Computer Vision for Human-Computer Interaction: Perceiving Faces

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PRISMA
2nd Thematic Network Meeting
1st Forensic Imaging Workshop
Toledo, 7-8 February, 2008

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Work carried out at:

Instituto Universitario de Sistemas Inteligentes y Aplicaciones Numéricas en Ingeniería

Universidad de Las Palmas de Gran Canaria

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- Glass Selector
- Face and smile detection for IM
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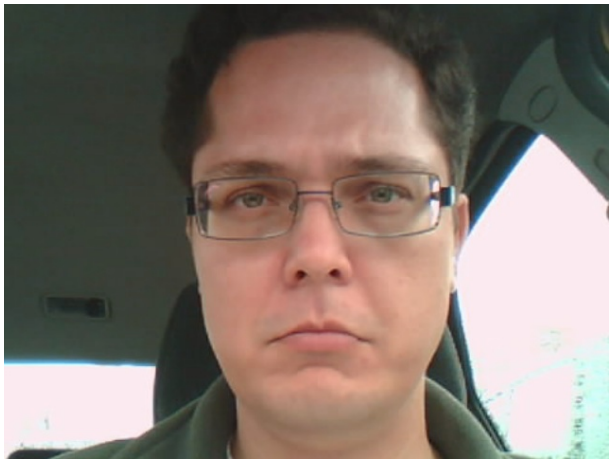
Introduction

- The human face conveys not only identity, but also other important information


- This talk describes two HCI applications based on perceiving the human face

Glass selector

- Glass selection systems are becoming a necessity in optical shops as the market is saturated with an increasingly complex array of lenses, frames, coatings, tints, etc.

