

## Robotic System for Automated Milking

**GEA Farm Technologies provides suitable solutions for the automation of dairy farms of all herd sizes and regardless of the available space.**

Automated milking is at the centre of new developments in dairy farming. From the identification of the cow and the automatic, camera-controlled placing of the teat cups to the cleaning of the teat, the entire milking process can be automated, requiring no human intervention.

This also includes the automatic transmission of data on the animals and the milk to a central computer running herd-management software. Milking parlours in which many animals can be milked simultaneously require a large number of intelligently networked sensors, actuators and control units.

emlix supports GEA Farm Technologies in the development and continuous optimization of some of these components, particularly in the improvement of the control units. During automatic milking, both the teats and the cups are recognized by a 3-D camera attached to the



*Comfortable milking parlour control*

robotic arm that is used to fit the machine and are spatially located. Fast, intelligent processing of the images means that the cups are placed on the udder precisely and the hoses are positioned so as to avoid any unnecessary stress for the cow.

### Multibox Systems and Modular Solutions - Innovative Milking Technology

The systems developed by GEA Farm Technologies satisfy the automated milking requirements of various target groups. Mlone and DairyProQ are central elements of different solutions.

The Mlone milking robot is intelligently incorporated into a coherent concept. The core element is the concept of a milking centre with Mlone at its heart. The cow itself decides when it wants to be milked. GEA Farm Technologies' proven milking technology guarantees a high quality of milk with the best possible comfort for the cow.

DairyProQ is a highly space-optimized module for various milking stations and for continuous, fully automated milking. It takes over all the steps of the milking process, from the placing of the cups and the cleaning of the teats (pre-dip), the pre-milking trial and the milking itself to the post-dip process and the removal of the cups.

This also includes the sterilization and external cleaning of the teat cups between milking runs. The DairyProQ milking station module was developed in order to enable an automated milking process with large herds, using a high throughput.

#### Further Information:

<http://www.gea-farmtechnologies.com>

## Living Operation Environment

This is particularly necessary because in this operation sophisticated technology has to interact with the unpredictable behaviour of live animals that are wholly unimpressed by it.

One of the requirements is therefore the quick repositioning of the robotic arm if the cow kicks off the cluster. It also means that the system must be able to differentiate between the cups, the teats, the cow's legs and its tail as it swishes around to drive off flies.

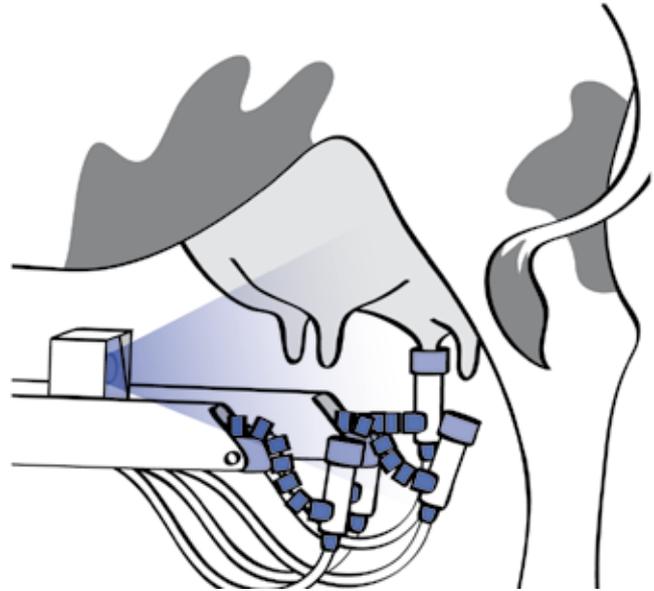
Data transfer and processing is a critical element of the system. It is continuously being improved, with emlix focusing mainly on hardware-level system programming and taking on responsibility for the optimization of the CAN bus communication and the interface control as well as for the development of specific drivers.

The tight spatial conditions in systems for rotary milking parlours place significant limits on the choice of hardware. This affects the selection of possible designs and the capacity of individual components, which also have to be resistant to the typical „cow shed“ environmental factors.

Some challenges therefore need to be „solved through software“, requiring very close cooperation between the GEA and emlix developers.

## Vertical Integration of Automation Components

Another group of functions that emlix is helping to optimize is the vertical integration of the individual milking control units, whose data must be transmitted to a higher-level



*The automated positioning process ensures that the animal is not unduly stressed.*

farm management system reliably and safe from manipulation.

For this task, the emlix developers are integrated into a GEA team, organized according to the scrum principle, which uses web services and Java technology to further improve platform-independent data transfer and process visualization.

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