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Real Time Control Seminar *Introduction & Overview*

(28th October 2008)

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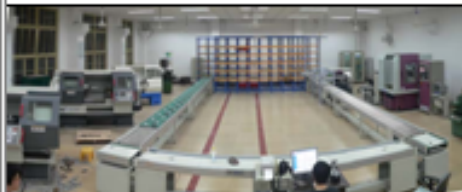
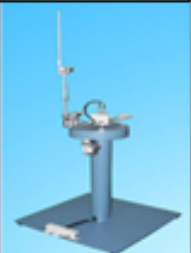
Business Development Director

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Innovative Motion Control Solutions



What's in Common?

- Car Auto parking System
- Join Strike Fighter
- Space craft locking Station
- Pick and Place Robot
- Walking and Eating

Answer?

- A) All written in English
- B) All sentences are more than 2 Words
- C) All related to Control Application in 1 way or another

Our Company

Solutions4U

<http://www.solutions4u-asia.com>



- Set up in 2007, located at KL, Malaysia.
- Distributor of Googoltech, Terasoft, SYSTAT, Neurosolutions, Mototron product in Malaysia and Singapore
- Focusing on providing training , product (software/hardware) Solutions to customers.
- Main Supplier from US, Hong Kong, India, Taiwan, etc.
- Key team members with more than 8-10 years working experience in Software and Hardware environment (such as Matlab, Quanser, Maple, etc..)

Main Control Supplier



GOOGOL TECHNOLOGY (HK)
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<http://www.googoltech.com>



- Headquarters. Set up in July 1997, located at HKUST, Hong Kong, 120 Staff.
- Googol SZ, first wholly owned subsidiary, located Hi-Tech Park, Shenzhen, China
- The first company in China and Asian-Pacific area specialized in designing and manufacturing motion controllers
- Focusing on development of motion control technology as their core technology
- Promoting the applications of motion control technology in industrial automation

Today' Challenges in Control Solutions

- Support Various Discipline (Electrical, Electronics, Mechanical, Aerospace, Automotive Engineering)
- From undergraduate, postgraduate, teaching , research to industry
- Integrate with others domain & Application (Image, control, Signal Processing, Navigation)
- From to provide Modeling, Simulation, rapid prototype to deployment (from Concept to Practical)
- Support multiple software development platform (Matlab, Labview, C++, etc..)
- Quality, Appearance, Reliable, easy to use, flexible, modularity
- Cost effective
- Good documentation & service support

Googol's Product Competitive Advantages

■ <u>Technical Strength:</u>	<ul style="list-style-type: none">❖ Lead by world renowned experts;❖ A comprehensive R&D team; about 40% with Master & PHD❖ Strong technology alliance (academic and industrial)
■ <u>Superior Technology:</u>	<ul style="list-style-type: none">❖ Integrate DSP & FPGA technology (Fast & cost effective)❖ Open-architecture (Integration of 3rd party software & hardware)❖ Robustness & Industries specification❖ Patent and CE Certificate❖ Modularity in some experiments
■ <u>Superior Support and Services:</u>	<ul style="list-style-type: none">❖ OEM design (Hardware, Firmware,...) at lower cost and faster speed & for small scales, Customizable❖ Total system solution❖ Rapid response
■ <u>Low Cost:</u>	<ul style="list-style-type: none">❖ Much lower cost compared to competitor, but no compromise in quality and support