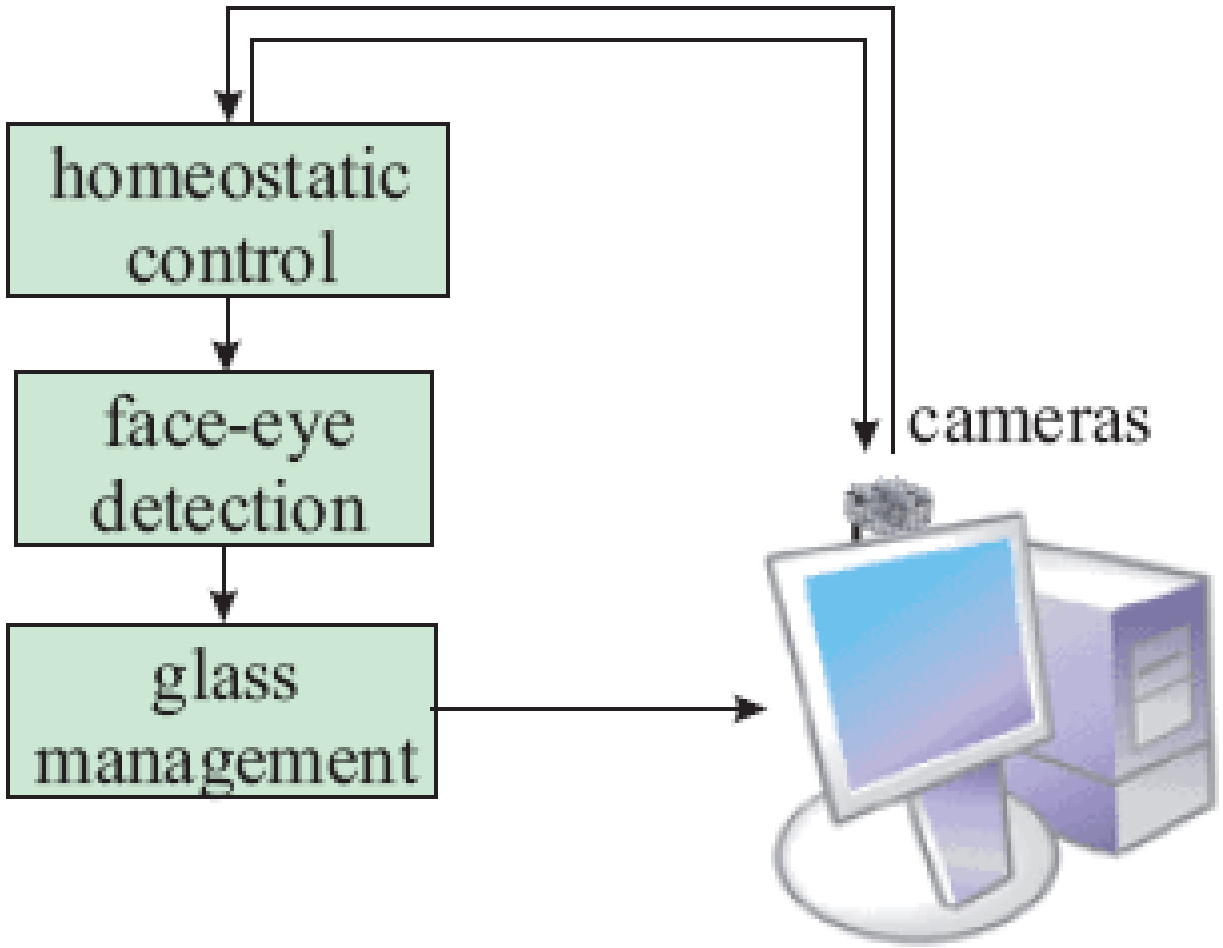
Glass selector

- A low-cost computer vision system has been developed that allows the user to visualize different glass models in live video
- Glass models are superimposed over the live-video image of the user
- The user can select and test a range of models

Glass selector

- Two cameras with motorized zoom, focus, white balance and shutter speed
- Cameras on top the computer monitor
- One of the cameras has a larger zoom and works with grey frames

Glass selector



Glass selector

- The homeostatic control module tries to keep image parameters under control
- Suitable for dynamic scenarios (like an optical shop!)
- Currently only luminance (by adjusting iris and shutter speed of the cameras)

