



Robots and Machines Development: from Imagination to Implementation

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Common Architecture of Robots/Machines/Human





Mechatronics Engineering

Mechanism

Electronics

Computer



Which robot/machine should be made?

- Customer's Requirements
 - Made to order robot/machine
 - Requirements defined in specifications/term of references (TOR)
- Market Survey
 - Existing products
 - Potential products
- Dream and Imagination



Some Projects at AIT

- Flying Robot Project
- Underwater Robot Project
- Medical Tele-Analyzer Project
- Intelligent Vehicle Project
- Gyroscopic Unmanned Bicycle Project
- Exoskeleton Project
- Inverted Pendulum Project

Flying Robot Project

Objective: To develop an autonomous flying robot which can fly following a trajectory automatically by using computer onboard. No operator is required.





Applications of Autonomous Flying Robot

- Agricultural Purposes
 - Pesticide Spraying
 - Fertilization Spraying
- Natural Resources Exploration
 - Water Resources
 - Forest
- Security Purposes
 - General Patrol
 - Military Usage



Video



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Underwater Robot Project

Objective: To develop an autonomous underwater robot which can move following a trajectory automatically by using computer onboard. No operator is required.



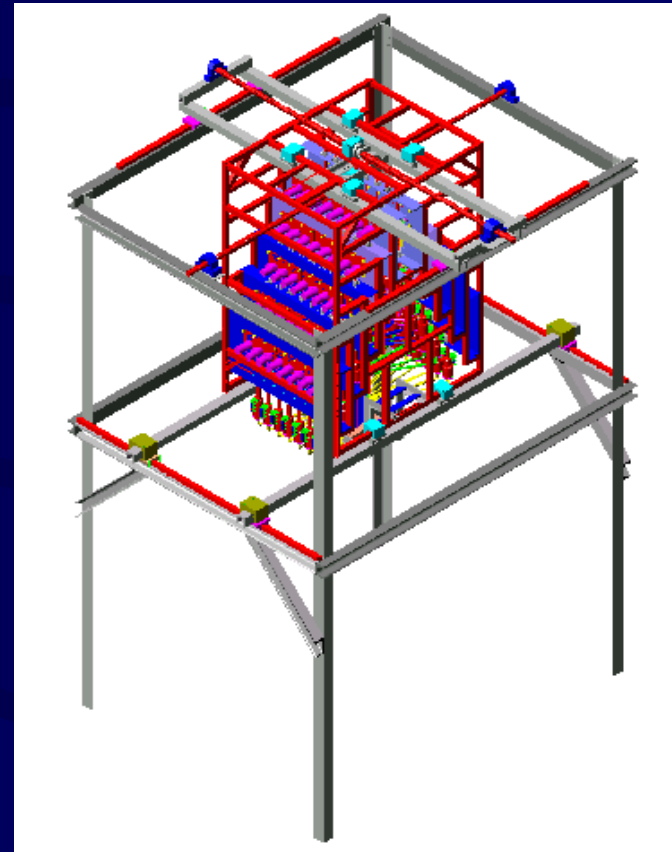
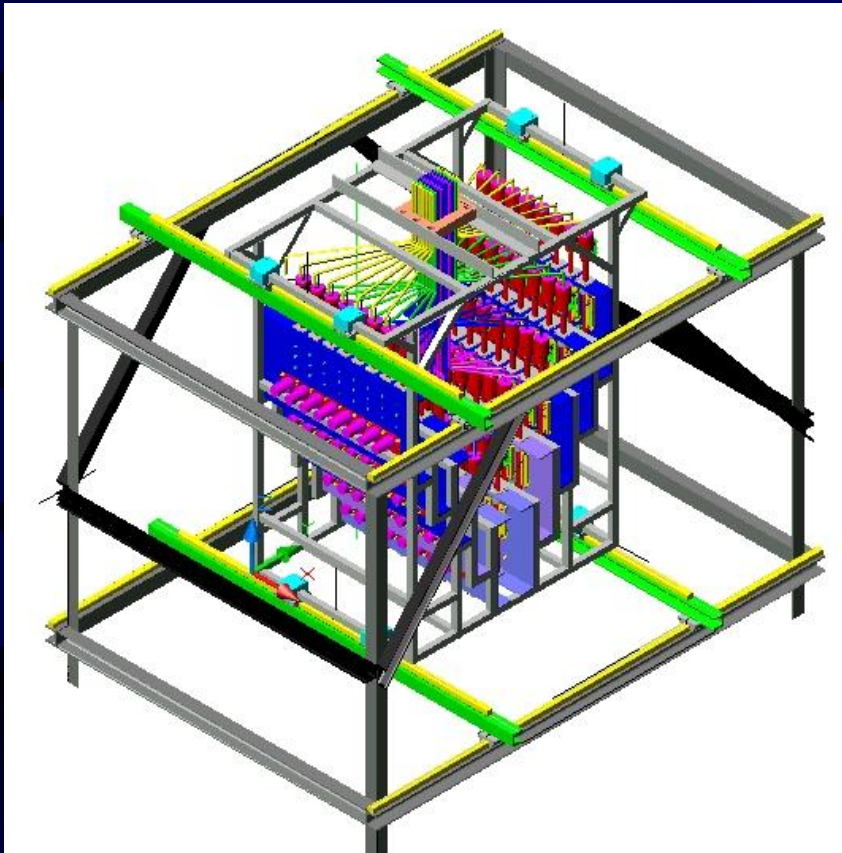


