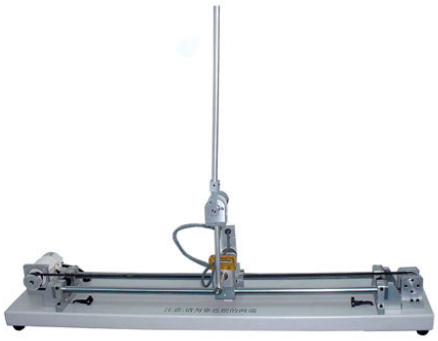
Linear Inverted Pendulum

Overview

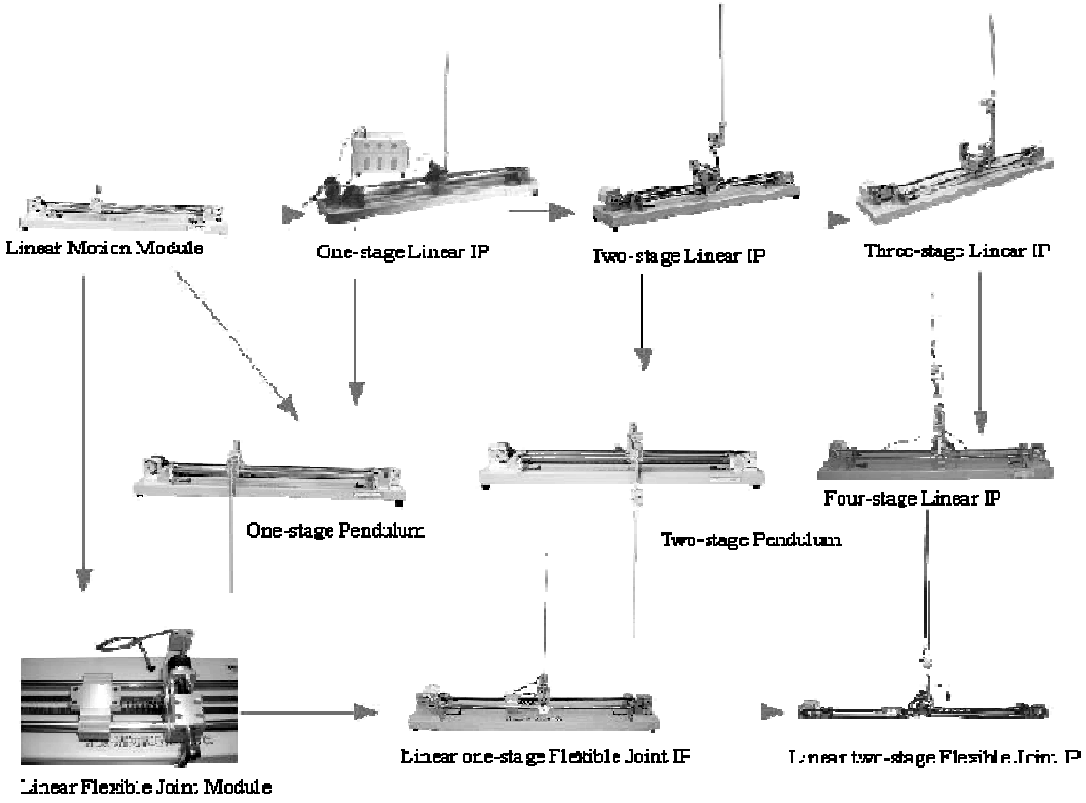


Inverted pendulum system is a nonlinear unstable system, an ideal experiment platform for teaching control theories and conducting various control experiments. Many abstract control concepts, such as the stability and the controllability of a control system, can all be shown visually through the inverted pendulum system. In addition to educational purposes, an inverted pendulum is also a research area for many researchers of modern control theories. Through the continuous research on new ways of controlling inverted pendulum, researchers have developed new control methods, and apply them to the high tech areas such as aeronautical engineering and robotics, thanks to the characteristics of the system, such as high-order, instability multi-variables, non-linearity and strong coupling.

The linear inverted pendulum series products developed by Googol Technology adopt an open control solution and a modularized experiment platform. With the linear motion module as the base platform, it is easy to build more than 10 teaching and experiment control platforms, satisfying the various needs for control teaching and research.

Main Feature

Modularized Platform



Industrial Grade Components:

- All the modules are designed and manufactured with industrial components. For example, the sliding guide bars are made of precision stainless steel, the synchronization gear belt is a gear belt of industrial grade, and the base platform has the vibration absorption function.
- Industrial grade encoder, AC servo motor and drive to ensure best quality and reliability. Compared with similar products of other brands using DC motors, the AC servomotor offers the additional advantage of no maintenance on brushes and longer service life.
- Limit switches, anti-collision buffer device, as well as the unique structure design provide excellent system safety, especially suitable for students.

Open Architecture:

- Hardware platform is based on PC and DSP-based motion controller.
- Experiment verification and demonstration program of DOS version, with source codes provided.
- MATLAB Windows2000 experiment program, with SIMULINK as user interface can build model, perform simulation and analysis, evaluate control performance, and improve control system directly.
- Comprehensive experiment kit , covering the dynamic modeling, classic control experiment, modern control experiment, optimized control experiment and intelligent control experiment. Users can select relevant material for the experiment and teaching needs of various courses.

User Creativity:

- Flexible configuration of customized experiment platform.
- Develop and verify one's own control algorithm.
- Tackle the challenging control problems related to three- and four-stage inverted pendulum.

Technical Specifications

Valid Travel Distance	Max. Motion Velocity	Friction System between Dolly and Sliding Bar	Length x Width x Height	Weight
720mm	6000mm/s	< 0.02N • s/m	1000mm x 220mm x 150mm	< 15Kg

Ordering Guide

Model Number	Model Name	Description
GLIP2001	Linear One-Stage Inverted Pendulum	• GLIP linear inverted pendulum platform • single-stage inverted pendulum module • inverted pendulum control system (motion controller + single-axis servo motor) • control box, houses a power supply, a servo amplifier, and terminal interconnections • single stage inverted pendulum experiment software pack (DOS version), with source code. • MATLAB Tools

GLIP2002	Linear Two-Stage Inverted Pendulum	• GLIP2001 package • two-stage inverted pendulum module • two-stage inverted pendulum experiment software pack (DOS version)
GLIP2003	Linear Three-Stage Inverted Pendulum	• GLIP2002 package • three-stage inverted pendulum module
GLIP2004	Linear Four-Stage Inverted Pendulum	• GLIP2003 package • four-stage inverted pendulum module
GLIP2011	Linear One-Stage Flexible-Joint Inverted Pendulum	• GLIP2001 package • one-stage flexible joint inverted pendulum module (with linear encoder) • one-stage flexible joint inverted pendulum experiment software pack (DOS version)
GLIP2012	Linear Two-Stage Flexible-Joint Inverted Pendulum	• GLIP2011 package • two-stage flexible joint inverted pendulum module

Applicable Courses

Mechanical engineering control fundamentals, automatic control principle, modern control engineering, linear control system and computer control system, etc.

Recommended Text Books

- Modern Control Engineering (Third Edition) [USA] Author: Katsuhiko Ogata, Published by Electronic Industry Publishing Company, 2000.

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