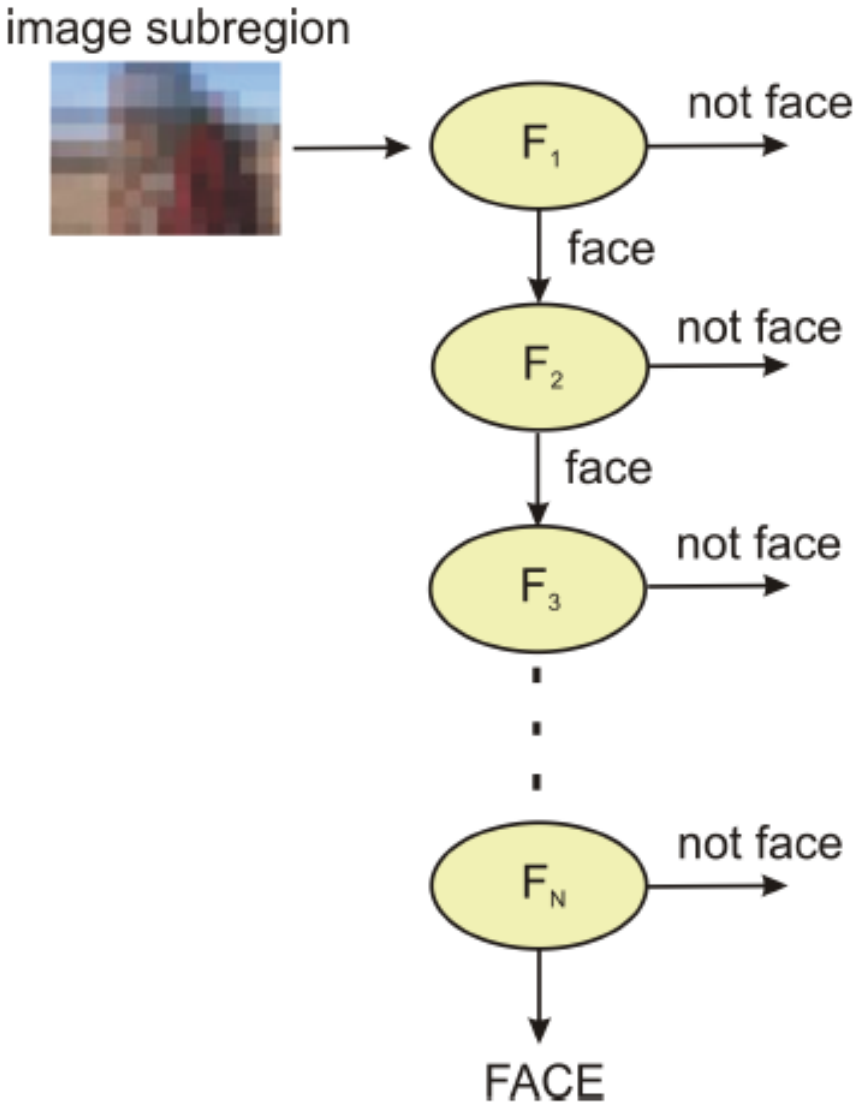
Glass selector

- The Face Detection module (ENCARA2) locates the face in the image
- Eyes are also located in images of the two cameras
- Viola-Jones cascade of classifiers based on Haar-like features

Glass selector

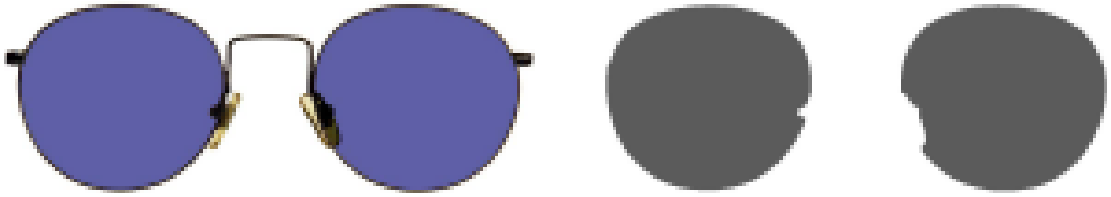
- Viola-Jones cascade of classifiers based on Haar-like features
- Each single classifier has a high detection rate (d) and a low rejection rate (r)
