European researchers to get a much better insight into the robotics scene in Taiwan, i.e., research institutions and individual groups.

This brochure is the result of an in-depth process of querying and conducting a number of polls in Taiwan. We introduce the groups in Taiwan in a uniform format and hope to give the reader the information he needs, in order to quickly and accurately assess the value of the work going on in Taiwan.

It is my hope that this endeavor may be of use to others and that those inside and outside the European robotics community will find this brochure useful and inspiring – just as useful as the original European edition.

Prof. Dr.-Ing. habil. Alois Knoll

ECHORD and ECHORD++ coordinator

Professor of Computer Science

Head of the Chair of Robotics and Embedded Systems

Computer Science Department of the Technische Universität München

Prof. Dr.-Ing. habil. Alois Knoll
ECHORD and ECHORD++ coordinator

Table of Contents

Part I

Robotic Research Institutions

NTU International Center of Excellence on Intelligent Robotics and Automation Research (NTU - iCeiRA)

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Keywords
Human-robot interaction
Medical robotics
Service robotics
Cognitive Robotics

Research areas

We plan to focus on research in core technologies of cognitive robotics and intelligent automation with special emphasis on the following areas and technological needs:

- **Intelligent robot integrated manufacturing automation:** learning and adaptation; modeling, analysis and simulation; control and planning; perception; human-computer interaction; structure and expression etc.
- **Medical and health care robotics:** intuitive human-computer interaction and interface science and technology entities; automatically resolve human behavior science and technology; automatically understand the emotional and psychological state of technology; suitable for all scales of high-agility operation; automated sensor-based health data acquisition technology.
- **Intelligent service robotics:** agile operation of humanoid technology; real-world 3D exploration technology planning and cognitive science and technology; strong perception of science and technology; intuitive human-computer interaction and interface type entities technology; skills learning technologies; security robotics.

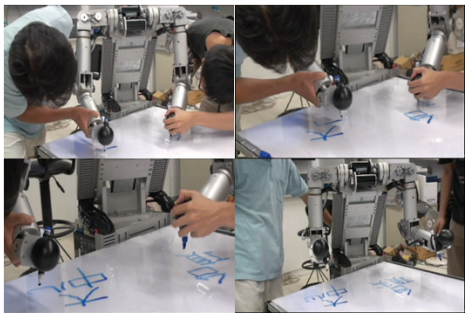
Cooperation

The center is going to cooperate with world-class research institutions and universities, including French National Center for Scientific Research (CNRS), National Institute for Research in Computer Science and Control (INRIA), Pierre and Marie Curie University (UPMC). Cooperation with foreign institutions of joint research projects and content features include: environmental modeling research; learning research skills and assignments; human-robot interaction research; autonomous decision making and action planning and implementation; control structure; in densely populated autonomous navigation and dynamic environment, and other projects.

Projects

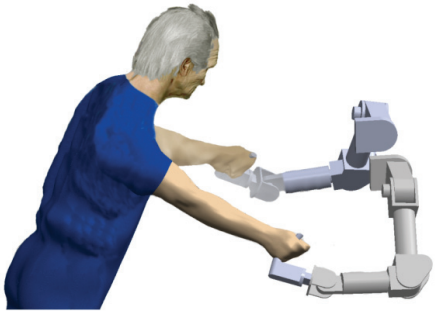
Medical and health care robots

- **Human-robot interaction - the control and application of humanoid arm**



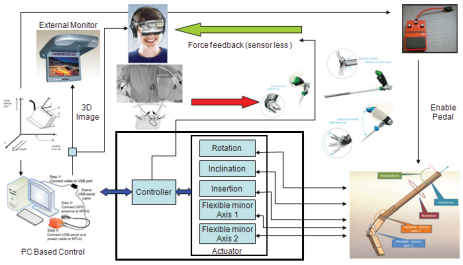
The humanoid robot arm we designed has six degrees of freedom. We use Intelligent Motion control Platform (IMP) as the computing core, and burn the algorithm to the IMP to ensure the stability of the clock in every operation. To elucidate, the algorithm we used combines with the development of force feedback compensation control and impedance control to achieve compliance control. Moreover, the arm has gravity compensation, auxiliary power compensation control, and force feedback compensation includes a multi-axis arm in the gravity compensation. In addition, compensation in addition to enhance the performance of the control also extended to many application level, to enhance the mechanical arm and the contact interaction, such as to comply with the control and teaching (Teach & Play).

- **Rehabilitation robot system**

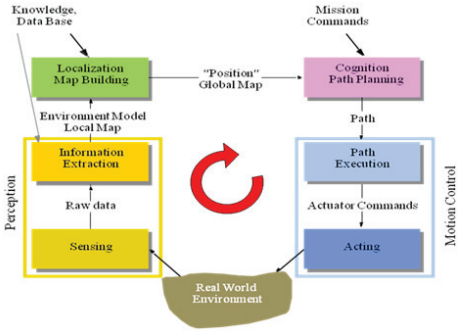


The prospective of the project is to build a dual arm rehabilitation robot system based on multi-sensors, and apply the system to clinical applications. For patients with partial or total upper limb paralysis, a robot system that can assist the rehabilitation process is able to train the ill limb through symmetric action training and repair the balancing functions of the brain. During the treatment process, various linear trajectories of action training are designed and command through the active motion of the arm of the patient, which enables the arm of the patient to be rehabilitated by the robot arm along the required trajectories. At the same time, the robot arm can record the parameters of the arm of the patient, such as the position, angle, or force of each joint, and summarize the above information to give out a set of objective and quantitative evaluation indicators.

- **Intelligent multi-DOF robotic endoscope system with sensorless force detection for assistive minimally invasive surgery**



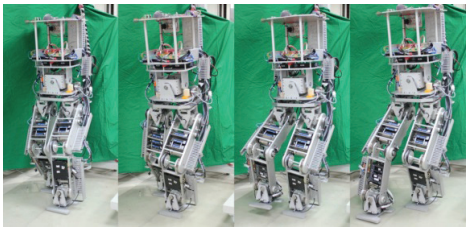
The proposal (Intelligent Multi-DOF Robotic Endoscope System with Sensorless Force Detection) provides a way to accord the different angle of the Motion Node which is mounted on the surgeon's head with an ENABLE/LOCK function to operate the position of the endoscope. The system allows the surgeon to process the surgery and operate the endoscope himself simultaneously. The force feedback will provide thw surgeon with moving resistance of the endoscope. This design can avoid patient's organ to be hurt by the moving endoscope. The system substitutes for endoscopic assistant, it can reduce manpower and improve surgical efficiency and efficacy.

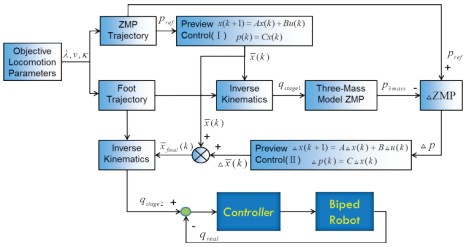


Robot Operating System (ROS)

- **Semantic map**

Semantic Map is a format in which we store our knowledge. Semantic map correlates the knowledge of objects and scenes to a location in the map, which means establishing the relationship between the environment and objects. Modules that use Semantic Map directly include Navigation, Collision Avoidance, Localization and Mapping, which means establishing the relationship between the environment and objects, Path Planning, and Human Robot Interaction, etc.

