clink!

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ABSTRACT
"clink!" is a project that incorporates the idea of coloring liquids in cocktail glasses with light. The tradition of clinking is used as the event to trigger the mixing of colors of two cocktail glasses. In contrast to other projects dealing with augmented interpersonal visual communication "clink!" allows highly controllable interactions, visually representing the participants in a very subtle way. The second half of this paper discusses different design approaches and the technical realization of a first demo setup.

Categories and Subject Descriptors
H.5.2 [**Information Systems**]: User interfaces and Presentation – User Interfaces, K.4.2 [**Computing Milieux**]: Computers and Society – social Issues, I.3 [**Computer Methodologies**]: Computer Graphics - *interaction techniques*, H.1 [**Information Systems**]: Models and Principles

General Terms
Design, Human Factors.

Keywords
Visual Communication, Interface Design, Visual Representation, Wireless Dataexchange, Light Design.

1. PROJECT DESCRIPTION
In one of the decisive scenes of the movie "Suspicion", the glass of milk that Cary Grant brings upstairs to Joan Fontaine appears to glow (Figure 1). Interviewed by Francois Truffaut, Hitchcock remarked that this effect was achieved simply by hiding a light in the milk glass.

"clink!" is based on this idea of light and liquids. The project consists of individual cocktail glasses, each equipped with three LEDs (red, green and blue). By controlling the amount of light emitted by each LED a milky liquid in the cocktail glass can be tinted in every possible color - based on the principle of additive color mixing. Clinking two glasses mixes the respective colors. The color change is achieved by adding the two individual r-g-b color values (additive color mixing). For example clinking a blue and a red cocktailglass results in changing the color of both glasses to magenta.

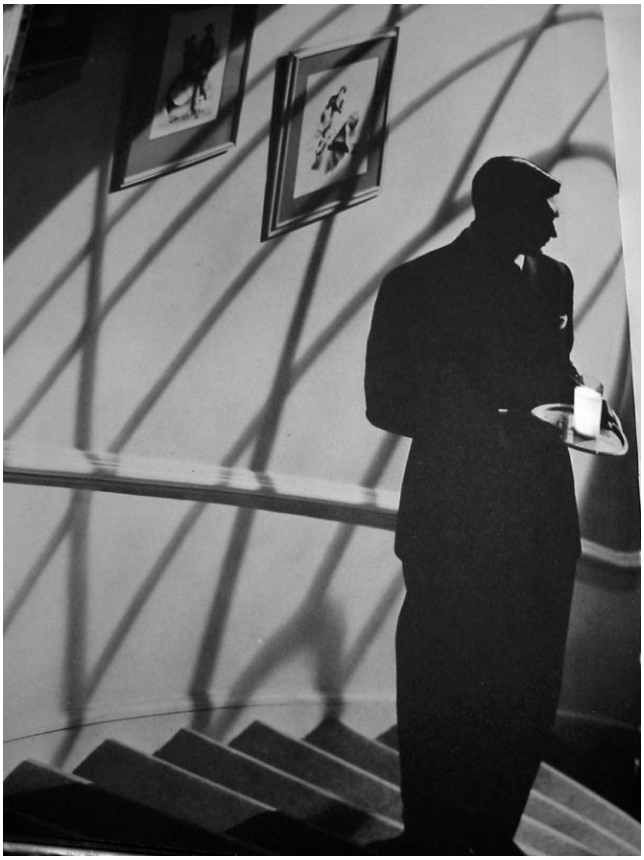

Figure 1. Cary Grant with milk glass in Hitchcock's "Suspicion"

2. SOCIAL/COMMUNICATIVE ASPECTS
"clink!" can be seen in the tradition of projects dealing with technology mediated visual communication expressing personal affinity. Most of these projects however imply a strategy where the participant cannot consciously influence the display of his or her own mood. Mood rings from the late seventies or, more recently, Diller and Scofidio's "Brain Coats" within the "Blur" project for the Swiss EXPO 2002 are such examples. Here the critique can be brought forward that if the participant is not fully aware of surrendering to the visual representation of his or her own mood (not even taking into consideration the possibility of unprecise representation) disappointment or intimidation might be the result.