- If, for example, d=99% and r=50%, a 6-stage cascade would have:

$D=0.99^6=94\%$ $R=0.5^6=1\%$



Glass selector

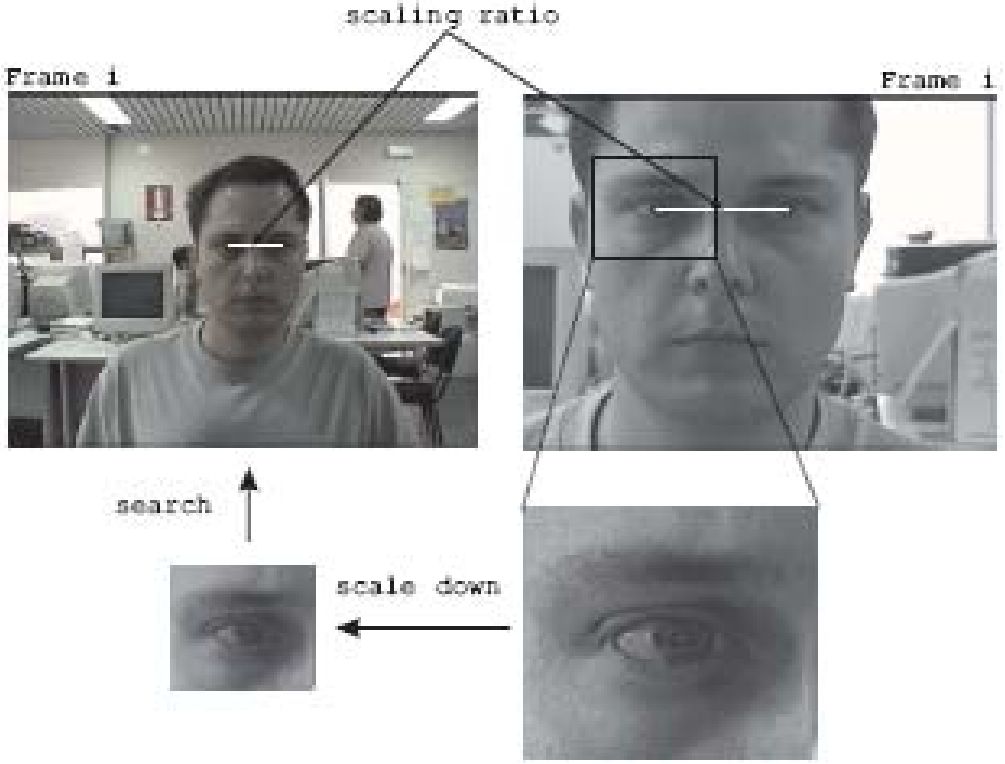
- Glasses are superimposed over camera live video using Alpha Blending
- Glass models were obtained by taking frontal photographs of real glasses at a local optical shop
- Image editing software was used to extract foreground and transparency channels



