

Passively Acquiring Information Must End

Hermann Maurer
Graz University of Technology

Presentation for



At IMC FH Krems, Austria, September 2, 2021

Main thesis and starting point of my work, jointly done with Bilal Zaka and Sonja Eisenberger:

Is it not strange how „asymmetric“ the net is used?

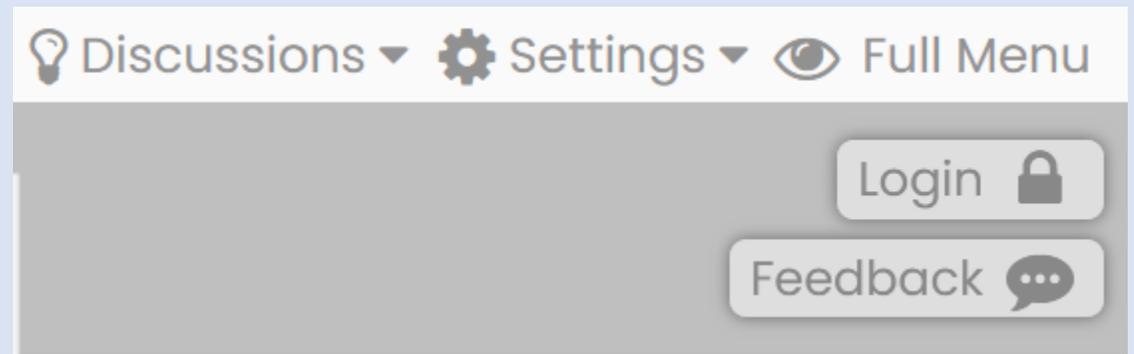
In computer games, and E-Learning, and Social Networks, and other applications, interactivity is essential.

However, typical documents or information on the Web usually do not allow any kind of interaction but are studied just passively.

We have developed a system NID, an acronym for **NetInteractive Documents** that has many features for action and interaction.

The most obvious one is that users can send feedback to the person(s) responsible for the document (called „editor“ in what follows): Such feedback can be anonymous or if a user wants an answer, an E-Mail address has to be included in the feedback form.

Feedback button on every page



Clicking at
button
produces →

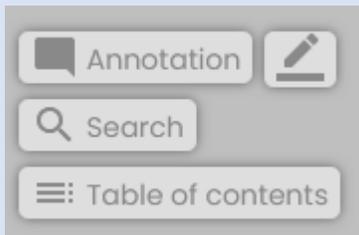
Feedback!

Email (Optional)

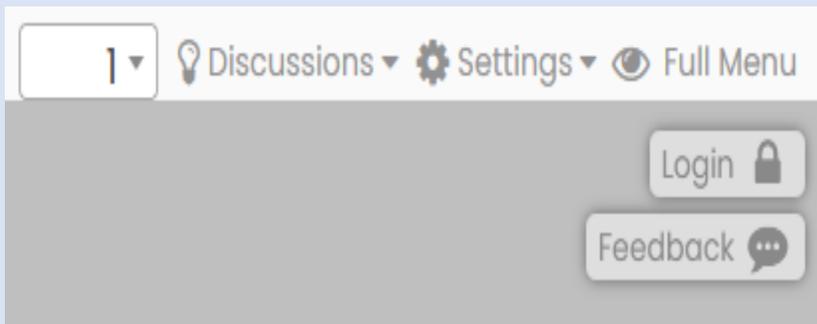
Feedback *

A note on the menu structure of NID

To make the use of NID easy for beginners we have what we call the “Short Menu” that shows up in most situations:



Menu in the left upper part of pages. It is used for making of annotations, for starting a search, and for showing a table of contents. The latter has not been added to all books: if it does not exist the entry „Table of contents“ is not shown.



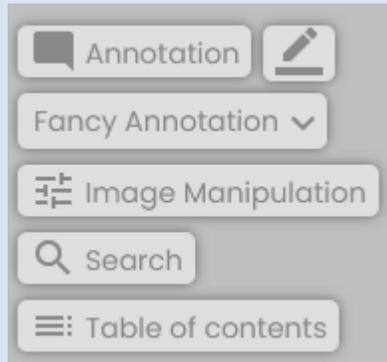
These are the options on right upper part of pages. From the left: A field that allows to directly jump to a page, Discussions will be explained later, Settings allows to go to a different mode of presentation (one page, two page, thumbnails, etc.), Full Menu allows to open more options (see next page), Login is to identify oneself for one of many purposes (some discussed later). Feedback is the button dicussed on the previous page.