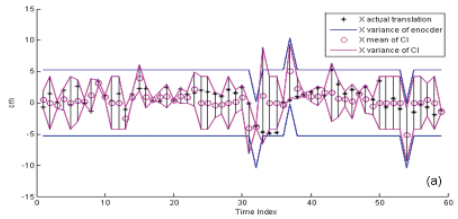




Biped Robot

- **Preview and force control of non-constant height biped walking robot**

This project proposes a control architecture for the biped walking robot with non-constant COM height. The walking pattern with up and down COM motion is generated by preview control with optimal COM height trajectory to save time consumption. A feedback force controller takes the COM as the operating point to achieve a compensation of the motion of COM.



Edutainment Robot

- **Robot pose estimation**

The Covariance Intersection (CI) is a data fusion algorithm which takes a convex combination of the mean and covariance in the information space. This figure shows Covariance Intersection Fusion result on Robot Pose Translation (a) x-direction (b) y-direction.

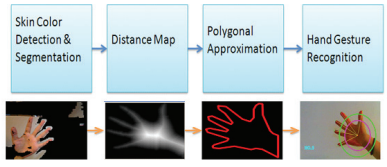
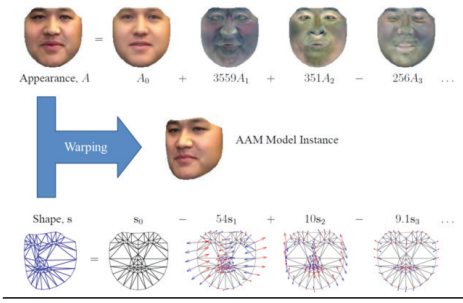


圖 — Illustrate of hand skeleton recognizer process



- **Hand recognition**

In this thesis, we propose a combinatorial hand gesture recognition algorithm which combines two distinct recognizers. These two recognizers collectively determine the hand's gesture via a process called Combinatorial Approach Recognizer (CAR) equation. These two recognizers are aimed to complement the ability of discrimination. To achieve this goal, one recognizer recognizes hand gesture by hand skeleton recognizer (HSR), and the other recognizer based on Support Vector Machines (SVM), equation is devised to synthesize the distinctive methods.

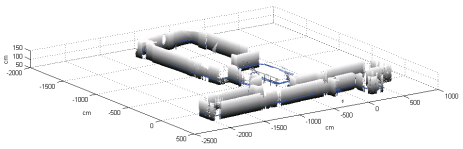
- **Facial expression recognition**

The objective of this thesis is to implement an integrated system which has the ability to track multiple people at the same time, to recognize their facial expressions, and to identify social ambiance. In our facial expression recognition

scheme, we fuse Feature Vectors based Approach (FVA) and Differential-Active Appearance Model (AAM) Features based Approach (DAFA) to obtain not only opposite positions of feature points, but also more information about texture and appearance.

- **Motion planning and control**

To develop a useful motion planning and control system of robot, the robot can do real-time motion planning through this system, and the robot can independently move in dynamic environments, to finish the tasks what we ask for. The robot's frameworks are SLAM and motion planning, also using automatic navigation algorithm. This will include sensing, perception, intelligence, control, mechanism and actuation.



- **Range estimation from stereo vision constraints**

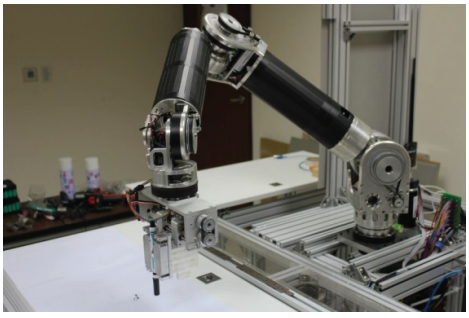
The CU optimization constraints would be applied into a linear matrix inequality (LMI). The minimum volume can be found by solving the following determinant maximization problem:

- **Panda Robot**

We implement a multi-function robot called Panda Robot. Differing from common commercial robotics and for general purpose, our robot platform has the feature of six-axis robot arm equipped, which can help the robot doing human-machine interaction with the user. The picture shows our mobile robot with 132 cm height, 65 cm width and 53 cm length. This robot is generally divided into three components. In upper layer (head), there is an X86 system, which uses wireless LAN to communicate with host computer. A camera is placed at the robot's nose. A sensor board is used to localize itself. The middle layer (trunk) has a Kinect sensor inside the chest and also has two robot arms with one DOF end-effector. At the bottom layer (lower limbs), we install a Laser Range Finder and two motors. Camera, Kinect and Laser-Range Finder (LRF) are connected to X86 systems in upper layer. And the Motion Control System is communicated to the X86 system by CAN BUS.

- **7 DOF robot arm**

The robot arm in the automated production line has been widely used, a typical robot arm with six degrees of freedom (six rotary joints). The ends of the jaws can make three directions in space translational and three rotational direction. Compared with the human arm it is more dexterous, staffing has seven degrees of freedom (the most simplified), more than a redundant degrees of freedom, can make more complex gesture. In some applications, such as curve welding or welding operations in complicated and limited space, the use of seven degrees of freedom robotic arm (as shown) is relatively easy to make, and can reduce the production line space and increase modifiability



NTU Medical Robotics Laboratory (MRL)

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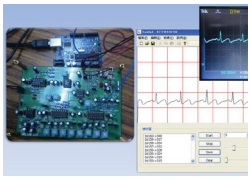
MRL is a research laboratory at the department of Electrical Engineering, National Taiwan University of Science and Technology (NTUST), Taipei, Taiwan.

The research interests of Medical Robotics Laboratory are:
Medical instruments and assistive systems



Educational Tool for
Biopotential Amplifier Design

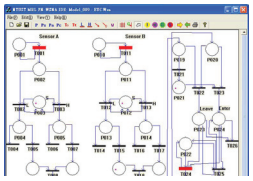
P300-based Brain-computer-interface Wheelchair Control System

Indoor Robotic Wheelchair

Pushrim Activated Wheelchair Control System

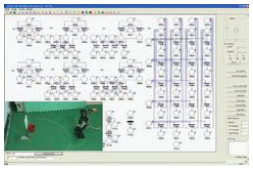
Electromyography-based Robot Arm Control System

Wireless Sensor Networks (WSN)

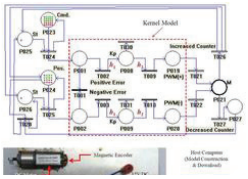


Petri Net-based Wireless Sensor Node Architecture for WSN Applications

e-Plus Solutions for a Bilateral Arm Trainer with WSN Techniques



PN-WSNA-Based Eye-Hand-Leg Coordination with a Humanoid Robot



Controllable Petri Net Based Implementation Approach for Motor Control Systems

Biped humanoid robots

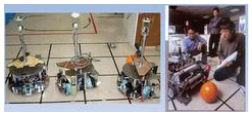
Humanoid Robots for FIRA Competitions

Humanoid Robots for RobotCup Competitions

Wheeled mobile robots

Mobile Service Robots (Platform, Sensors, Vision)

Mobile Robot with Tele-presence Applications



Autonomous Soccer Robots for RoboCup Middle Size

Robotic Cleaner with a Complete Coverage Study

Medical Robot Lab

NTU Robotics Laboratory

National Taiwan University
Department of Mechanical Engineering

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Keywords
Humanoid robot
Human-robot interaction
Rehabilitation robotics
Cognitive robotics
Robot vision
Mobile robot

Research areas

Humanoid robot (Nino)

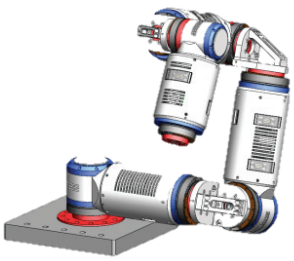
- Integrated design in foot, leg, arm , hand, head, spine, and distributed system for real time control.
- Integration of speech, biped walking, and motion coordination: Nino can perform sign language, stair-climbing, and is aimed to be a human-centered service robot.
- Development of new scenarios with human-robot interaction or cooperation, and other advanced applications.