Heading & Depth Control Video



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Medical Tele-Analyzer Project



Objective: To develop a medical tele-analyzer used to diagnose abdominal mass remotely.

Applications

- Used to diagnose abdominal mass remotely
 - Hepatomegaly
 - Splenomegaly
 - Tumors at Breast, Ovary, Uterus, Colon



Video

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Click Tour Phai



Intelligent Vehicle Project

Objective: To develop an Intelligent vehicle, the vehicle which can move autonomously from a place to the other place without driver by using information from GPS, digital map, camera, sonar, etc.





Adaptive Cruise Control Video

The screenshot displays the Adaptive Cruise Control (ACC) software interface, which is divided into several functional areas:

- Membership:** A grid of membership functions (NVL, NL, NM, NS, Z, PS, PM, PL, PVL) with numerical values ranging from -4 to 4.
- Control Parameters:** Includes fields for Gap (m) set to 15, SetPoint (km/hr) set to 0, and Current Speed (km/hr) set to 0. Buttons for 'Stop' and 'Manual' are present.
- Discrete Control:** A table of discrete control values for various membership functions (NS, Z, PS, PM, PL) and their corresponding error signals (Relative Speed, Distant Error).
- Connectivity:** A 'Disconnect' button and a status bar showing '00.F: 00000' and '00000.R: 00000'.
- Graphical Data:** A vertical plot on the left showing sensor data with a scale from 0 to 70 m.
- Vehicle Parameters:** A table listing 'Number of Car' (1), 'Car Width (m)' (1.24), 'Relative Velocity (km/hr)' (00.025), and 'Distance (m)' (17.7).
- Control Actions:** A 'DICK control' section with buttons for 'Disconnect', 'Initiate', 'Road Sensor', 'Stop Sensor', and 'Close'.
- Video Feed:** A 'WebCam Control' window showing a real-time video of a white car on a road.

Handwritten annotations in green and red are overlaid on the interface:

- 'Set point' and 'Vehicle speed' in red.
- 'Distant gap' in green.
- 'Adaptive Cruise Control 45km/hr' in red at the bottom.



