

What's Cooking – Interactive Inspiration for 'Chefs'

The kitchen table of the future with USB 2.0 industrial cameras



Do you still go to the supermarket yourself? Or does your refrigerator automatically order the groceries that are running out, via the Internet and all by itself? Does your bathroom mirror know the stock market quotes and is your percolator switched on by mobile phone as if by ghost hand? The visions that researchers are embracing for the fully automated home of the future actually run somewhere along these lines. Much planning, research and testing is already being dedicated to the envisaged conveniences—attending even to the tiresome issue of “what am I going to cook today.” The proactive kitchen table, the “Recipe Table,” once and for all solves the problem that invariably crops up each and every day. To accomplish this feat, it uses the possibilities of modern industrial image processing and the ultra-compact design of a USB 2.0 camera.

An almost overwhelming flood of cooking magazines fill the newsstands, TV chefs show off their art in our living rooms, and newly tried recipes are a popular topic of conversation. But how often do we actually venture to cook a new dish? Most of the time, we give up already in view of planning and getting the ingredients that are not part of our standard repertoire. When looking for recipes that use only the ingredients we've already got at home, we end up frantically flipping through cook books, improvising the missing ingredients. Even the Internet provides only lame inspiration to help us conjure up ingenious, delicious dishes from whatever ingredients we happen to have on hand.

researchers at the University of Art in Linz, Austria, have developed the so-called “Recipe Table.” The interactive work top reacts to the ingredients that are placed on it. It identifies the groceries and determines their locations and quantities with the help of a miniature camera. It then searches its database for recipes that contain only these groceries plus some basic ingredients like water, salt, oil, etc. The recipe is selected according to the order in which the products are arranged on the work top. The ingredients closer to the user are more important, those further away are less relevant. A salt shaker serves as the “joystick” with which the user can navigate through the menus.



uEye® cameras—the chef's suggestion!

Against this background, the Interface Culture master's level class, an arts and science course of studies for prospective media artists and

Let's say, for instance, that eggs, flour and tomatoes are placed on the work top. The tomatoes are closest to the user, flour is in the middle, and the eggs are farthest away. The top recipe suggested here might be simple tomato bread. If the tomatoes and eggs switch places, the recipe list is reorganized. The screen will then show boiled eggs filled with tomato paste, along with a picture of the finished dish, of course. If all the ingredients are placed in the middle, the database will suggest home-made noodles with tomato sauce. The selection process continues until the cook chooses a recipe from the list. Products can be reshuffled, added and removed anytime, leading to different results on the screen after every change.

The "Recipe Table" integrates into the kitchen counter top and comprises a recipe database that is continuously updated over the Internet. The individual ingredients are identified using a fast high-resolution industrial camera. The model employed is a uEye from IDS Imaging Development Systems, a machine vision specialist located in Germany. One of the first manufacturers to use the convenient USB 2.0 interface, IDS meanwhile offers a wide range of industrial cameras, accessories and software tools on this basis for a vast variety of applications.

With the smallest version only 24 x 32 x 27.4 mm in size and weighing in at 60 g, the robust industrial cameras of the uEye® series are not just compact and lightweight. Their standardized interface also eliminates the need for additional hardware and allows instant connection to any modern laptop, industrial PC or embedded computer. The performance features are quite impressive: The cameras provide up to 3,1 Mpixel resolution, the fastest USB model achieves up to 86 frames per second in full-frame mode. Far higher frame refresh rates are possible in the Area-of-Interest (AOI) and Partial-Scan modes. Cutting-edge features such as windowing, binning, subsampling and image mirroring in the x and y directions complement the scope of functions.

The IDS product portfolio has meanwhile increased to way over 100 different models. Besides simple CMOS cameras, it offers a comprehensive choice that ranges from various monochrome and color cameras, CMOS with rolling or global shutters up to 5 MPixels through to 2-megapixel Progressive Scan CCD cameras with Sony sensors. Resolutions from 640 x 480 pixels to 2560 x 1920 pixels are achieved, depending on the model. All models are fitted with a universal, opto-decoupled trigger input as well as an opto-decoupled output, e.g. for operating a flash.

The excellent software support provided for the cameras as well as a software development package and universal drivers allow fast and smooth integration with all standard industrial applications. Each camera comes with a free software package comprising a software development kit (SDK), demonstration pro-



Thanks to their comprehensive software support, the uEye® cameras are quick and cost-effective to integrate into custom applications.

grams for image recording and analysis, and the corresponding source code written in C/C++. The uEye® cameras are thus also perfectly suited for experimental applications in the area of human-machine interaction, as the "Recipe Table" example shows. A further advantage in this regard is that all uEye® cameras support the current Windows operating systems as well as Linux.

The prototype of the "proactive kitchen table" has already passed its first road test with flying colors. None less than Linz's celebrity chef Georg Essig tested the "Recipe Table" at a cooking show at the Ars Electronica computer art festival. At this exhibition held in Linz in September last year, the students of the Interface Culture course of the University of Art presented their visionary work. It will be interesting to see whether the "Recipe Table" will make its way into our kitchens one day. One thing is for sure, however: The actual cooking is something even this ingenious appliance cannot take off our hands.

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