Human-robot interaction and rehabilitation robotics

- Leg and elbow exoskeletons with variable stiffness SEA systems.
- Development of brain-controlled rehabilitation system and brain signal processing and classification.
- Human intention estimation by EMG and assistive exercise control in an elastic actuation robotic system.

Cognitive robotics

- Vision-based control on robot systems.
- Development of simultaneous localization and mapping (SLAM), pedestrian detecting and tracking with the consideration of uncertainty, etc.
- Social behavior learning: building the visual field of humans in crowded environments, observing and learning the "stand in line" behavior, constructing the simulation of pedestrians, etc.



The 6th generation robot arm – FREEDOM

The robot arms in Robotics Laboratory have been developed for more than a decade. To pursue high power density or extend the workspace, all the robot arms are designed with different concepts, configurations or actuator types. To develop further applications of robot arm manipulation in terms of kinematics redundancy, the 6th generation robot arm, FREEDOM, is designed as an 8-DOF robot arm which can be folded in a compact size. The mechanism of FREEDOM adopts the four dual-axis modularized reconfigurable actuator (DAMA), and the distributed system via CAN bus developed from the 5th generation robot arm and the embedded wires are all integrated into the robot arm to maximize the movable range of FREEDOM.

國立台灣大學機械系機器人實驗室
NTU Robotics Laboratory

NTU Five-Finger Hand V

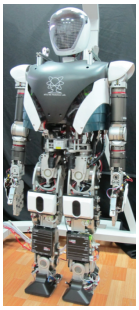
Dexterous hands have been developed in Robotics Laboratory for a long time. The robot hand with 5 fingers and 12 degrees of freedom, NTU Five-Finger Hand V, consists of five modular finger sets. Every finger set is composed of cable-driven mechanism and one series elastic actuator (SEA). All its mechanisms, drivers, sensors, and controllers are integrated on palms with specifications similar to human hands. Additionally to the ordinary manipulation of grasping motions in well-known environments and 3D models of objects, it is expected to exploit the grasp planning of picking up objects with complaint fingers without the knowledge of structured 3D models of objects.

Mobile robot – Bunny

As a platform for the research of cognitive robotics and motion planning, Bunny is capable of patrolling as a security guard, or guiding people in the public. The SLAMMOT algorithms embedded in Bunny is developed for dynamic or crowded environments with un-modeled uncertainties. With embedded sensors such as laser, camera, and Kinect, Bunny can further realize or model other behaviors partially observed from human, and then integrate with its motion planner to make itself behave more like other pedestrians. Bunny can cross the street and queue up in a bus stop or store.

Humanoid robot – Nino

Nino has 52 DOFs, 145cm in height, and 65 kg in weight. It consists of cable-driven hands with series elastic actuator design, robot arms with modular actuators (DAMA), head and neck, waist and biped mechanism. Natural walking and power saving management systems are embedded. It is capable of walking straight and backward, making left and right turns, walking on a slope, climbing up-stairs and downstairs, carrying a 3 kg-object with one hand or two hands, carrying a trolley, and performing sign language. Further navigation algorithms with obstacle avoidance and interaction with human are under investigation.



Lower-limb exoskeleton

The lower-limb exoskeleton is developed for helping the elderly or persons with lower extremity diseases. The difference to the upper limb exoskeleton is that the task is simpler for lower extremity but the load is larger. Therefore, a new backdrivable torsion spring actuator (BTSA) with hybrid control is adopted in the lower-limb exoskeleton. This approach switches control modes between direct EMG biofeedback control and zero impedance control to provide a novel rehabilitation training and walking assistance mechanism for humans.

TKU Intelligent Control Laboratory

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I. C. Lab is one of the research laboratories within the Department of Electrical Engineering at the Tamkang University (TKU), and is directed by Dr. Wong, Dr. Li and Dr. Cheng. Our research interests are in the area of automation systems, intelligent control, intelligent robots and SoPC embedded system.

Projects

Small Size Humanoid Robot (2004 ~ now)

The main purpose of this project is to design and implement a small size humanoid robot. The research group began to develop the small size humanoid robot in 2004. Since then eight small size humanoid robot have been developed. In this project, six parts are designed: (1) mechanism design, (2) robot vision, (3) localization and navigation, (4) gait pattern design, (5) behavior design, (6) human-machine interface.

Vision-based Autonomous Soccer Robot (2003 ~ now)

The main purpose of this project is to design and implement a vision-based autonomous soccer robot system. In 2003, the research team began to develop the soccer robot system. Four FIRA soccer robots and three RoboCup soccer robots have been developed. The soccer robot system is composed of a soccer robot team of multiple robots cooperating with each other to complete the robot soccer competition. Each robot is an autonomous wheeled robot. It can be placed in the dynamic environment of the soccer field, and make a behavioral decision independently. This system has an omnidirectional vision system and an omnidirectional mobile chassis. The major research focuses: (1) robot vision, (2) software architecture frame of component, (3) localization and navigation, (4) motion control, (5) motor control, etc.

Intelligent Robot Manipulator (2008 ~ now)

The main purpose of this project is to design and implement a 6 DOF robot manipulator. In designing this manipulator, it is aimed to complete all tasks in HIWIN Robot Manipulator Competition, such as writing, drawing, placing dominos, and classifying colored balls. In order to achieve our goal, four key techniques need to be considered: (1) mechanism design, (2) image recognition and analysis, (3) motion control of the manipulator, and (4) design of the motor control. Specifically, we won the third place in the 2010 HIWIN Robot Manipulator Competition during the developing process.

Home Service Robot & Security Robot (2008 ~ now)

The main purpose of this project is to design and implement a home security robot system. The research focus of TKU @Home team has five parts: (1) mechanism design, (2) navigation, (3) localization and mapping, (4) vision recognition, and (5) intelligent control. In addition, during developing process, our team has participated in the RoboCup @Home League. Furthermore, we attended the "2010 SKS Security Robot Competition" and won the championship.

Part II

Robotic Equipment Manufacturers

Advantech Co., Ltd.

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The Advantech 3-Circle Principle is based on „Good to Great" written by Jim Collins. According to the book, a company looking for long-term success should clearly address the 3-fundamental principles, and commit to long-term solid execution of these principles. Advantech is fully convinced by this theory so we adhere to it by clearly defining Advantech's 3-Circle Principle .