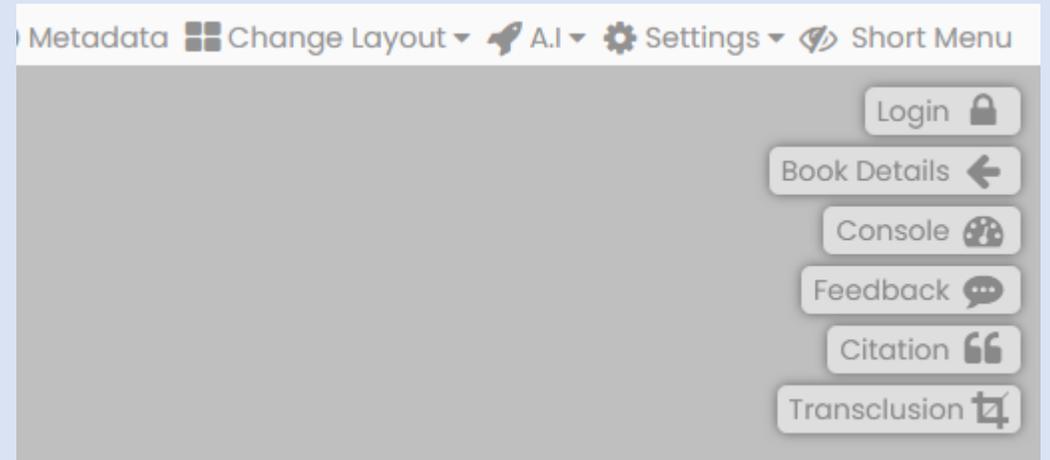
Options in the right lower part of page: + and – for zooming, the four > to move a picture if sufficiently large, and the central house icon to return to the original size after zooming.

The Full Menu

If clicked, the menu options in left and right upper part are extended as follows:



The only additions here are „Fancy Annotation“ allowing more than just using the outline of blue rectangle as link anchor (an example will be shown later)



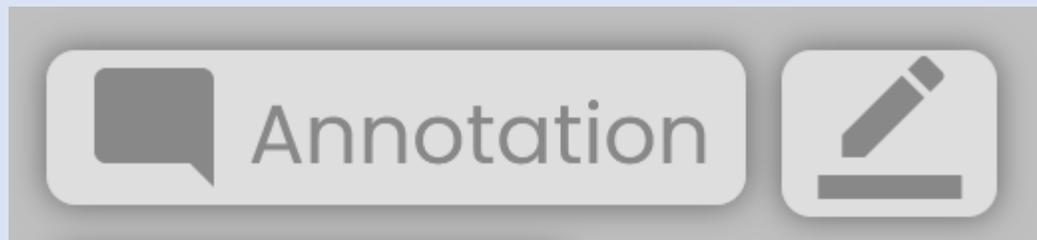
Metadata shows some information about the document, Change Layout permits to put more than one page even from different servers on the screen (an example will be shown), A.I. allows to extract data from pages that will be used for „semi-automatic linking“ of similar pages in the future, Settings has two more items for quiz and for groups (we touch on these subjects later), Book Details just shows the cover of the document, Console is essential for certain administrative features, Citation allows to automatically create a proper citation according to language and citation style chosen, and Transclusion allows to generate a link that leads to a chosen rectangular part of a page. This link can, e.g., sent by Mail to someone who then will see the part of the page one did intend to show!

Some of the interactive features :

Users can add information (“annotations”) to a page of a document: This can be a piece of text, a picture, a link, or a clip.

Note: The editor of the document gets information when an annotation is added by someone, can change it or delete it. Also, when creating the document, the editor specifies if annotations can be made anonymous, or only by logged-in users, or are invisible until made visible by the editor.

Text or multi-media material oder links can be added to any page of a document (We call such additions „annotations“)



Simple way to do it: A click on pencil allows to mark any area on a page and opens the form

