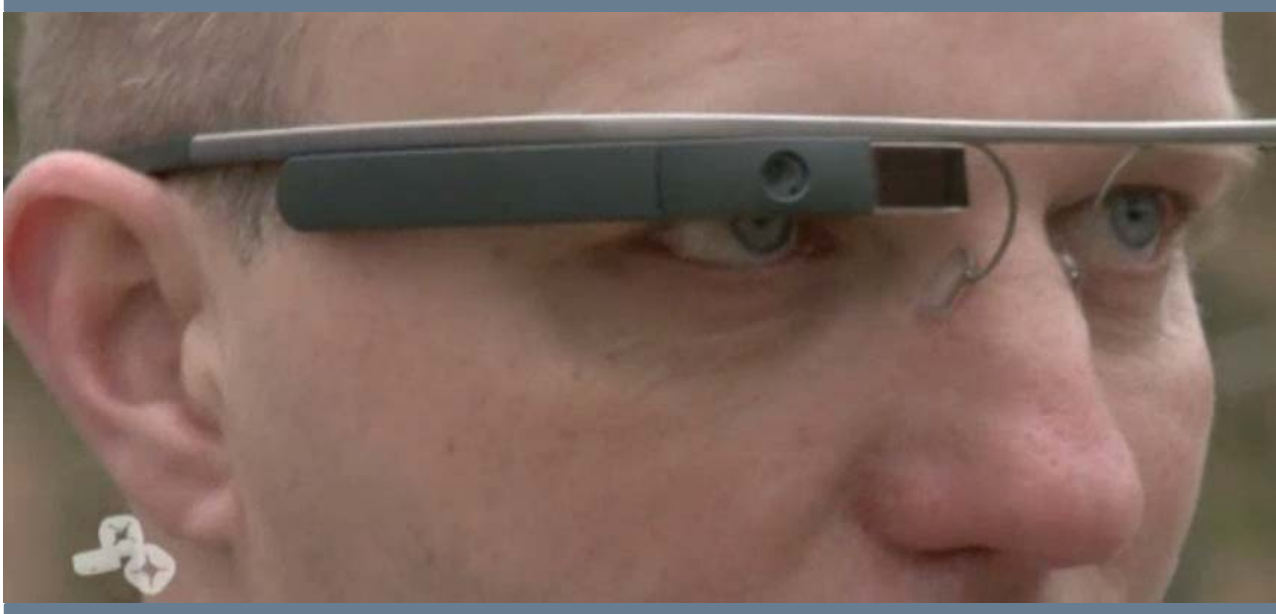


picture from the coverage of nouvo @ Swiss Television and Radio about Forest Glass



Rethinking silvicultural decision support with Forest Glass

Christian Rosset (1), Ulrich Fiedler (2); Lukas Baumann (2), Roland Brand (1)

(1) Bern University of Applied Sciences, School of Agricultural, Forest and Food Sciences HAFL

(2) Bern University of Applied Sciences, Engineering and Information Technology TI