Founded in 1983, Advantech is a leader in providing trusted, innovative products, services, and solutions. Advantech offers comprehensive system integration, hardware, software, customer-centric design services, embedded systems, automation products, and global logistics support.

We cooperate closely with our partners to help provide complete solutions for a wide array of applications across a diverse range of industries.

Our mission is to enable an intelligent planet with automation and embedded computing products and solutions that empower the development of smarter working and living. With Advantech, there is no limit to the applications and innovations our products make possible.

ADVANTECH

Enabling an Intelligent Planet

World-class recognition

Advantech is an authorized alliance partner of both Intel® and Microsoft®. Our customers will find the technologies we use inside our products to be widely compatible with other products in the global marketplace. In 2008 and 2011, Interbrand, the world renowned brand consulting firm, once again recognized Advantech as one of the Top 10 Taiwanese global brands. Advantech appreciates this recognition of our efforts to build a trusted, global brand; it also symbolizes a promise we gave to our business partners, which was to do our best to keep building a trustworthy brand that is recognized everywhere in the world.

Mission & Focus

Advantech defines its brand mission as "Enabling an Intelligent Planet", to empower innovative technologies and solutions.

Advantech welcomes the advent of Internet of Things (IoT) and cloud computing with a new slogan to reflect the company new corporate image for the new era: "Enabling an Intelligent Planet." In addition to refining its existing product applications, Advantech modifies its operation strategies accordingly and focuses on promoting all-inclusively integrated IoT solutions. The company would also earmark substantial capital and manpower into strengthening its presence in the vertical market. Using the company strong support solutions in cross-industrial service platforms and advanced worldwide web software technologies as leverage, Advantech endeavors to develop intelligent IoT-centric applications. The company is eyeing to become the most influential multinational in IoT, automation industries and embedded computing to offer its esteemed clients a diversity of value-driven custom services; through continuous innovative applications development, Advantech puts its strengths into ensuring greater intelligent lifestyle wellness for mankind.

Advantech has been an innovator in the development and manufacturing of high-quality, high-performance computing platforms since 1983. It offers comprehensive system integration hardware, software, customer-centric design services, global logistics support and an industry-leading front and back office e-business infrastructure. With Advantech, there are no limits to the applications its products can offer.

ADVANTECH

Enabling an Intelligent Planet

Compal Communication Inc. (CCI) - UrRobot

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Record of Events
New Tech. Development Dept., 2007
Home Companion Robot RBC1, 2009
iF Product Design Award, 2008
New Business Development Division, 2009
Established UrRobot brand, 2011
Edutainment Robot Product "Robii", 2011
Taiwan Excellence Award, 2011
Gold Award at the Inventions of Geneva, 2011
Robot & Intell. Automation Business Division, 2012

Brand vision

Caring + Thoughtfulness is UrRobot's core spirit. Our goal is to create a more technological, convenient, safe, fun and happy ideal life for you and me. UrRobot made technology is no longer cold, and makes the robots friendlier; we advocate that technology is developed from needs, and product design must also start from human needs. Therefore, UrRobot must find out your needs in advance, and focusing on you to create a sensible technology dedicated to you.

- UrRobot can be your family, to be considerate of you and care for you;
- UrRobot can be your friend, to accompany you and share with you;
- UrRobot can be your housekeeper, to be thoughtful and take care of you.

Thinking for You . We visit consumers like you from every corner of the world, and participate in your daily lives. We try out best to understand your needs and the problems you want to solve. We don't design just for designing's sake; we design for you. Because we hope that when you see the product, you will surprisingly say: "This is just what I wanted! How did you know?"

Brand inspiration

After entering the 21st century, the aging population and declining birthrate phenomenon have become global trends; the reduction of the global productivity population will cause human life, social structure and economic development to face unprecedented changes. Therefore, how to apply intelligent technology to solve the new social needs resulted from the aging population and declining birthrate structure will become an important issue.

CompalComm had started the development and integration of intelligent home robot related technologies years ago, and has also been observing consumer needs. We have also combined multi-resources from industries, government, academics and researchers to develop a key core technology together. After cultivating quietly for several years, the UrRobot brand was established in 2011, striving to start from consumer needs, apply innovative technology, integrate services, allowing robots to become closer to human life and enter people's families to satisfy their real daily living needs. On the other hand, through the development of innovative technology and the integration of industry supply chains, increase the overall competitiveness of Taiwan's robot industry, and finally use creating a more advanced and happy human society as our mission.

About the team

CompalComm is the largest smart phone ODM manufacturer in Taiwan; our main customers include various major cell phone brands and telecommunication businesses. We invested in the research and development of robot technologies since 2007, and expanded the new business development office in 2009, and invested 100% towards the development of the robot industry; we hired more business marketing and brand management personnel. At the beginning of 2011, we revealed the world's first edutainment robot Robii with projection functions under our own brand UrRobot, and received great reviews from various communities.

Chairman Ray Chen and General Manager Stephen Chen participating in the Robii Product Launch Press Conference.

HugBot

The love comes from embracing. It has been verified that we all need physical contact to feel well, and one of the important forms of physical contact is the hug. UrRobot was established in 2011, striving to start from consumer needs, apply innovative technology integrate service, allowing robots to become closer to human life. According to the mentioned before, we are developing a highly touchable, huggable robot who can share his warm hug with you, also has some high tech and unique functions like non-contact vital monitor, ring microphone array etc.

Characters & Innovations

- The worldwide first warm hug robot
- UWB non-contact vital monitor
- Ring microphone array.

Applications & Benefits

- Kindergarten, elementary school
- Amusement park
- Hospital, nursing home.

S-Man

S-Man (Sales Man) is the mobile robot designed to assist salespersons as an intelligent demonstration platform. A salesman can easily use the control interface to operate the robot. The robot's operator can give orders to it, such as moving robot, moving lifting platform, doing presentation, telepresence. S-Man lets salesman do presentation conveniently and shows their products at any time and any place. S-Man provides sufficient information for salesman's reference, such as audience's number, telepresence and the robot's position etc.

Characters & Innovations

- Plug-in demonstrating platform module
- Automation lifting platform
- Embedded navigation and avoidance system
- Recording customer's information and analysis
- Built-in laser, IR, sonar and camera sensors.
- Auto battery charging

Applications & Benefits

- Exhibition, shopping mall
- Telepresence
- Mobile brief and multimedia.

HIWIN Technologies Corp.

Location
Taichung, Taiwan

Website
www.hiwin.com.tw

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Fax: +886-4-23594420
business@mail.hiwin.com.tw

Company profile
Established: October 1989
Founder: Eric Y. T. Chuo
Employees: 3442 (Aug, 2011)
Global headquarters: Taichung, Taiwan
Overseas subsidiaries: Germany, Japan, the United States, the Czech Republic, Switzerland, France, Israel
R&D centers: Tokyo (Japan), Offenburg (Germany), Moscow(Russia), Yiselie.
Worldwide manufacturer of a complete line of motion control products

Management philosophy
To integrate global resources for continuous innovation, to provide a better way of life and a better working environment for mankind, to achieve the goal of continuous operation through practices of professional excellence, working enthusiasm, and enterprise responsibility.