Thailand Intelligent Vehicle Challenge Video



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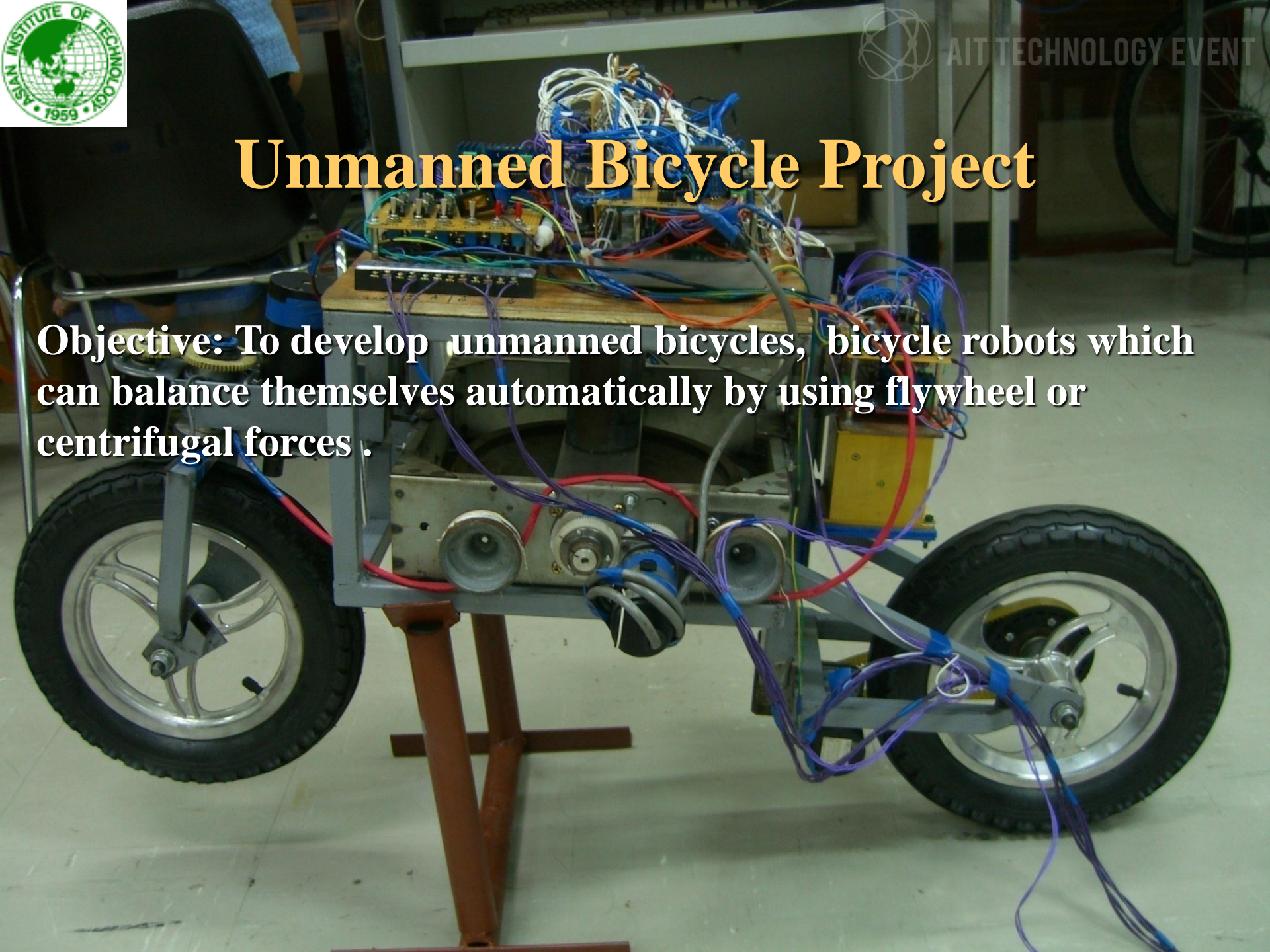


Automatic Parking Video



Unmanned Bicycle Project

Objective: To develop unmanned bicycles, bicycle robots which can balance themselves automatically by using flywheel or centrifugal forces .