Googoltech Products Overview

Robot & Mechatronics

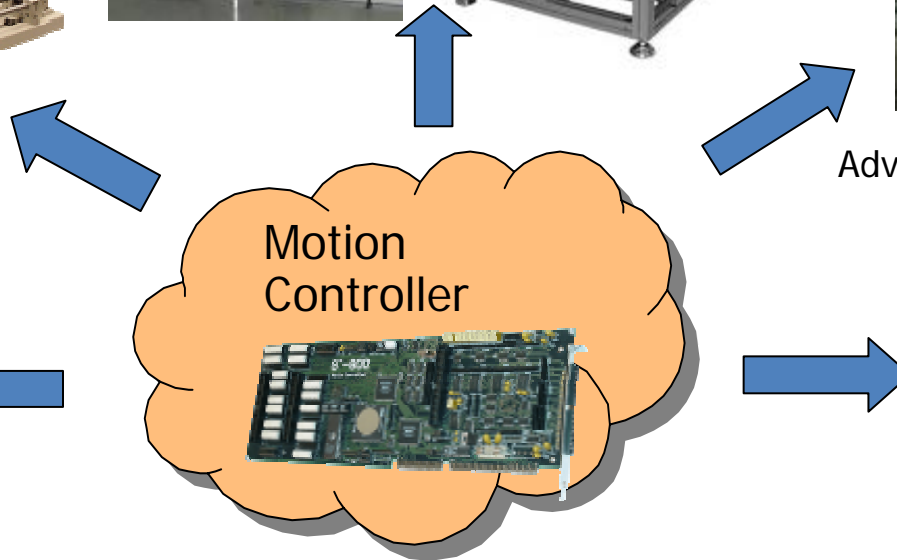
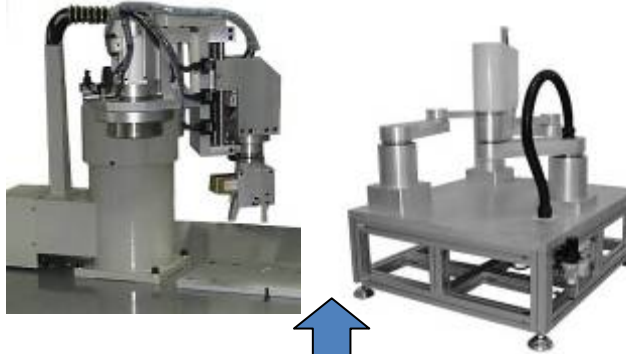
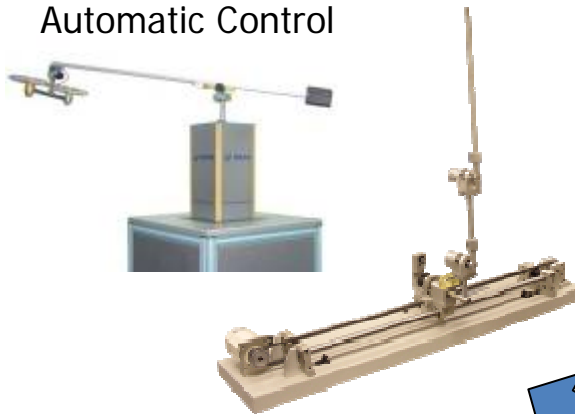
Flexible
Manufacturing
System

Automatic Control

Advanced Logistic System

CNC System

Motion
Controller

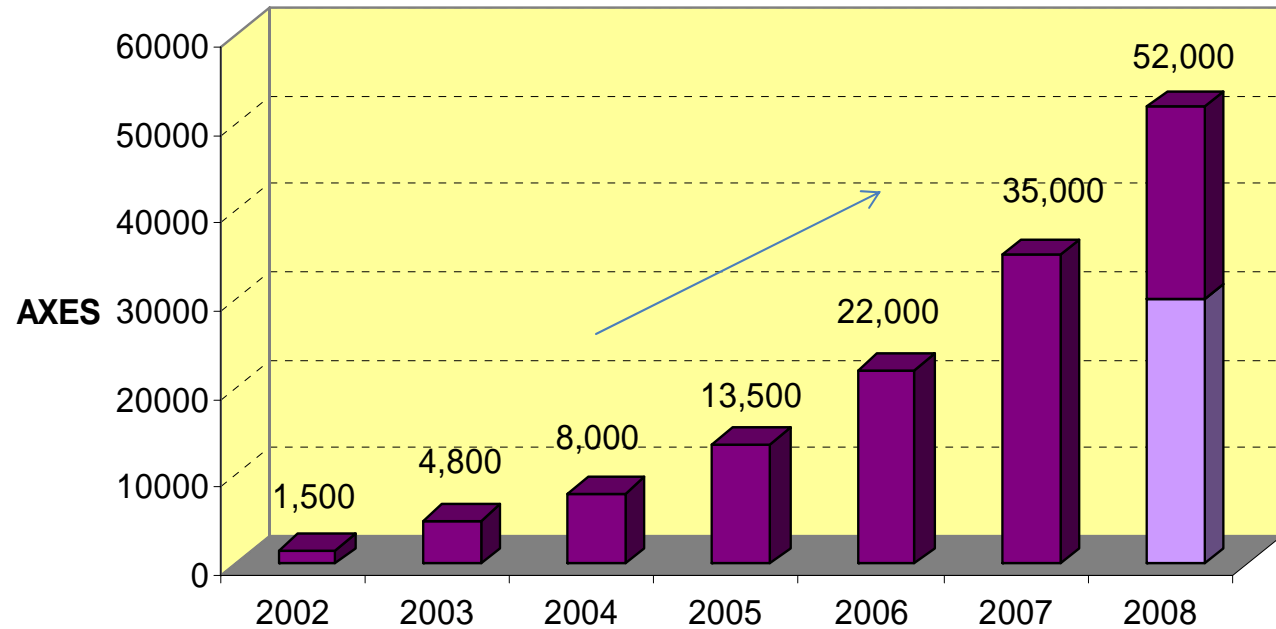


■ Based on open architectural motion control as the core technology, Googol developed the products family to facilitate the study and research in the area of robotics and automation.....