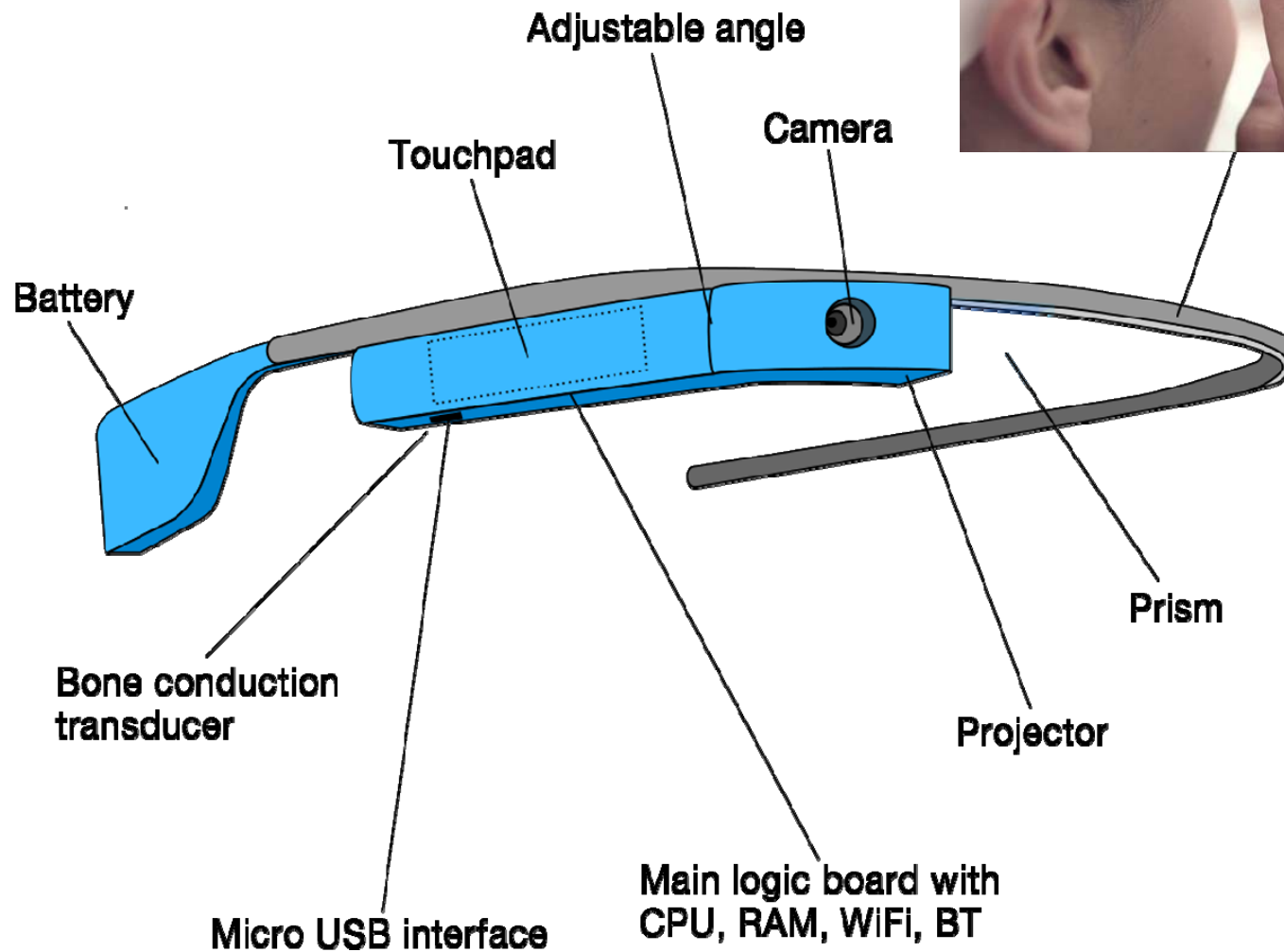
SSAFR 2015, August 19-21, 2015 UPPSALA, SWEDEN

► School of Agricultural, Forest and Food Sciences HAFL

What is Google Glass?



picture from the video "Google Glass How-to: Getting Started" available @ youtube.com



https://de.wikipedia.org/wiki/Datei:Google_Glass.svg - 19.08.2015

Mobile Applications developed at HAFL, BFH

1. MOTI: dendrometric measurement tool on smartphone

- ▶ Can measure G, N, h and thus determine V
- ▶ For use with dedicated measurements or combined measurements in sample plots both at **stand level** and at **forest level**

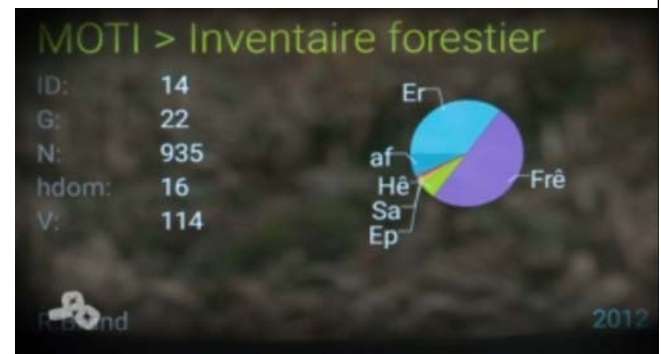
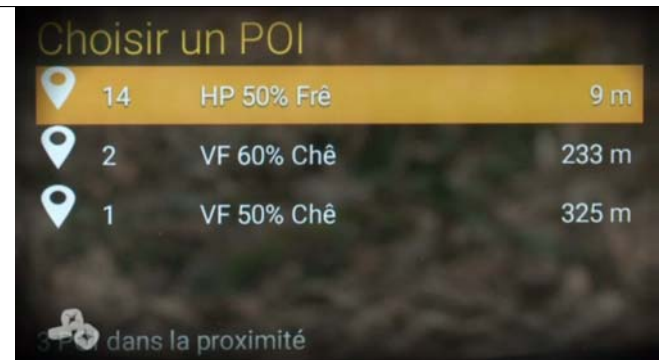
2. SiWaWa: growth model based on the inputs of MOTI