Video





Video

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Video



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Video



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Video

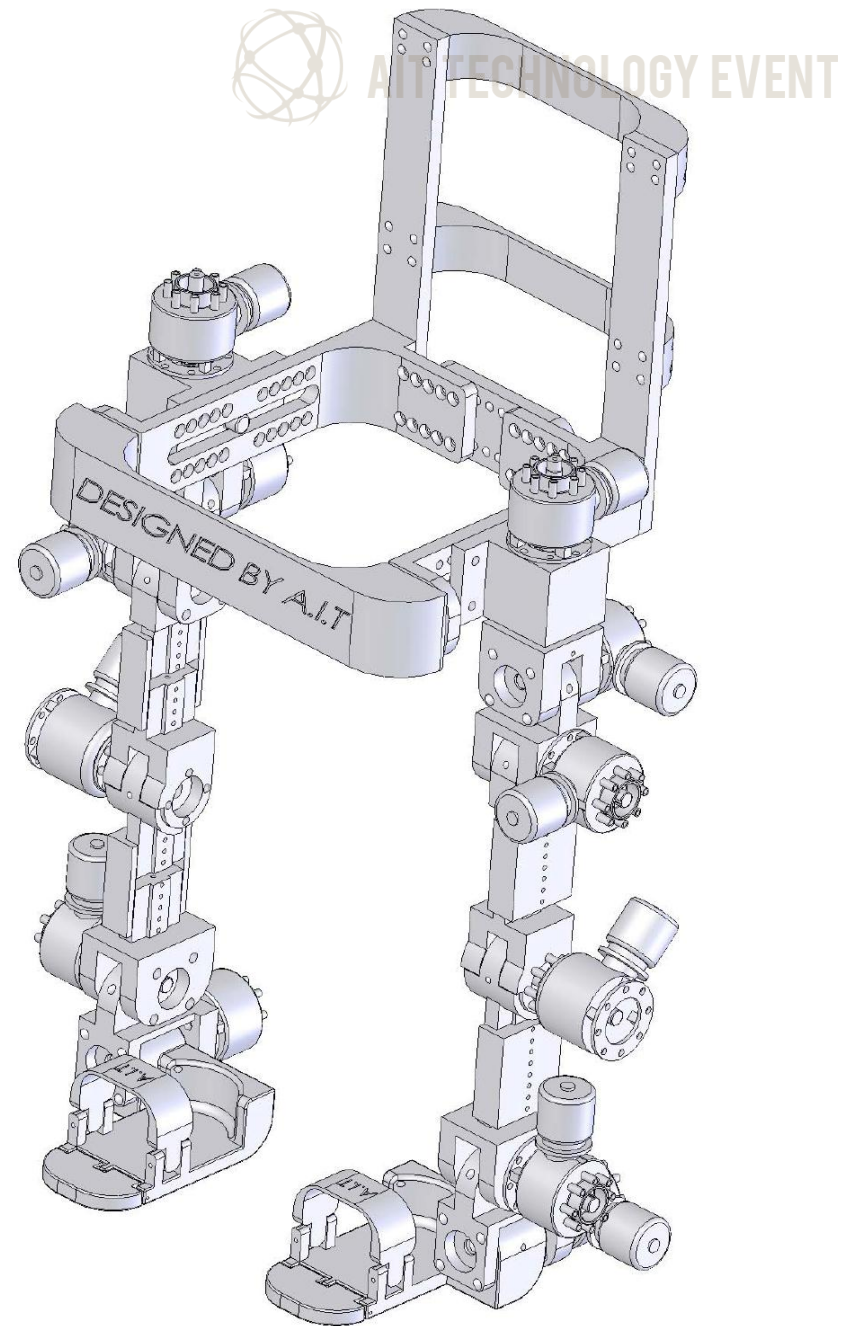


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Exoskeleton Project

Objective: To develop an exoskeleton for handicapped, paraplegia, hemiplegia people.





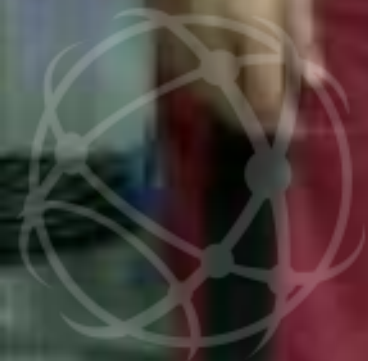
Floor Walking Video



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Leg Exoskeleton Video



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Arm Exoskeleton Video



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Leg-Exoskeleton for Rehabilitation