Motion Controller Applications

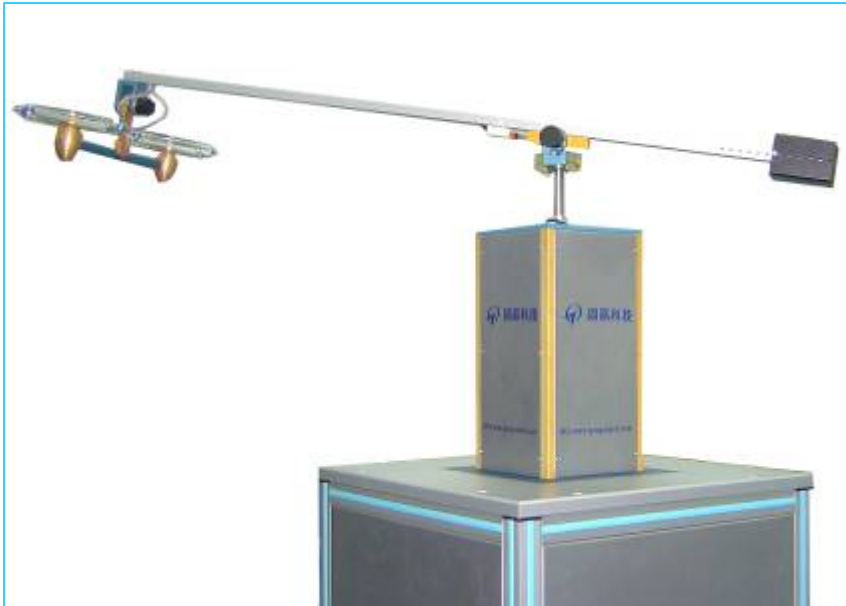
PCB, CNC, Cutting, Engraving, Scanner, Textile, Printing, Testing

Over 800 industrial customers Worldwide...



	Automation Control	Robotics & Mechatronics	CNC & Production Automation	Electrical & Electronics Engineering
Basic Control Courses	AC Servo & linear motion control Linear single Stage inverted pendulum Circular single stage inverted pendulum Ball & Beam 3 DOF Helicopter Tank Level Process control Magnetic Levitation	AC Servo & linear motion control AC Servo and motion module Linear and Circular single stage inverted pendulum XY Table	AC Servo & linear motion control AC Servo and motion module XY Table	Ball & Beam DSP motor control laboratory experiment platform (basic) Magnetic Levitation
Advance Control Courses	Linear 2-Stage inverted pendulum Circular 2-stage inverted pendulum 2 DOF robot arm 3 DOF Helicopter 4 Rotor Hover Vehicle Tank Level Process control Magnetic Levitation Ball & Plate	3-D Linear motion platform 2 DOF robot arm 3 DOF robot arm 4-axis motion control 2D Pan & Tilt	3-D Linear motion platform 2 DOF robot arm 3 DOF robot arm Automatic Storage System 2D Pan & Tilt	DSP motor control laboratory experiment platform (advanced) Magnetic Levitation Ball & Plate
Control, Robotic & Automation Challenge Design Research	Motion controller cards Embedded Motion development platform Linear 3 and 4-Stage inverted pendulum Planar inverted pendulum Circular 3-stage inverted pendulum 3 DOF Helicopter 4 –Rotor Hover Tank Level Process control Magnetic Levitation	Motion controller cards Embedded Motion development Platform 4~6 DOF robot arm High speed, high precision motion platform Planar parallel redundant robot arm	Motion controller cards Embedded Motion development platform 3-D engraving machine 4-axis synchronized CNC system Automatic logistic System (ALS) Flexible manufacturing system (FMS)	Embedded Motion development platform Magnetic Levitation System Ball & Plate Pan & Tilt Vision System Self Balancing Robot Automatic Logistics System (ALS)

Aerospace example - 3DOF Helicopter

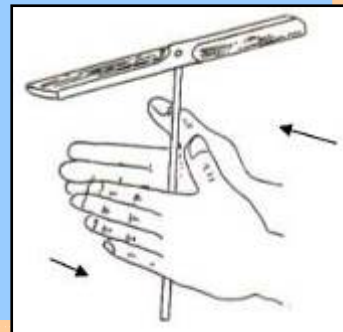


➤ Helicopter derives its source of lift from the rotor blades rotating around a mast