3. Sylvotheque.ch: visual documentation of the forest with high resolution photo spheres

- ▶ Users can **see the forest in all directions** as if they would turn around on site where the photo sphere has been recorded
- ▶ Opens up possibilities to **track changes over time**, especially the reaction of trees after silvicultural interventions
- ▶ Suitable to collect different types of forests and silvicultural treatments, possibility to **compare different situations**
- ▶ => **Can Google Glass lead to further improvements?**

MOTI Smartphone > Google Glass

- ▶ Visualizing data
 - + localization of sample plots in the surroundings
 - + GPS based navigation to a sample plot
 - ± data display as texts or graphs
- ▶ Gathering data
 - + comfortable with commands over voice, ...
 - ± ... true for simple forms, but not for sophisticated forms
- ▶ Performing measurements
 - + measurement of tree height (more stable)
 - ± measurement of N (adapted measurement solution to the small screen; not tested yet)
 - ? measurement of G (not tested)



picture from the coverage of
nouvo @ Swiss Television and
Radio about Forest Glass

SiWaWa on Smartphone > Google Glass

► Visualizing data

- (-) Limited interactions to access the result of the simulation; e.g. going through the results of a simulation for the next 30 years
- Possible to visualize a limited number of figures considering the small size of the screen



SiWaWa on desktop > Google Glass

- ▶ Interaction with the simulation tool
 - not obvious how to let the user describes straightforward thinning interventions (by voice command or with a simplified touchpad?)
 - not obvious how to display simulation results for different alternatives in a way the user can compare them easily (small size and small resolution of the screen)

G, N, h_{dom}

Intervention(s)

Simulation

Stand development:

Stand at different simulation states



Sylvotheque.ch > Google Glass

- ▶ Smartphone / Tablet > Google Glass
 - + localization of photo sphere in the surroundings
 - + GPS based navigation to a photo sphere
 - ± localization of the centre of the photo sphere
 - ± overlap between what you see and the visual documentation (“time windows”) done automatically, but ...
 - ± ... difficult to display details such as a magnifying glass (small screens, precision of the sensors to know in which direction the user is looking)
 - + hands free
 - battery
 - ? gather photo spheres by your own