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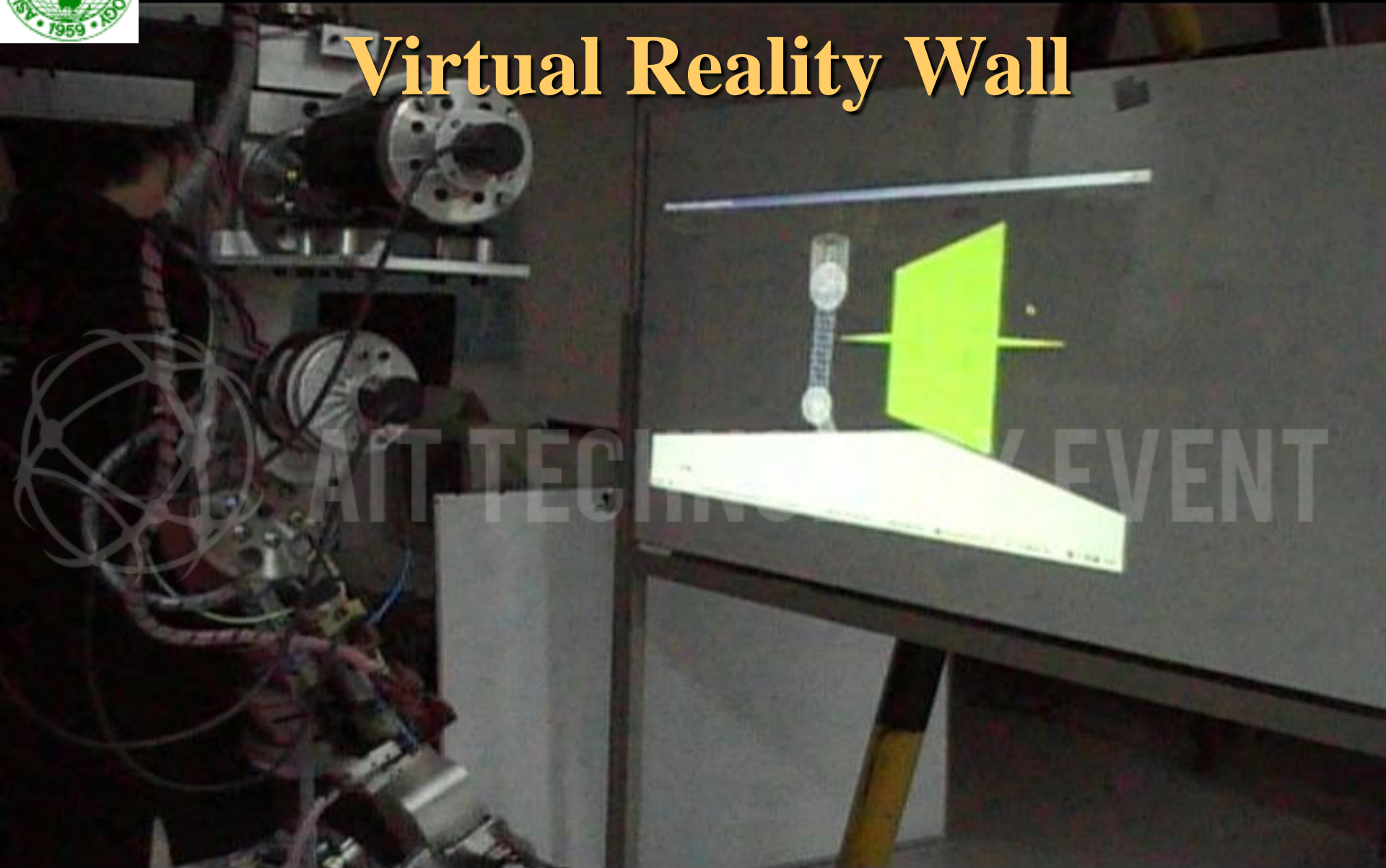
Leg-Exoskeleton



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Arm-Exoskeleton with Virtual Reality Wall



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Inverted Pendulum Project

Objective: To evaluate control performance of various control algorithm in balancing an inverted pendulum.

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Video





Video

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Video





Video



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Thank you