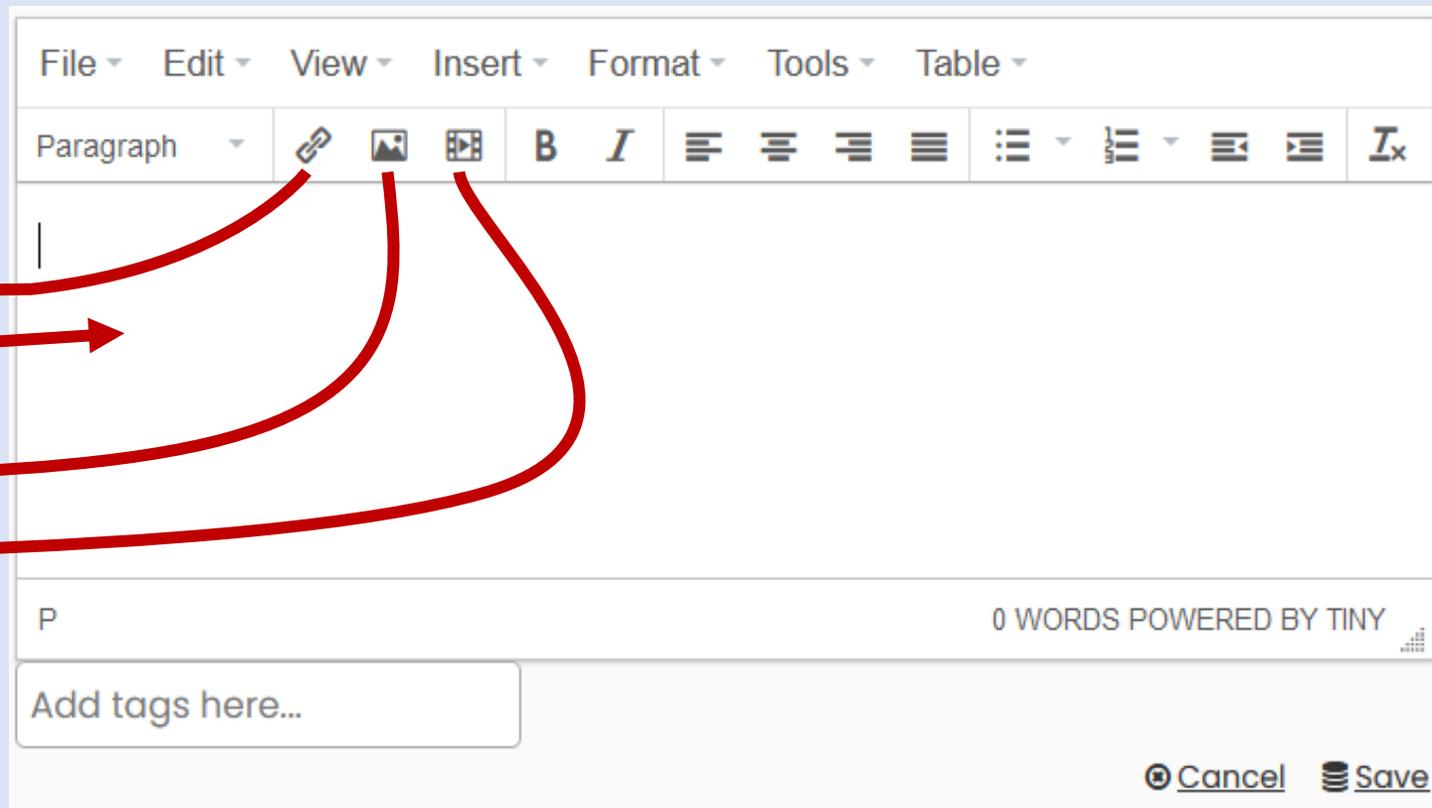
Link

Text

Picture

Clip

...or Combination



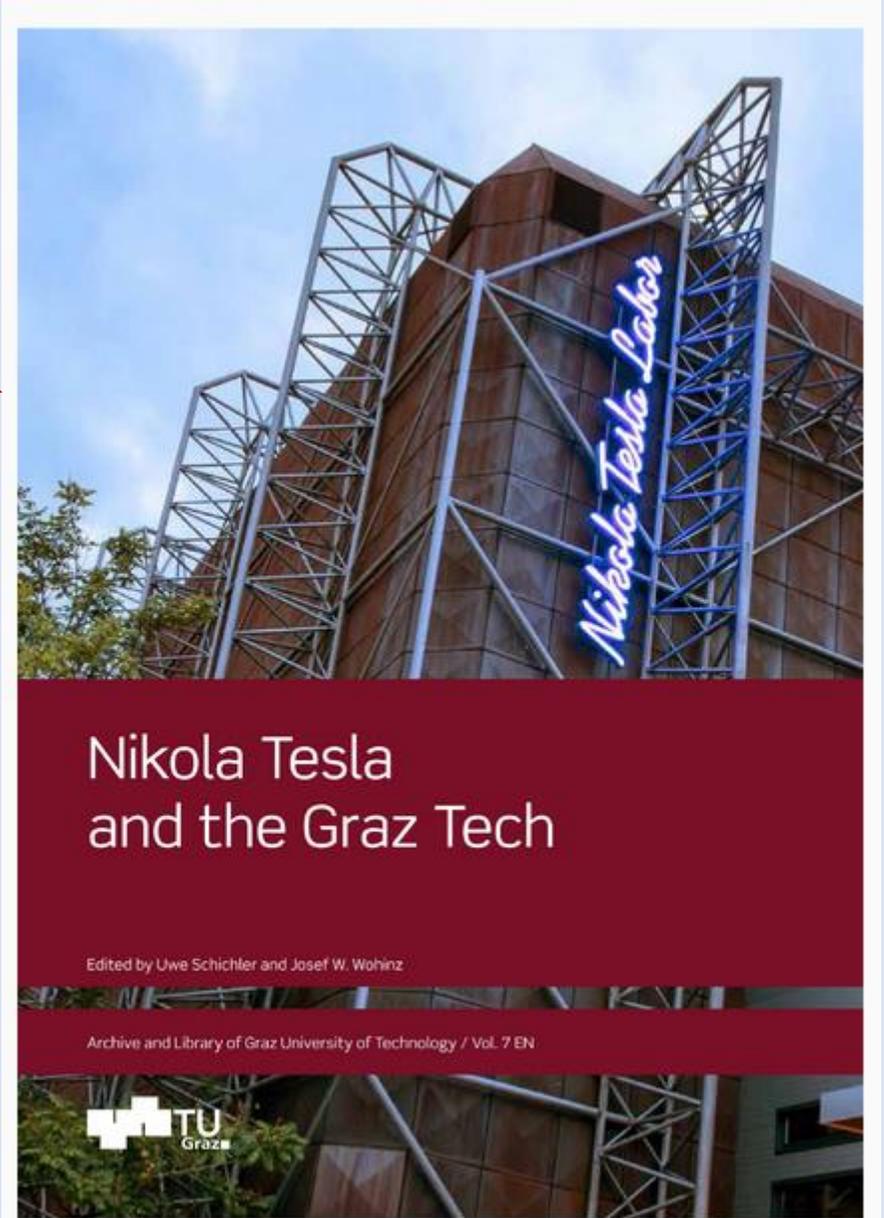
Demo Booklet Tesla

The decision to build a demo around the name Tesla emerged since **Graz University of Technology** decided to honor the former student Tesla by publishing a book on him, one version in **English**, the other in **German**. The name