"clink!" has a completely different approach to these social phenomena: it allows a technically mediated visual communication in a much more subtle but at the same time highly controllable way, displaying a participant's mood indirectly but very precisely.

3. TECHNICAL DESCRIPTION

3.1 General Technical Issues

The mixing of colors of two cocktail glasses is technically a two-level process. First the clinking of two glasses has to be detected, then color information has to be exchanged (cf. Figure 2). The process of detecting the clinking event is purely digital, i.e. based on an ON/OFF impulse. Here, three types of sensors can be used: capacitive sensors (using the capacitance of the glass and the person holding it), tone decoders (to filter the frequency of the clinking) or a very sensitive accelerometer (to detect the vibration produced by clinking two glasses). The most reliable solution however seems to be a combination of capacitive sensing and tone decoding.

Once the clinking of two cocktail glasses is detected, red, green and blue color values, ranging from 0-255, have to be exchanged between the glasses. Technical solutions for the transfer of data from one glass to the other include IR data transmission, inductive coupling and RF data transmission. So far, a big problem with the data transfer is the simultaneous sending and receiving of information. The color values have to be sent and received simultaneously - other than exchanging information between two nintendo game pads where one pad works as the sender first and then turns into a receiver.

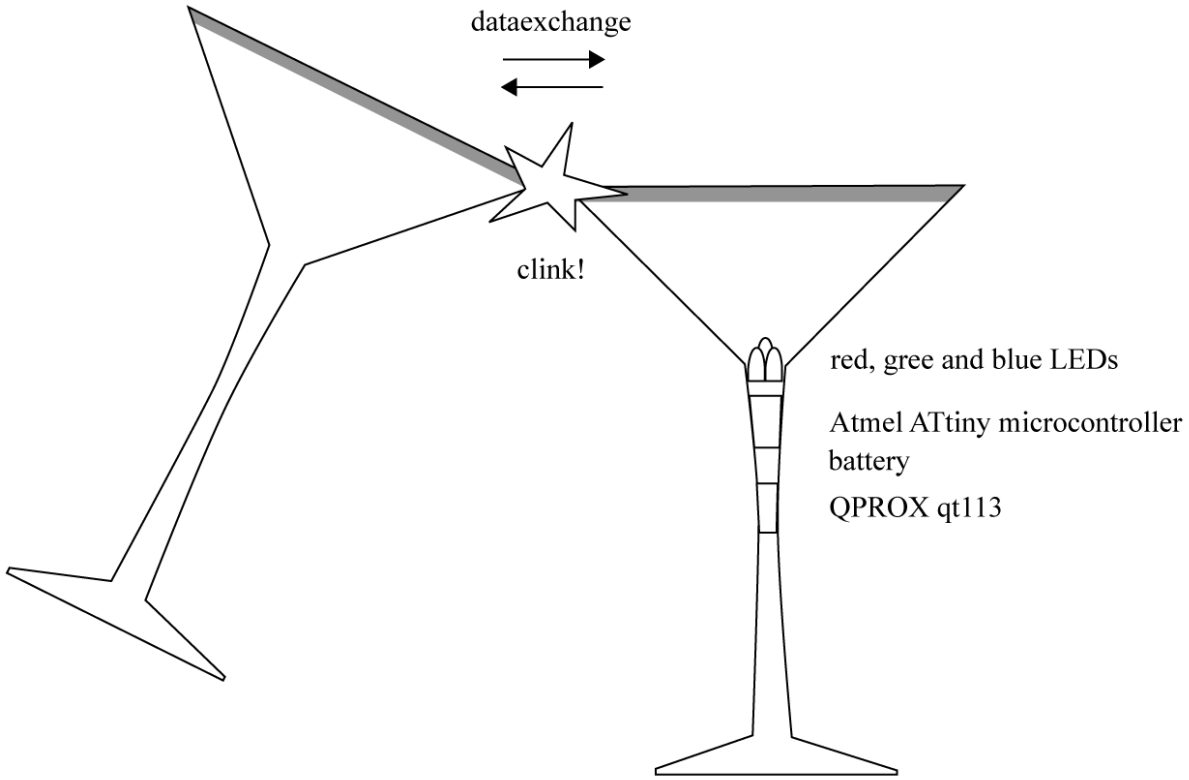

Figure 2. The act of clinking as trigger for dataexchange between the two cocktail glasses.