Mission statement
To provide a better way of life and a better working environment for mankind

1. For Taiwan: be able to develop high precision, high-tech, high value-added industrial products.
2. For the world: HIWIN products can replace hydraulic components, reduce pollution and noise, and conserve energy.
3. To provide a safe, clean and comfortable environment for employees as well as to maximize profit for shareholders.

Our Name: "HIWIN"
HIWIN is a combination of HI-tech and WINner and means, "With us, you are a hi-tech winner." As you incorporate our product within your applications, you will realize the uncompromising value and leading technological advancements available through HIWIN. Beside this, we also take pride in our industry's acknowledgments of our innovative technology. The principle of providing our customers with greater value through technological advancements and enhanced global competition is the foundation that supports HIWIN's plan to be the leader in hi-tech industry. HIWIN has become a well-known brand with patents registered in over 34 countries including the US, Japan, the European Union, and more.

HIWIN®
Motion Control and System Technology

Our corporate colors – Green & Red

Green: Signifies the idea of environmental consciousness, nature, and continuous growth.

Red: Denotes enthusiasm, aggressive work ethic, and an indomitable, innovative spirit.

HIWIN Technologies Corp. is professionally engaged in the innovation and the manufacturing of ball screw and motion control components. Always regarding "Professional excellence, working enthusiasm, and enterprise responsibility, " as our management philosophy since HIWIN was established, we strive for meeting with the demand of all fields.

In order to establish the environmental protection and the occupational health & safety as systematization, HIWIN emerges the concept of environmental protection and occupational health & safety into the decisive processes of innovation, manufacturing and service of products, adoption of raw material, and abandonment of waste material. Also, we will keep continuous improvement upon them to take up our responsibility of the prevention of pollution, the reduction of waste material, the saving of resources and energy, and the protection for employees' health & safety.

To implement this policy effectively , HIWIN promises to all its employees, customers, suppliers, and the public the following:

1. Educate and upgrade HIWIN employees' concept about the environmental protection and occupational health & safety; and keep on the mutual communication with our suppliers and customers.
2. Abide by the laws, the regulations, and the other requirements of the government concerning the environmental protection and the occupational health & safety.
3. Stress on the prevention work against pollution and actively keep on the improvement.
4. Be secure and legal on treatment for discard material and enduringly proceed the deduction of industrial wastes.
5. Protect natural resources and economize the use of energy.
6. Promote the prevention work of occupational health & safety to reduce its hazard and risk, and also carry on the improvement to the target of "zero accident".

HIWIN will make all employees comprehensively understand and keep on the execution of our environmental protection and occupational health & safety policy through internal audits and continuous training. Besides, HIWIN will convey this policy to those, who work or stand for the organization to work, through suitable media to let all relative organizations realize HIWIN's definite determination upon the management of environmental protection to the earth and occupational health & safety for all HIWIN employees.

Innovati, Inc.

Location
Hsinchu City

Website
http://www.innovati.com.tw

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Hsinchu City 300, Taiwan (R.O.C.)
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service@innovati.com.tw

About Innovati

Innovati, Inc., located in Hsinchu City, Taiwan, is the first high-tech company dedicated to the R&D, production, and sales of personal single-board computer systems (PSBC). The business scope of the company includes the design, development and sales of the single board computer "BASIC Commander" and its peripheral modules.

Since the establishment of the company in 2005, the company has been devoted to the development of the personal single board computer and its peripheral application modules. The company provides simple software and hardware development platform to reduce the threshold for the individual user to develop the micro-controller-based applications so that the design of micro-controller-based applications will not be the privilege of the professional technicians. The company hopes to supply the best product options for the creative users.

BASIC Commander® System

Application areas for Innovati's personal board computer are wide and varied and could include creative DIY hobbyists, robotic development, school educational projects, creative student special projects as well as an engineering tool for rapid project implementation etc.

The system allows those with limited electronic experience, to quickly and easily assemble many types of innovative products and ideas. Some of the BASIC Commander® system special characteristics includes BASIC type langue development platform, low learning threshold, BASIC Commander® provided high level functional instruction set, totally object-oriented peripheral modules, command bus for controlling up to 32 external peripheral modules, USB connection to PC for real-time human interface etc.

These features combine to provide a system that is not only suitable for entry level students as a means to quickly cross the microcontroller system design threshold but also as a system for professionals to quickly develop high level microcontroller applications.

innovati

Robot Kits

16-DOF Robotinno™ Kit

The 16-DOF Robotinno™ Kit is a humanoid robot kit, composed of 16 metal-geared RC servos, aluminum brackets and a Servo Commander™ 16 control board. By using the innoBASIC™ language and Motion Editor utility, users can easily design and implement their own humanoid gait research. This kit is suitable for more advanced hobbyists and for college robotics. With its dexterous maneuvering capabilities, it is also very suitable for participation in robotic competitions.

Miniubot™ Kit

The Miniubot™ is a universal robotics bot, composed of 2 DC-motor, aluminum chassis, Sonar and IR modules. By using the innoBASIC™ system, users can easily and seamlessly add more modules on the bot for more complicated robotics research. The Miniubot™ is also capable of communicating with a computer. This further integrates computer-based platforms with the innoBASIC™ system for robotics researches, which require large amount of computations, such as vision recognition.

LNC Technology Co., Ldt.

Website
lncen.weebly.com

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Taichung City 407, Taiwan
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service@LNC.com.tw

Hello, we are LNC! LNC Technology Co., Ltd. We produce powerful CNC controllers that continually push the boundaries of innovation to provide true precision control for relating machine makers.

LNC was founded in October, 2000, with a capital of NT600millions. Today, we are the leading brand of CNC controller in the Chinese market with 300-400 employees. We provide a wide range of numerical controllers that can be applied broadly to CNC machines, such as turning, engraving, milling, grinding & punching machines, as well as to equipment for robots, injection molding machines, semiconductor, LCD, automation, and other related industrial fields. As for the CNC accessories, we also have innovation on spindle inverter, spindle motor and sewing machine motor. We developed various types of CNC controllers, not only in metal cutting, punching, grinding and other areas of outstanding high-end machine tools, because we have quick expansion at China and Taiwan market share, but also across to plastic rubber injection, robot, saving energy system, spindle motor, sewing machine motors and other industrial machinery.

Such diverse products can be applied on large-scale end-user factory (such as electronic assembly plants), from product mold processing, parts stamping, polishing, grinding, plastic injection to final product pick & put one-stop automation production line. Around the world of controller manufacturers, LNC is the only company that can provide such complete service in the Chinese industry.

Our mature R&D technology, outstanding manufacturing capacity, and uncompromising quality control ability are the key reason to be the worldwide leading brand controller provider.
Our entire series of controller products are all with CE certificates. The reason why LNC is the best controller choice is mainly because of the great cutting performance which can compete with international suppliers. At the technology, branding, service, price layout, we have achieved remarkable recognition over the past couple of years. Many leading machine makers use LNC controller on their standard models and also on application of high-end multi-axes, dual system, and high precision design ones. LNC's product portfolio offers easy-to-use solutions that embrace the full range of operation resources, remote monitor function anytime and Ethernet on the go. By this strength, we should become the leading innovative supplier of high-end and high-quality machines by providing value-added design, world-class manufacturing and logistic and service capabilities.

