THE VIRTUAL FARM

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SUMMARY

The Virtual Farm is an internet based computer program designed to create 3D-models of farms with animals in it. It will be the outcome of a big cooperative effort, lasting for several years. The completion of this ambitious project requires combining existing knowledge and future research.

The key Finnish players in the Virtual Farm cooperation are Savonia University of Applied Sciences, University of Kuopio, University of Helsinki, FarmiMalli Ltd., and some private companies. Other domestic and foreign universities and companies are welcomed to participate in further development of the idea. This paper includes the outline of the Virtual Farm idea.

Keywords: virtual farm, three dimensional, ethogram, computers

THREE STEPS TO THE VIRTUAL FARM

1. Drawing the farm with the Virtual Farm Designer

The Farm Designer is a computer program (www.farmdesigner.com), which can be accessed easily with any internet browser (Figure 1). It is possible to design a farm building by simply dragging the walls, windows, doors and other facilities to the desired place with a mouse. The results can be seen immediately three-dimensionally. There is a possibility of "flying" inside and outside the building and looking closely at details. The program has been developed by FarmiMalli Ltd.

In the latest version of the Farm Designer, the same drawing can be manipulated from different locations simultaneously. This allows for the the farmer and building designer to plan the farm together on the internet, seeing the drawing in three dimensions, and being able to move walls and facilities to their desired places.

A demo of the program showing a barn of 50 cows (without the actual animals) is available on the internet (http://www.annemanni.fi/index.php?id=442). After installing the program "Barn.exe", it is possible to move both inside and outside the barn by following the instructions on the screen.

2. Modelling virtual animals

The second step is to model virtual cows and other animals. To model animals information about how the animals look and move, their daily activities, their behavioural patterns and their location is needed.

Animating an animal starts by creating a skeleton with all joints in place. Muscles and skin can then be added to the skeleton.

Cows and other animals can be made to look very realistic by using special animation techniques, but the difficulty is to make them move like real animals. This is achieved by using a combination of a an ethogram – a list of descriptions of the behavioural patterns of a species – and animation. This process has been started at University of Kuopio, Finland with behavioural studies done to compile an ethogram of cattle. With the aid of a literature review and observations of animals, almost a hundred different behavioural patterns of cattle were titled, described, photographed and will further be video-recorded. Using the video ethogram, the animated cows can be made to move and perform different behaviours accurately and as lifelike as possible.

Information of the location of cows in a barn will come from a project called "Very Intelligent Cow Barn" run by University of Kuopio. In the project, the exact location of all cows in a real barn is received every second. Location of the real cows will be transferred to be the location of the animated animals. Now, with the help of the cattle ethogram and the location information it is possible to make the virtual cows move correctly in the right places.

The 3D model of virtual animals will help tremendously in the functional design process of new farm buildings. The coming building with cows (or pigs, horses, sheep etc.) moving in it can be visualised before anything has been built.

3. Simulation

Simulation, the third and final step of the process, is the most challenging. This is where international cooperation is needed. The aim is to simulate different occurrences (fire, mastitis epidemics, hoof trimming, fertility problems, etc.) in the virtual farm. It is theoretically possible to create an endless amount of simulations; if a way to make the virtual animals react to them in a certain way can be found.

There are still plenty of uncertainties about the simulation process, for which there are currently no solutions. The goal is to create "intelligent" virtual animals, so that information of research work could be included into the behavioural patterns of the virtual animals.

Interested research groups and enterprises are warmly welcomed to discuss with the authors about possible cooperation at this stage.

Figure 1. The Farm Designer is an internet based program designed to create 3D models of farms. It is possible to move freely inside and outside of the building and look at details. The 3D farm is the first step towards the Virtual Farm Project. Once finished, it will feature virtual animals that look and move in an authentic manner and react to the changes in the environment.

LINKS

The Farm Designer, http://www.farmdesigner.com
The Farm Designer Demo, http://www.annemanni.fi/index.php?id=442
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