3.2 Design Considerations

The “clink!” project can be technically realized in three different ways (cf. Figure 3). One possible setup houses the technical parts in the stem of the cocktail glass, the LEDs are pointing upward from the top of the stem. A second and third approach to realize the project introduce an autonomous unit that is added to the cocktail glass. One idea is to develop a unit with the form and size of an olive which is simply thrown into the cocktail glass. The other idea is a unit in the form and size of a stirring stick for cocktail glasses. Both concepts leave the cocktail glass itself untouched. A big advantage is that the independant units can be used with all different types of glasses, the design of the cocktail glass is not touched.

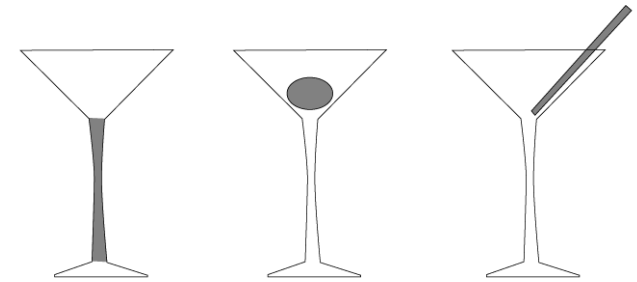

Figure 3. Design considerations

The initial goal of the project was to have a performance-like event. With this in mind, the first solution, i.e. integrating the parts into the cocktail glass is easier to realize (e.g. a problem of a unit that is completely disconnected from the cocktail

glass is that the act of clinking becomes harder to sense). The first project presentation in a performance-like cocktail party can be used to gather information about user behavior, involvement and interaction. A second goal might emerge from user feedback and observations: to turn the idea into a commercial product. If the final aim of the project is mass production than the concept of individual units has to be explored.

3.3 Demo Setup

In a first demo setup two cocktail glasses are equipped with red, green and blue LEDs to produce the colors in the liquid (a mixture of 50 percent water and 50 percent vitaminD milk). A strip of aluminum foil is attached to the rim of each cocktail glass. The aluminum foil is the antenna of a capacitive sensor, built around a QPROX QTouch™ IC. Changes of the electromagnetical field sourrounding the antenna are output by the chip as voltage between 0 and 5 volts. The voltage is read by the input line of an OOPIC microcontroller. Both capacitive sensors are connected to one OOPIC board. If both sensors detect a clink then the color values of each glass are added and output to the individual LEDs in order to produce the respective color. The output lines connected with the LEDs are pulse width modulated (PWM) to allow 16 different brightness values for each LED.

Figure 4. Cocktail glass with rgb value 255-0-0

After the mixing of colors the two glasses are reset and new intial colors are produced by pressing a button.

This first demo setup is put together with standard electronical parts. For the final realization of the project the surface mount version of each of the parts is going to be used.

4. CLINK HISTORY AND THE MIXING OF COLORS

As the first interactive simulation (see shockwave movie on the website [1]) showed, the way of how to mix colors has to be observed more carefully. The first idea was to mix colors straight, based on the principle of additive color mixing. Mixing a purely red cocktail glass (R-G-B value 255-0-0) with a purely blue cocktail glass (R-G-B value 0-0-255) results in two magenta colored cocktail glasses (R-G-B value 255-0-255) (cf. Figure 5). Eventually all glasses turn white after clinking a couple of times (R-G-B value 255-255-255).