In order to continue to expand market share in the world's largest market-China, we have been successively set up marketing service divisions in China in Dongguan, Kunshan, Ningbo, Tianjin, Nantong, and Chongqing to offer customers the most immediate service. Recently, we also have expanded service facilities to the inside regions. In the global layout, we already have channel sales in Turkey, Thailand, India, and Vietnam and plan to establish sales service centers all over the world. With a strong sales service team and partners around the world to provide the most immediate service, LNC is working towards to being a world-class brand.

LNC mission
Professional, good at hardware and software technology; Service, offer best service; We create a better life for you!!

LNC vision
To be a world-class brand, use automation to create better future.

LNC product
CNC Machine Controller, including lathe (turning machine), milling machine, engraving machine, machining center, grinding machine.
Injection Molding Machine Controller, including all-electric, hydraulic, hybrid injection molding machine.
Robot Control System, including injection molding machine, CNC machine.

TECO Electric and Machinery Co., Ltd.

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Taipei, Taiwan

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Description of the company

Since its founding in June of 1956, TECO Electric and Machinery Co., Ltd. has never rested on the laurels of its own success. TECO has started out as an industrial motor manufacturer since 45 years ago. Over the years, it has successfully diversified into a conglomerate with worldwide business operations. TECO is not only renowned as a leading heavy electrical industrial brand, but also as a leading manufacturer of home appliances, telecommunications equipment, IT systems, electromechanical components, and commercial electronics. Not satisfied with producing motors or limited by home appliances, the TECO Group is also committed to the medical information system, e-commerce, semiconductor, optronics, network, software, infrastructure, financial investment, food services, and distribution industries, becoming a globalized, high-tech enterprise group. TECO group has about 30 subsidiaries and affiliations across Asia, America and Europe, and the total employee number is over tens of thousands. TECO is forever dedicated to long-term development, creating new competitive advantages, enhancing service quality, developing top-flight personnel, and creating outstanding products.

Range of products

JSDA+ Advanced AC Servo Drive

The JSDA+ series, the input voltage is AC 200-230V single/three phase and AC 380-480V three phase, the rated output is 100W- 15kW, encoder resolution is 17-bit (Incremental) or 15-bit (Absolute). This is a high quality, high reliability and high stability product, with high performance, high accuracy and fast response motion control are available for mechanical applications. We can provide a full product range with excellent performance applicable to low speed and high rigidity processing equipment with high level of protection and coordination for main circuit and control circuit. Besides, we have the features listed as below, torque/speed/position/internal 32-step positioning mode and mix mode switching, speed bandwidth response is up to 800Hz, the braking transistor and braking resistor is built-in. We also have multi-set of programmable I/O ports for multi-function and RS-232/RS-485 communication interface.

JSDE+ Standard AC Servo Drive

The JSDE+ series capacity is 200V 100W~3kW, it support 2500/8192 ppr incremental Encoder and the frequency Characteristic is up to 600Hz. With torque/Speed/ Position/Internal mode (32-step) and mix control mode, the customer can use our drives for different applications. Besides the value of rotation resolution divided can be set as controller and we provide built-in regeneration discharge function (with optional Regenerative resistor). We also have programmable DI/DO ports for multi-function and RS-232/RS-485 communication interface.

JSMA Standard AC Servo Motor

The JSMA series, the rated power output is 50W- 15kW, the frame size is 42/60/76/80/86/130/180/220mm for our customer to choose. The encoder resolution is 2500ppr/8192ppr/17-bit (Incremental) and 15-bit (Absolute), the rated speed range is 1000/ 1500/ 2000 and 3000rpm for different motor, the torque range is 0.48N-m ~ 204N-m.

JSMA series provides excellent performance, smooth operation, high quality and stability, and a full range of performance with outstanding high torque output, besides low noise, low vibration, elegant appearance, easy installation and IP67 enclosure are also available.

Victor Taichung Machinery Works Co., Ltd.

Location
Taichung, Tawian

Website
http://www.or.com.tw

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Victor Taichung Machinery was founded in 1954 and started with making conventional lathes and now steadily supplies CNC machine tools and PIM Plastic injection molding machines by devoting her management to non-stop R&D and innovation. With a working capital of 35 million US Dollars and 900 employees around the world, Victor Taichung has four manufacturing plants in Taiwan and two factories in China to produce about 200 sets CNC machines tools and 80 sets PIM machines monthly. To ensure customers' return on investment, Victor Taichung has invested considerably in setting up a distribution network in teams of global vision and local touch for her sales and service support worldwide. Besides the qualified exclusive agents around world, Victor Taichung has 8 overseas subsidiaries in Germany, France, UK, US, South Africa, Thailand, Malaysia and Indonesia to provide customers efficient after-sales service and technical supports.

Victor Taichung is also the leading manufacturer in Taiwan for wheel machining by integrating vertical lathes and horizontal machining centers and capable of offering Turnkey Solution for the unmanned operations on her machinery ranges. In keeping with the constant growth and development of product range to ensure staying at the forefront of the machinery industry, Victor Taichung has taken on the task of producing FMC (Flexible Manufacturing Cell) by integrating robot, part feeding and/or unloading system into her machines built with FA interface for unmanned operation with minimized cycle time.

VICTOR-TAICHUNG

Single lathe with built-in articulated robot

Gantry robot for single or multiple lathes

Single lathe with articulated robot

Unmanned cell for Alloy rim machining

Mold injection with robot for auto part unloading.

VICTOR-TAICHUNG

Part III

Robotic Organizations

Industrial Technology Research Institute (ITRI)

Location
Chutung, Hsinchu, Taiwan

Website
www.itri.org.tw

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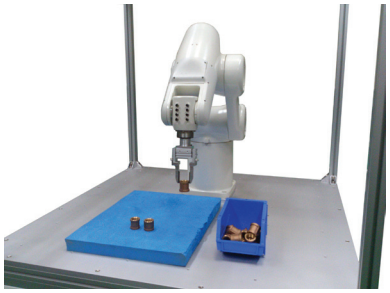
Wang_Alex@itri.org.tw

Description of the organization

Industrial Technology Research Institute (ITRI) is a nonprofit R&D organization engaging in applied research and technical services. Founded in 1973, ITRI has played a vital role in transforming Taiwan's economy from a labor-intensive industry to a high-tech industry. Numerous well-known, high-tech companies in Taiwan, such as leaders in the semiconductor industry TSMC and UMC, can trace their origins to ITRI. ITRI has worldwide offices in Germany, Russia, US, and Japan with an aim to promote international collaboration. ITRI has been conducting research and development on intelligent robotics and intelligent automation for years. Technologies developed in ITRI covers robot design and control, 2D/3D vision, autonomous transport robots, exoskeletons, and intelligent manufacturing robot cells and systems.

Range of products and technologies

HEF- Hand-Eye-Force coordinating robot controller - With compliance teaching. The Hand-Eye-Force (HEF) coordinating controller is a general robot controller from ITRI which allows low-level dynamics and force control. It supports 6/7-axis A-type robots as well as 4-axis Delta-type robots. One unique feature of the HEF controller is the "compliance teaching ability" which allows operators to freely move the robot arm by hand without adding extra force/torque sensors. In addition, the collision and impact detecting mechanisms ensure a better safety interaction in human-robot-cooperation. A GPU-based vision system is built-in with the HEF controller which provides the low-level integration between vision and motion. Complex applications such as visual servo can be achieved by only one HEF controller.