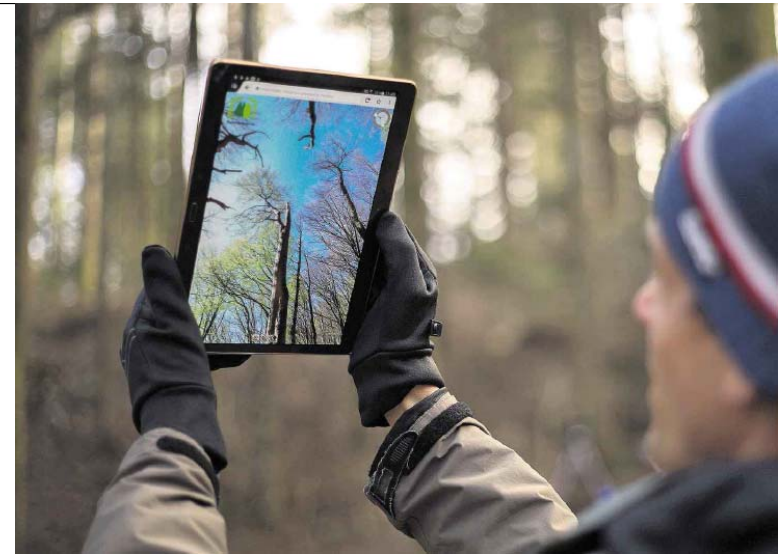


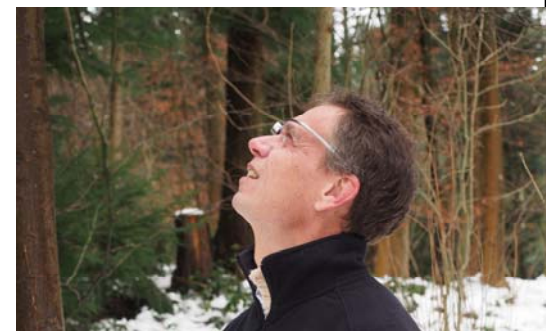
Photo: Martina Huber

Conclusion on Added Value of Glass

- ▶ Existing (relevant) information about what you see is automatically available in your visual field
- ▶ On site data collection and data processing to quantify what you see and to have a visual documentation of what you see ... with the advantage not to have to hold the device with the hands ... possibility to easily document silvicultural treatments as a part of a knowledge management system (bottom-up)
- ▶ On site data and knowledge sharing (e.g. video feed, possibility to obtain advice from somebody else being at another location)
- ▶ Probably not adequate to elaborate a DSS, but as a part of a DSS in combination with other mobile device like tablets
- ▶ Challenges: limited space to display information and limited possibilities to navigate between screens, new way of user interactions (usability, attractiveness?)
- ▶ Limitations: battery, device not adequate for all kinds of weather conditions, still a prototype, not clear how further development will be

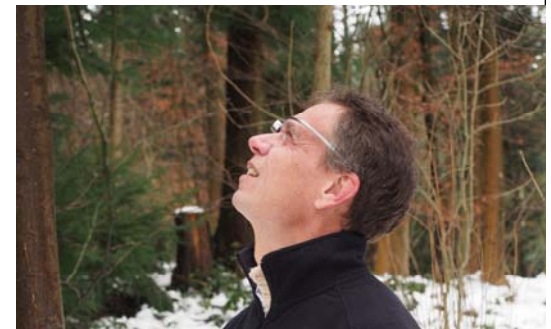
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Conclusion on Added Value of Glass

- ▶ Challenges: limited space to display information and limited possibilities to navigate between screens, new way of user interactions (usability, attractiveness?), readiness to use this new kind of technology?
- ▶ Limitations: battery, device not adequate for all kinds of weather conditions, still a prototype, not clear how further development will be



Thank you for your attention!

Video @ Nouvo about Forest Glass (TV program on new trends and technologies of the Swiss Television and Radio) > www.nouvo.ch

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Le 19h30, 21.03.2015, 19h30

Nouvo / Journée int. des forêts: les lunettes connectées de Google séduisent les garde-forestiers

765

1 3

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< 21.03.2015, 19h30 >



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01:44



Nucléaire iranien / Futur accord: les précisions d'Avram Zisyadis
01:19



France: des dizaines de milliers de curieux se sont déplacés pour la "marée du..."
02:06



Italie / Lutte contre la corruption: des prêtres s'élèvent aussi contre la mafia
02:25

Outlook → Diffusion innovation theory

(Rogers 1995, after Lin und Chen 2012)

- ▶ The **relative advantage** to the current situation
- ▶ The **compatibility** of the current structure
 - data sharing! make existing data easily available
- ▶ The degree of **complexity** and the corresponding perceived difficulty of using the new technique
 - HMI development particularly demanding to ensure usability and comfortable use
- ▶ The chance of **trialability** before purchasing
 - Google Glass officially not available in Europe (except UK)
- ▶ The degree of **observability** with respect to the recognition of the consequences for the introduction of a new technology
 - Very few examples of applications

Additional Applications For Glass

- ▶ Tagging existing administrative data to points-of-interest (POIs)
 - ▶ Data describing site conditions and related silvicultural recommendations for tree species selection is visually associated with the location
- ▶ [Video feed in medicine -> article ...]
- ▶ ...



Outline

- What is Google Glass?
- Three mobile applications for silvicultural decision support developed at BFH and their added value and limitations
- Can the added value be increased by porting such applications to Glass?
- Conclusion and outlook