Week report for GoAIBO

**Week 12**

We made a program that could decide how wide a paper of a certain color spans in pixels from AIBOs view. The program will also give a numerical value of how far the center of the paper is from the center pixel in the camera. This information is printed to the telnet session. A script called split.php have been made which will do some text formatting for Matlab.
Week 13

We are now working on two programs at the same time. Mikael and Mårten are developing the distance measurement via camera while Tim and Henrik are working on moving the legs.

Measurement via camera

The program is further developed from last week's code. The goal is to find good thresholds for the different channels in the picture. With good thresholds, the paper width could easily be measured.

Next week we will investigate the effect of vibrations. Without vibrations there seems to be no problem finding the paper edges, this might not be the case when the camera is vibrating due to walking.

Moving the legs and walking

Alongside with the image analysis module we have also developed a module that controls the legs of AIBO. Basically what it does so far is that it converts a variably complex paw movement polygon to paw movements and repeats the polygon cycle over and over. The paw movement polygon can have an arbitrary number of corners and each side also has a speed parameters. The corners are given as three-dimensional vectors. Each paw has its own movement polygon. The program interpolates along the sides of the polygon and converts each position in 3d-space to an angle set which is then sent to the servos in the legs. Each paw's polygon also has a phase parameter allowing the various paw's phases to be controlled individually.

We have not fine tuned or debugged this yet since AIBO keeps running out of batteries, but the results so far seem promising.

Target

The plan is to combine the image analysis module with the movement module as soon as things start working better. In doing this we hope to have AIBO walk automatically towards a target that we can place at a distance in front of AIBO.
Week 14

The measurement program have been changed and is now much more accurate when it comes to specify a direction to the paper. Instead of searching for red pixels on the middle row it is now searching for a band of red pixels. The distance from the image borders to the paper borders is defined according to the picture below.

![Diagram showing left x and right x with a red band]

To get the diastase and direction to the paper the function getDirection can be used. Returning from the getDirection function is a vector of both the direction to the paper and the width of the paper measured in number of pixels.

The program have been tested and shows good performance. A A4-paper can be spotted from over 8 meters which will be good enough for this project.

The blue channel have shown to be dependent on the distance to the paper and have therefore been left out when left x and right x is being decided. Since this is not the main purpose of the project, we have decided that AIBO

The program controlling the movements have been further developed. Functions for direction-control have been implemented. AIBO can now during its trot compensate for losing direction to the target.

The two programs have been migrated into one and is now communicating with each other. AIBO is now walking towards the paper. As expected the vibrations of the head seems to be a problem.

Target
Next to do is to investigate the different parameters regarding the trot. Aibo needs a set of parameters that will give a good start. Now Aibo have some problems walking and the program have therefore been slowed down for easier investigation of the trot.