Glass selector

- The glass model is rotated and scaled, and then superimposed over live video

- The scaling ratio is based on the inter-eye distance detected
- Eye locations obtained in the zoom camera allow to get more precise eye positions



Glass selector

- On-screen buttons allow to visualize the next/previous model

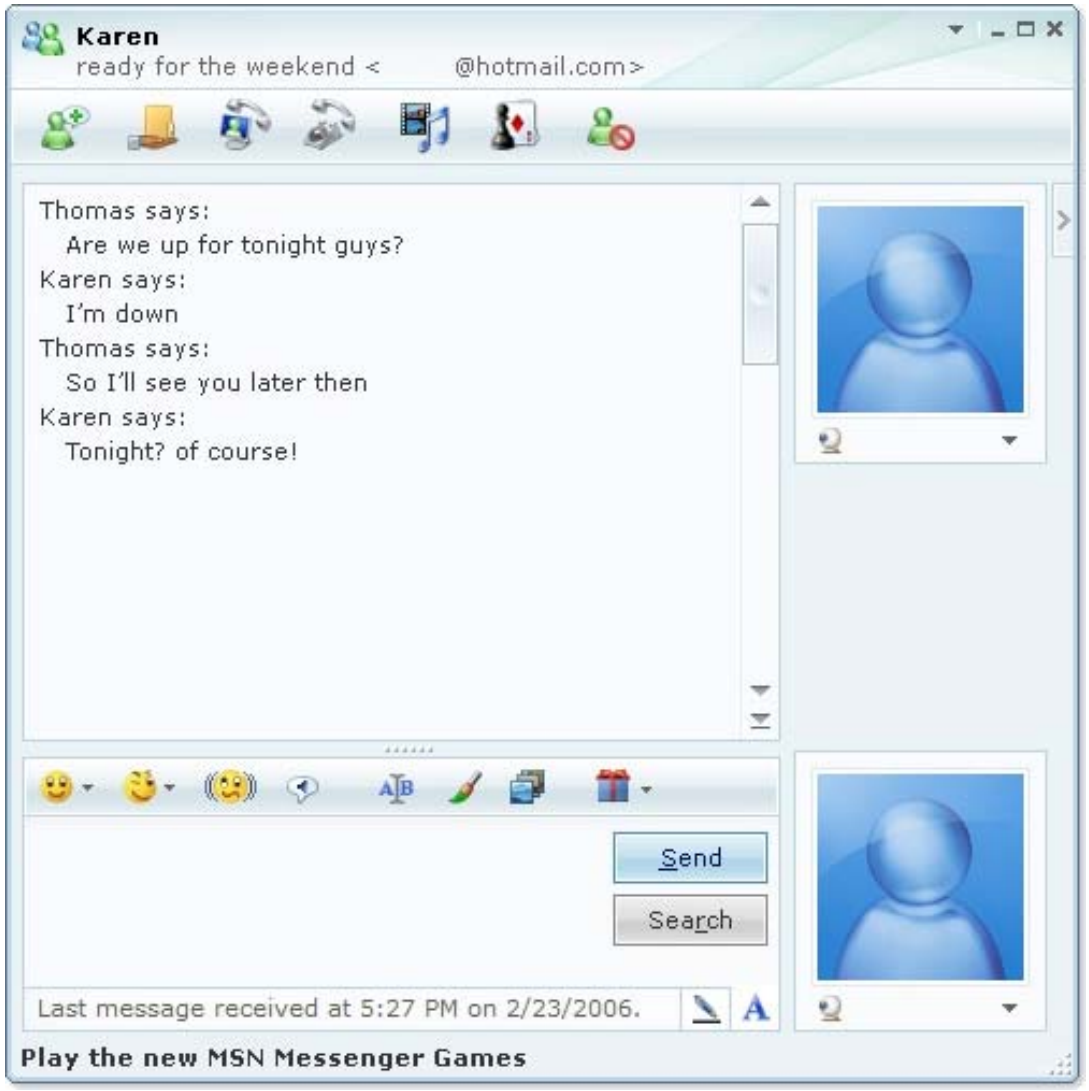
Glass selector

Glass selector

- Glasses can be fitted (vertically)

Face & Smile Detection for IM

- Instant Messaging (IM) is a form of real-time communication based on typed text



Face & Smile Detection for IM

- History of IM:
    - Appeared in the 1970s to facilitate communication with other users logged in to Unix machines
    - GUI-based clients appeared in the mid 1990s
    - Currently, actively used as a fast communication tool, specially among young people and in the workplace

- The benefits of IM include the ability to know when personal contacts are available, nearly instantaneous communication, and the ability to carry on several informal conversations at once.

Face & Smile Detection for IM

• In IM users can use emoticons to convey emotional states or facial expressions:

:-) 

• Problems of typed-text IM:
  • Emotions conveyed through emoticons can be fake
  • User status (online, away, etc.) has to be specifically controlled by the user himself (misunderstandings are common)

Face & Smile Detection for IM

- Modern laptops are equipped with a standard webcam:

Face & Smile Detection for IM

- We trained a face and smile detector to aid in the IM experience
- The face detector detects if the user is in front of the computer or away
- The smile detector detects user's smiles
- User status and emoticon insertion is achieved by sending keystrokes to the IM conversation window
- The camera works unobtrusively

Face & Smile Detection for IM

- ENCARA2 face detector
- Both face and smile detector based on Viola-Jones cascades of classifiers using Haar-like features
- Smile detector trained on 2436 positive images and 3376 negative images taken from Internet and previously processed by the face detector

