

2009-2010

# ALEXploratorium Projects Support (APS)



**1. A Simulator Based on Stewart Platform:**

- **Project Field:** Fluid Mechanics
- **Type of Project:** Hardware
- **University:** Alexandria University
- **Project Description:** Simulators are often used in educational and research purposes.

For Example, flight simulators capability to produce a virtual driving environment that can be set to stimulate real driving conditions may be used to train novice drivers before they are exposed to the real world.

The Stewart platform is one of the most popular manipulators. It is a six-degree-of-freedom positioning system that consists of a top plate, a bottom plate, and six extensible legs connecting the top plate with the bottom plate.

The extensible legs of the Stewart platform are hydraulic pistons controlled by a hydraulic system and an electric circuit. The Stewart platform has the same advantages of the parallel manipulators. Parallel manipulators have high stiffness and large load carrying capacity as the load is supported by all legs. Another advantage is the hydraulic power which has a high accuracy positioning system.

- **Grade:** Excellent
- **Contact Person:** Muhammed Kamal El-khlaidy ([muhammedelkhlaidy@gmail.com](mailto:muhammedelkhlaidy@gmail.com))

**2. I, Robot:**

- **Project Field:** Communication, Electronics and Mechanics.
- **Type of Project:** Hardware & Software
- **University:** Mansoura University
- **Project Description:** It is a 64-bit real-time wireless human movement robot simulator that uses accelerometers.

A 64-bit Windows developed application is responsible for transmitting the camera and microphone - which are attached to the robot live feed - to the human controller's laptop through the wireless access point, using:

- 1) Intel 64-bit C++ Compiler Integrated with Microsoft VS2008,
- 2) 64-bit "Sockets programming" package,
- 3) State of the art technology from Intel, "Intel parallel studio" for optimizing 64-bit applications for Multi-Core Intel processors.

The human controller who is wearing an "accelerometers equipped suit" - according to what he sees and hears from the robot's live feed - will make actions by his body and arms which will be recorded by the accelerometers.

These recorded signals will then be transmitted to the computer serial port through a PIC microcontroller interface, where they will be processed and analyzed by a Windows application. The computer will issue commands - based on the body movement - which will be transmitted to the robot wirelessly using real-time Internet protocols. The robot developed software will be responsible for receiving this data (commands) via its wireless card, translating it into controlling signals that are forwarded to its external ports, and, therefore to the Microcontroller chips to control the robot's various motors.

These steps will allow the robot to exactly simulate the human controller body movement.

- **Grade:** Excellent
- **Contact Person:** Ahmed Maged Ahmed ([Ahmedmaged3000@yahoo.com](mailto:Ahmedmaged3000@yahoo.com))