EEEbot – the robotic challenge

1. **Project Description**

The project focuses on robotics experiences so that a robot can interact with people. This involves many interesting topics in artificial intelligence. For example, sensing, imagine that a machine can detect the presence of people, recognise people by its face, and even communicate with people. One interesting example is the skeleton recognition software that can correctly identify human body gesture and it has been successfully sold as a game package. The second application is the robot motion control, such as obstacle avoidance and path planning. For example, we can take it one step further so that the robot can serve soft drinks during reception, guide dog for the blind. Here are a few sample video clips from the internet:

1. Pioneer robot controlled using hands and kinect
    http://www.youtube.com/watch?v=B4YX1iZnYIE

2. Kinect Enabled Autonomous Mini Robot Car Navigation
    http://www.youtube.com/watch?v=NmnepqAQIlk

3. Robotic Shopping Cart for the Blind
    http://www.youtube.com/watch?v=Dblw3CJTE8M

In our project, the robot will be wheel based, and the primary sensor is a 3D camera (Microsoft Kinect). The project requires hands-on experience in C/C++ programming. Training will be provided on image processing and face detection:

(a) **Face Detection based on Haar-like features**: this module is built in to the Open-CV library and can be called at ease.
(b) **Face Recognition on PCA**: this module requires training, and it is also available on the internet. For example, we need to collect about 3 frontal faces for each person, and then create a database with all team members. Then, after a training period, the computer is able to detect a face and comparing the face with the database for recognition.
(c) **Robot Path Planning**: This is an interesting topic that requires intelligence to program the robot to reach people and also avoid collision in the same time. There is a popular ROS library from internet which we can download.
(d) **Head pan/tilt and Robot Arm motion (open)**: this requires some hardware interfacing and low level programming.

In summary, the project provides hands-on experience in both hardware and software using the latest technology.