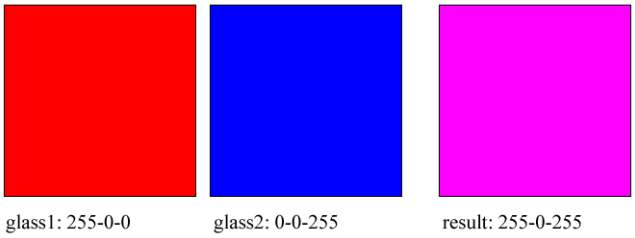

Figure 5

The problem with this approach is that the history of clinking is not taken into account and thus is not reflected in the color representation. Let's assume a party guest with a bright pink almost white cocktail (R-G-B value 255-200-200 - s/he toasted a lot before) toasting with another guest with a dark turquoise cocktail glass (R-G-B value 0-60-60 - it's his/her first toast). The result is a purely white color in both glasses (R-G-B value 255-255-255) resulting from the additive mixing of the two colors (cf. Figure 6). While this seems to be logical for the guest with the bright pink cocktail, the other guest with the dark turquoise cocktail may see his color underrepresented and wiped out by the almost white bright pink.

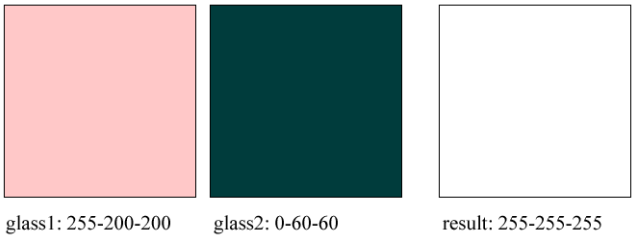

Figure 6

A solution to this problem could be a clinking history that internally gives each glass a certain computational weight depending on how often a glass has been clinked. The weight then becomes a variable in the process of mixing colors. Another solution would be a color mixing process where each glass only adds a percentage, e.g. 50 percent, of the other glass' color. Mixing a red (R-G-B value 255-0-0) with a blue (R-G-B value 0-0-255) would then result in a dark magenta (R-G-B value 255-0-123) on the one side and a dark purple (R-G-B value 123-0-255) on the other side (cf. Figure 7).

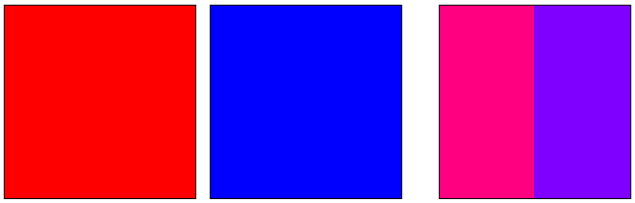

Figure 7

However this strategy leads away from the generation of exactly the same color in each of the two cocktail glasses, an important result that makes the project appealing and that has strong social implications ("... and if I like somebody and I want to approach him, then I can just say: Hey, I want to mix colors with you!" [personal communication with Tanya Peng]).

5. CONCLUSION

The next step in the technical realization of this project is the miniaturization of the technical parts, the realization of the wireless dataexchange and the improvement of the clink detection. Shrinking Down the size of the sensor and microcontroller can be achieved using surface mount parts instead of normal electronic parts. In order to realize the wireless dataexchange IR communication is going to be used. Combining a capacitive sensor with a tone decoder guarantees a more reliable detection of the clinking of two glasses (e.g. avoid triggering by touching the rim of the glass with fingers or lips). Once the first cocktail glass prototypes are developed, the process of mixing colors can be further investigated. A final formula of how the colors are mixed has to be worked out based on empirical data (gathered while using the "clink!" cocktail glasses): user interaction, user feedback and motivation. the aim of the first stage of this project is a stylized and performance-like cocktail party with "clink!" cocktail glasses. The development of a commercial application might be considered after analyzing the results from the first stage of the project.

6. ACKNOWLEDGMENTS

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7. REFERENCES

[1] Project website:
http://users.design.ucla.edu/~fwinkler/258/index.html

Figure 8. Colorvalues based on different brightness settings of the red, green and blue LEDs.