

Tele-presence Teaching Robot

The competition

XinCheJian, the first Hackerspace in China, is one of the 30 Hackerspaces across the globe that have been selected to participate in the Great Global Hackerspace Challenge (GGHC) competition. The objective of the competition is to create an electronics build that will make a real and positive difference in an educational establishment. The competition runs for six weeks, from Monday March 21st to April 30th 2011.

The winning project is evaluated on the following: *How reproducible is the final project? How easily can the parts be sourced in locations around the world? How low cost is the final output? How well are the plans documented? How relevant is the project to helping education today? How inventive and creative is the design and build of the project?*

The selection of our participation proposal includes a 5900 RMB (US\$900) budget in electronic components (including the required microcontroller and portable power source) generously provided by element14.com.

Idea

A telepresence robot allows teachers or experts to remotely teach classes and parents to remotely observe their kids performance in class. By adjusting the height (4 feet) and appearance (cute!) we can make the "teacher" more appealing to the students and sustain their attention longer. By equipping the robot with multimedia equipment, with can augment the teacher visual presence.

Competitive advantage

Although they already exist commercially, we believe we can make a cheaper workable solution on an open platform. In addition, of the competitors have selected this idea as their project. Finally, pretty much everyone loves robot, especially 6 years old!

Target audience

- Students: 6 years old with an height ranges from 102 to 128 cm ¹
- Tele-operators: teachers, experts or parents
- Tele-operators are equipped with a PC and Internet connection but not necessarily skilled technically
- Must be safe, stable and reliable with sufficient autonomy for a day of classes

¹ <http://www.medindia.net/patients/calculators/height-weight-chart-Result.asp>

The Proposed Robot

The robot is made up of three levels:

- Lower level for motors, collision avoidance sensors and batteries
- Middle level for the lower functions micro-controller
- Top level for the robot "head"

The head:

- Has wifi, a decent size screen (7 inches+), a video camera
- Has a USB port (preferably host)
- Proposed: Haipad m701

The micro-controller:

- Has a USB port and sufficient number of I/O ports
- Proposed: Arduino UNO: 6 analog ports, 11 usable digital ports

The propulsion:

- Needs to be powerful enough to conquer the body wheels friction caused by the weight of the robot
- Proposed: An RC toy car affixed to the bottom shelf of the body

The "body" frame will be shelves on wheels:

- Should have shelves made of a material that's easy to drill cleanly with the Dremel (metal - ideally aluminium)
- Be lightweight with an height of less than 100 cm
- Should have four 360 wheels
- The lower shelf clearance should be suited to affixing wheels
- Should allow to affix an external plastic or fiberglass shell
- Proposed: shelves on wheels

The battery or batteries:

- Should provide 12V and be rechargeable
- Proposed: one or two alarm system battery

Challenges and testable questions:

- Fixing the Haipad vertically (there's probably already something for this?)
- Charging solution for the batteries
- Interference since crystal for all RC cars are at same frequency...
- How much weight/friction can the RC car push along before being unable to move?
- Is the Haipad USB really an host USB? What about drivers? What about the Serial-over-USB driver?
- Can wifi be streamed efficiently enough for videoconference?
- Plain Linux or Android?