Face & Smile Detection for IM

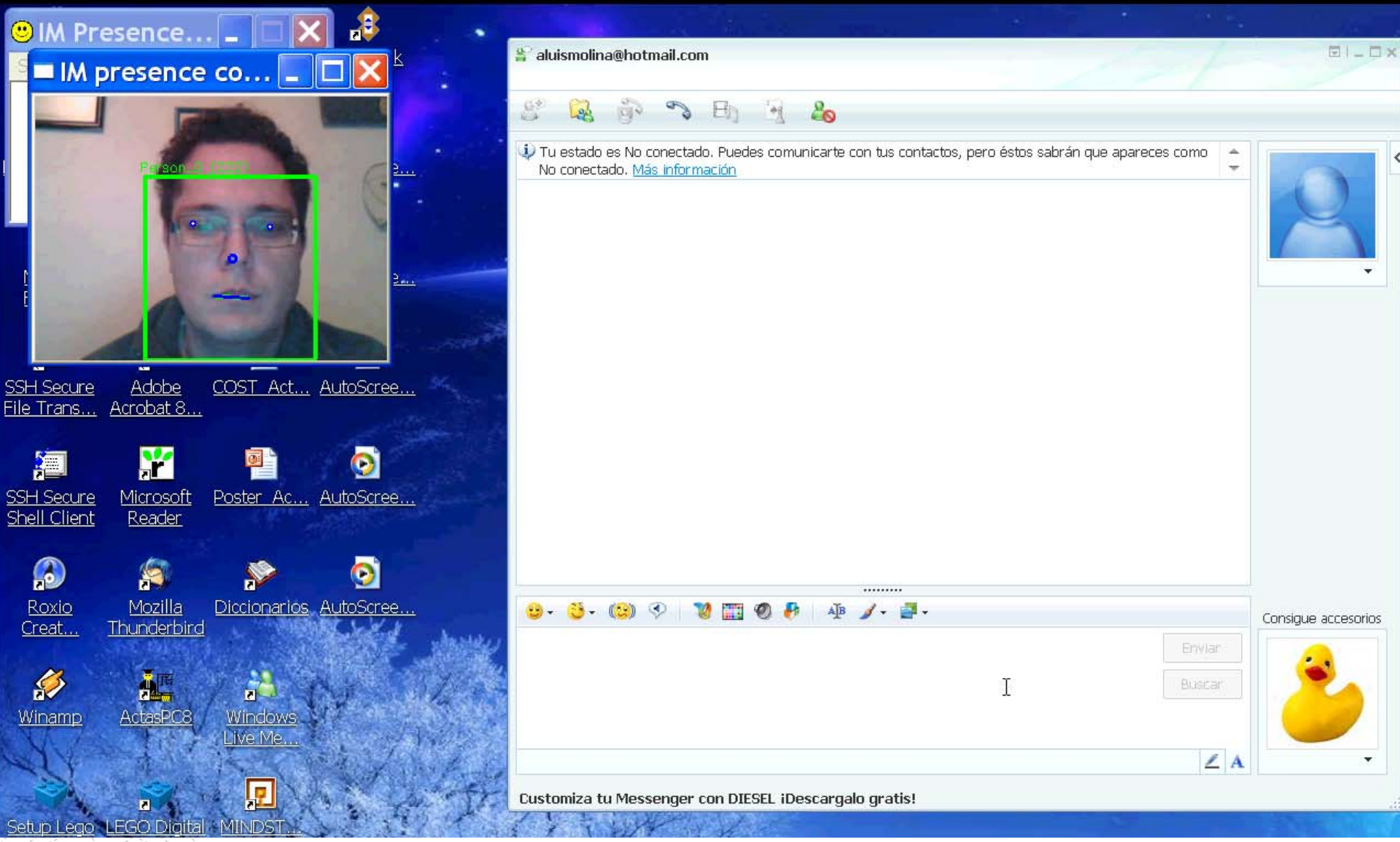
- The confidence measure of the smile detector is used to send smile and large smile emoticons:

:-) 

:-D 

Smile detection rate of 96% with under 3% false acceptance rate

Face detection rate of 99.92% with 8.07% false acceptance rate


IM Presence...
IM presence co...
aluismolina@hotmail.com
Tu estado es No conectado. Puedes comunicarte con tus contactos, pero éstos sabrán que apareces como No conectado. Más información
Enviar
Buscar
Consigue accesorios
Customiza tu Messenger con DIESEL ¡Descargalo gratis!
SSH Secure File Trans...
Adobe Acrobat 8...
COST_Act...
AutoScree...
SSH Secure Shell Client
Microsoft Reader
Poster_Ac...
AutoScree...
Roxio Creat...
Mozilla Thunderbird
Diccionarios
AutoScree...
Winamp
ActasPC8
Windows Live Me...
Setup Lego
LEGO Digital
MINDST...

Conclusions and Lines of Research

- Computer-vision applications for HCI
- Our current and future research also encompasses:
  - Face detection
  - Face recognition
    - Special interest in video processing and incremental learning
  - Surveillance:
    - Detection of abandoned packages
    - Detection of fights, of aiming gestures,…
    - X-Ray scanners at airports and stations
    - Detecting traffic infractions
    - …
  - CV for Human-robot interaction

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THANKS!