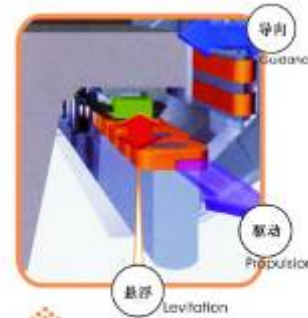
➤ Since 400 BC, the Chinese had a bamboo flying top that was used as a children's toy

➤ In 1493, Leonardo da Vinci first sketched a semi-practical machine, named in his "Codice Atlántico", that could be described as an "aerial screw"

[Video](#)



Magnetic Levitation



电磁悬浮
EM Levitation



传统轮轨
Traditional wheel-on-rail



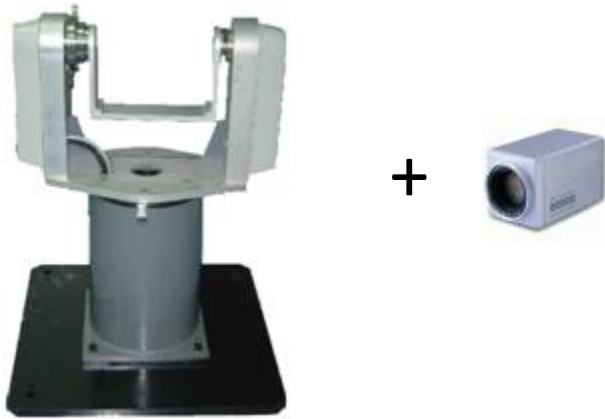
Most Popular Application of Magnetic Levitation System in the real world – Maglev Train is a form of transportation that suspends, guides and propels vehicles via electromagnetic force.

[Video](#)

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Control & Vision System

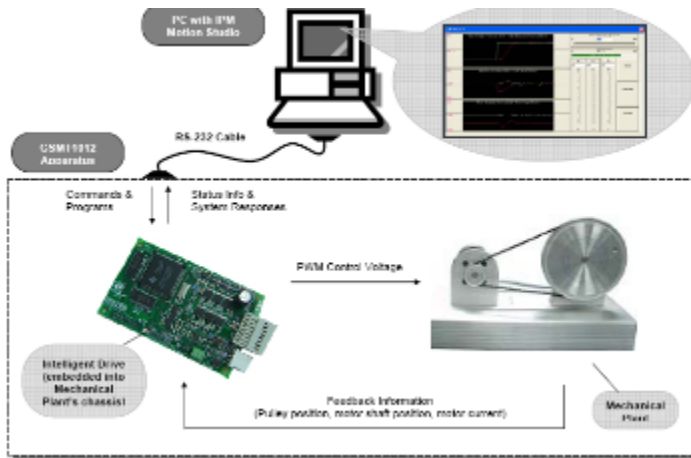


➤ Pan & Tilt System 2-axis rotation system is applying the principle of Vision with Control

➤ Used for fundamental motion platform for military and civil instrument such as Radar, Canons and monitoring devices. Useful for target identification, tracking of object in Defense and security application.

[Video](#)

Demo on Single Axis Servo Motor



Experiment Reference:

- Servo Motor Position Control
- Servo Motor Speed Control
- Motion Controller Programming
- System Identification
- Data Acquisition
- Motor Following

Ability to support IPM, ML/SL, Labview, etc..

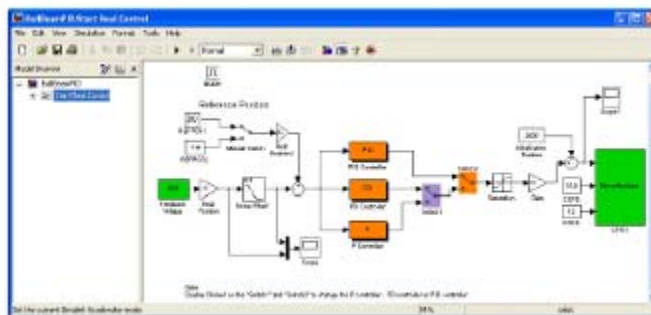


FIGURE 2 -4 SINGLE AXIS SERVO SYSTEM CONTROL DEMO

Agenda of Later sessions

Session 1:

Overview of Solutions in Control Application

- Selected video (3-D helicopter, Magnetic Levitation, Pan & Tilt)
- Single axis DC motor (demo)

Session 2:

Cross Application & Multiple Platform Support in Education Trainer Kit

- Inverted Pendulum Systems (demo & Video)
- Ball & Plate Systems (demo)
- Ball & Beam Systems (demo)

Session 3

R & D Platform - User Stories

- Self-Balancing Robot (video)

Session 4

Industries Application, Flexible Manufacturing System and Motion Controller

- XY Table (demo)
- Robotic Arm (video)
- FMS and ALS (video)