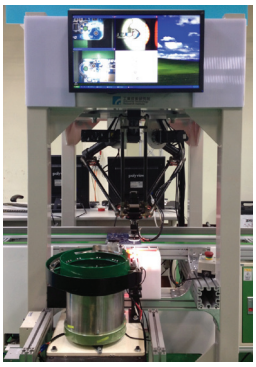
IBPS1- 3-D Vision Guided Random Bin Picking System. Random bin picking technology enables robots to pick randomly ordered components from bins, as an alternative to parts feeder but more flexible. It provides solutions for presently flexible automation. IBPS1, the first-generation bin picking system developed by ITRI, comprised of high-resolution high-precision 3-D vision sensor, generic pose estimation technology, and collision-free motion planning overcomes some key problems of bin picking, including object overlap and occlusion, significant variations of lights and shadowing, and grasping parts without collision. IBPS1 presents the opportunity for significant benefits such as faster productivity and reducing labor costs.

ITRI
Industrial Technology
Research Institute

AGVs – Autonomous guided vehicle for indoor material transport. AGVs are developed for transporting material in factories or warehouses to ease the burden of human labor. All the parts in our AGVs can be customized according to need. The speed of AGVs can reach up to 1m/s going straight and 0.6m/s during an R600mm turn. A variety of AGVs are developed for different application requirements such as heavy payload and compact size AGVs. In addition to factory or warehouse usage, our AGVs can also be applied to facilities such as hospitals. Our AGVs have been tested in real factories and warehouses.

EXO-R – Exoskeleton robot for assisting SCI patients walking. EXO-R is developed to assist patients suffered from spinal core injuries to walk on their own. EXO-R will improve a patient's daily living quality by allowing the patient to move freely according to his/her will. EXO-R supports non-stop walking, sit-to-stand, stand-to-sit motion. EXO-R has features of self-locking joints, light weight structure, gait estimation, and user pose stabilization. EXO-R is designed to be affordable and can be used in patient's living environment as well as rehabilitation training facilities.

IPCAI - Intelligent PCB DIP Component Automatic Insertion. IPCAI is a robotic PCB assembly system that inserts DIP components on PCBs. The system identifies the pose of incoming components from feeders and the pose of PCBs through intelligent vision algorithms. Assembly robots adjust the picking and insertion position dynamically based on the pose estimation result from vision. In addition, DIP components can also be inspected before insertion is carried out. IPCAI has been applied to the assembly of DIP capacitors on PCB mainboards in real factory lines.



The main features are:

- Force/Compliance control
- Customizable and open robot control architecture
- Full robot system including HW/FW/SW available
- Fast vision system
- Hand-eye-force coordination
- High cost/performance ratio autonomous guided vehicle
- Patient tested walking assist exoskeleton technology
- Industrial proven manufacturing systems

ITRI
Industrial Technology
Research Institute

Institute for Information Industry (III)

Website
web.iii.org.tw

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http://web.iii.org.tw/Contact

In 1979, III was incorporated as a Non-Governmental Organization (NGO) through the joint efforts of public and private sectors, to support the development/ applications of the information industry as well as the information society in Taiwan.

Besides technology advancement, III's mission has evolved from Information Technology (IT) to Information and Communication Technology (ICT) development with a wide social coverage.

Since its inception, III has been a source of vision, innovation and technological excellence. It is a major contributor to Taiwan's development into a significant player in the global ICT industry. Whilst dedicated to reinforce industrial development, III has also helped promote full utilization of ICT technologies hence advancing the establishment of a modern information society in Taiwan. As a result, Taiwan ranks 12th in the WEF/GCI (Global Competitiveness Index) and 11th in the WEF/NRI (Network Readiness Index) in 2009-2010.

III's unique success is attributed to a well-orchestrated cooperation between the government and private sectors, which has drawn attention worldwide (e.g. WEF information technology report 2005 - 2006). Today, with more and more international collaborative projects that offer the benefits of its engineering expertise and management skills, III has been aiding many other countries across the globe to develop their own ICT industries and build their own information infrastructures for economic competitiveness and social development.

III not only emphasizes cross-disciplinary environment, university-industry collaborations, techno-cultural co-development, but also has supported Taiwan's ICT industry with advanced technologies and international links that help strengthen global competitiveness, focusing on areas such as:

- Intelligent Digital Life, embedded systems (MeeGo, Android), mobile multimedia, networks/communications, smart handheld devices, information appliances, sensor networks, audio/video codes, 3D graphics, WiMAX, broadband and wireless industries, Green ICT, information security, Telematics, WAVE/DSRC,
- Strategic planning and development of large scale national infrastructure and application systems, such as e-Government, e-Transportation, e-HealthCare, e-Logistics, e-Weather, e-Banking, Natural Disaster Mitigation and RFID applications,
- Cloud computing, Living Lab, S.E.E. (service experience engineering methodology),
- Market intelligence gathering and analysis, science and technology law implication, promotion and media services
- Future Smart Classroom, standardized content authoring tool, M-Learn authoring tool, Learning Management Systems (LMS), Content Management Systems (CMS), and Content Trading Platforms that provide e-Learning companies with core technology modules for speeding up their developing process, as well as offer a total solution for enterprises to develop in-house training courses, and
- Professional training on ICT, IT Enabled Services, Operations and Management, and Digital Content fields.

Metal Industries Research & Development Centre (MIRDC)

Location
Kaohsiung, Taiwan

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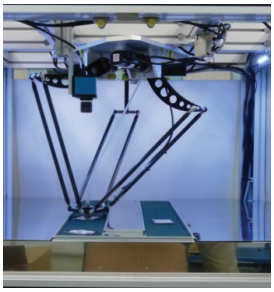
huang@mail.mirdc.org.tw

Description of the company

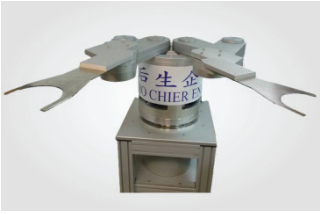
Metal Industries Research & Development Centre in Taiwan is a non-profit organization established in October 1963 for researching and developing the leading technology of metal and its related industries in Taiwan. The main service fields of MIRDC include basic metal industry, metal products industry, machinery industry, electrical and appliances industry, transport equipment industry, precision instrument industry, etc. The goal of MIRDC is to promote the growth and upgrading of metal and metal-related industries of the country so that manufacturers in Taiwan are more competitive in the international market.

Range of products



Delta robot with vision feedback for rearrangement application. The self-developing Delta robot arm is composed of three identical serial kinematic chains which are connected to the fixed base platform by three actuated revolute joints. It can execute a fast pick-and-place movement for rearranging workpieces from a moving conveyer belt through a vision module. The vision module can capture the images from workpieces in real time and identify the shapes, orientations, and colors of workpieces. In future, on-line high speed flaw inspection and classification in this system may also be performed to provide the feasibility of intelligent automated manufacturing.

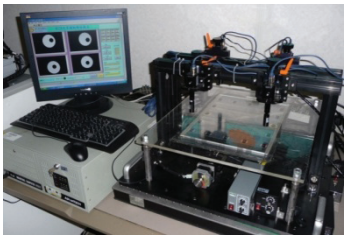
SCARA robot with vision feedback for assembling application. The integrated system is composed of a self-developing SCARA robot arm, four linear tables, and one XXY table for demonstrating an automatic assembling task. In this system, XXY table can provide a high accuracy positioning movement in x, y, θ direction for compensating the movement error from SCARA robot arm. The vision module can identify the characters from workpieces through image pattern matching technique. The matching template can be defined and selected by the users.



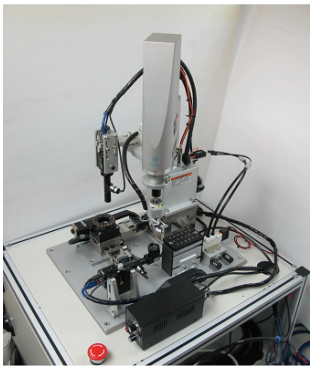
Dual-arm robot system for wafer loading/unloading. The self-developing dual-arm robot system can provide the local semi-conductor manufacturers for automated transport applications of 2 to 8 inches wafer. The mechanics of this robot contribute to its simplicity, modular design, easy control, teaching, and programming.

MIRDC

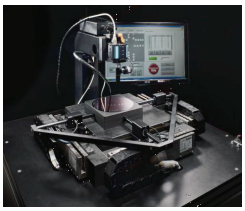
Multi-image acquisition module for auto-alignment application. In recent years, the consumer electric products have been approached to lighter, thinner, shorter, and smaller. The conventional alignment technique cannot satisfy the manufacturer's need. In order to improve the alignment accuracy, the multi-image acquisition module combined with a XYθ table was developed to achieve the target positions under the micro dimension size. This module is easy to equip on many manufacturing devices such as exposure machines and touch panel laminators.



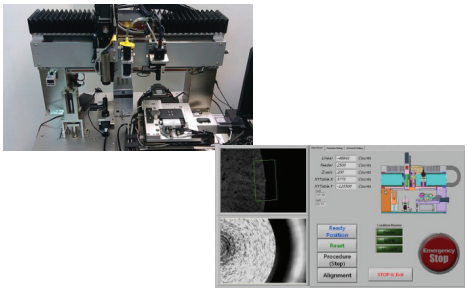
Micro/meso- automatic assembly system. With its broad applications, the domestic industry of the micro/meso- automatic assembly system is facing the increased demand from relative customers. However, due to the lack of experience of integration among the design of mechanical structure, image processing, and the micro-assembly system, most of the local companies adopt the imported equipment and technologies as a solution such that the business cost are increased. In this project, a SCARA and the machine vision were integrated. Via the vision and fast spatial alignment approaches, various parts could be assembled in higher speed to enhance the accuracy ant the quantity of the production. The requirement of mass assembly works with manpower is alleviated by applying intelligent automated system with higher flexibility and complexity during the manufacturing processes.



The coplanar three-axis positioning device. The coplanar three-axis positioning device can provide an X-Y-θ coplanar sub-micron positioning with long stroke movement. This device is able to solve known problems that the existing multilayer positioning platform causes cumulative errors. This device is composed of three linear actuators, air bearings and air-floating structure design for reducing the friction between each mechanical component.



Application - cartesian robot system for rotary encoder assembly. The Cartesian robot system is composed of a gantry robot arm, dispensing module, UV curing module, and XY table for auto-assembling a rotary encoder. This system uses 2 CCD cameras to obtain the relative position from the characters of the encoder disc and metal body. The encoder disc is picked and placed on the assembling position through the nozzle gripper after the UV-glue dispensing. The UV LED is embedded in the nozzle gripper to execute the curing process when encoder disc in assembling position. This system provides a more effective manufacturing is then resulted with upgraded quality of the products.



MIRDC

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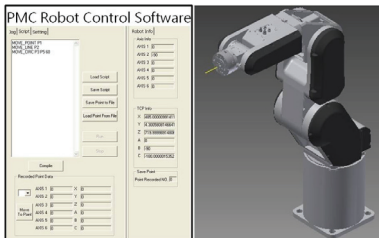
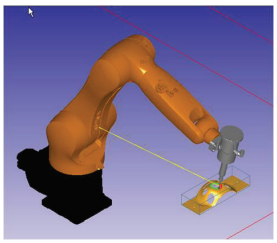
Description of the company

PMC is a group of service teams organized by specialists in the field of mechanical engineering, electrical engineering, control engineering, and information tech & management. PMC was founded by the government and Taiwan Association of Machinery Industry, established on June 1st 1993. PMC is a non-profit organization to help machinery manufacturers to value up the products. The responsibilities of PMC are to improve the image of Taiwanese precision machinery and help to upgrade the Taiwanese machine tool industry.





Range of products

PMC Robot Control Software

PMC Robot Control Software can turn any compatible PC into a real-time robot controller by adopting real-time operating system, and is compatible with general type of 6 axis and 7 axis articulated robot. PMC Robot Control Software adopts EtherCAT technology in motion control. PMC Robot Control Software can communicate with servo axis and I/O device with very high speed, and each axis can be synchronized with a very small deviation.

CAD-based robot programming

Read the operating target CAD files directly, extract and specify characteristics and automatically generated the industrial robotic language. No need to teach. With 3D interface, users can click on the features (such as face or profile) and specify. Built-in robot path simulator / debugger to check if the path is encountered the joint limit constraints.

7 degree of freedom articulated arm

Redundant robot, compared with many multi-joint industrial robots, has more than one redundant degree of freedom with the end of the six binding conditions, the position and orientation each has 3 DOF. According to these reasons, the robot could achieve more flexible, more space efficient motion characteristics.

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6 DOF articulated arm

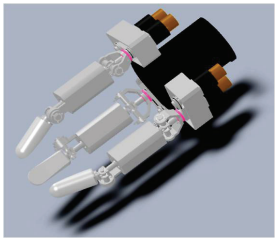
With best in cycle times, precision and motion range, the 6 axis robot of PMC has a unique slim design that allows the arm to reach into confined/restricted work space from many angles with smooth motion which is not achievable for other competitive models. The 6 axis robot can achieve more flexible, more space efficient motion capability.

Robotic book logistic system

Through the cooperation of automatic sorting systems and interfacing modules, a mobile robot carries books to the collection district. This mobile robot has dual-mode moving functions: 2D laser indoor localization and navigation technology for fully automatic moving, and the magnetic induction mode, which can be used in the slopes and the narrow passageway.

9 DOF of three-finger robot hand

The 9 DOF of three-finger robot hand is designed to use on industrial robot for multi grasping task. This 9 DOF of three-finger robot hand aims to grasp at most 1 kg objects and, with torque sensors in each finger, it can grasp soft object, such as cups, by force feedback control. Its compact control system including control board and motor driver can deal with the information of 9 motors, 9 encoders, and 6 encoders. Its control software and torque sensors enable the robot hand to do adaptive grasping task, such as inserting a pin.



The main features are:

- Robot kinematics
- Motion control
- Force control
- Interpolator technology
- Articulated robot mechanical design
- Service robot mechanical design
- CAD feature extraction
- Robot post-processor
- 3D robot simulator
- Simultaneous localization and mapping.

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Publishing Information

European Clearing House for Open Robotics Development

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