Tesla as name for one of the earliest electric cars allowed to also add a little bit on the electric cars, and on Musk as the mastermind behind it and other interesting endeavors.

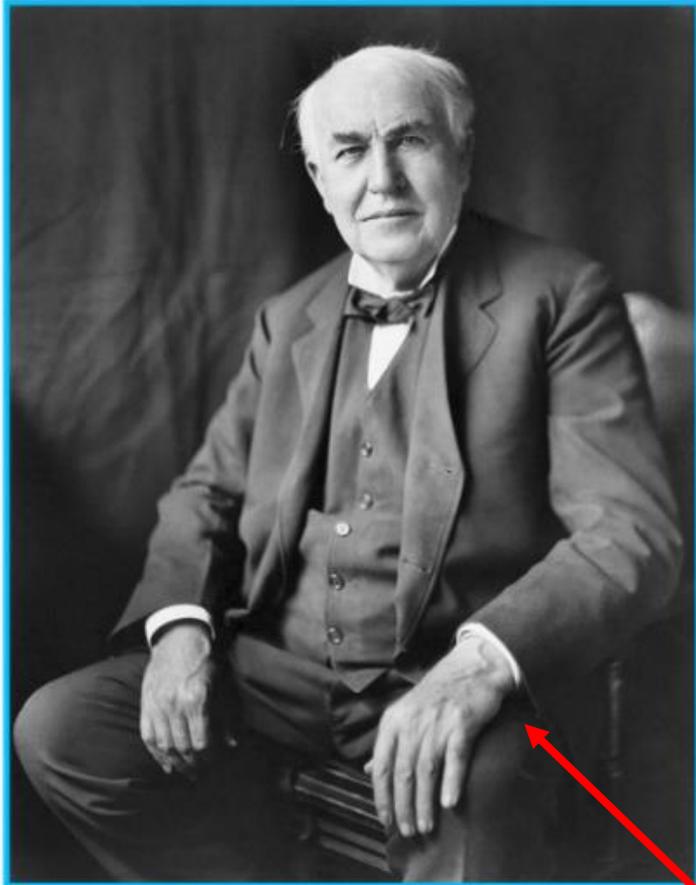
Examples for annotations:
On mouse-over pictures appear.

Added By: Marco Fuchs on: 19-Oct-2020

 [New Window](#)



War of the currents with Thomas Alva Edison



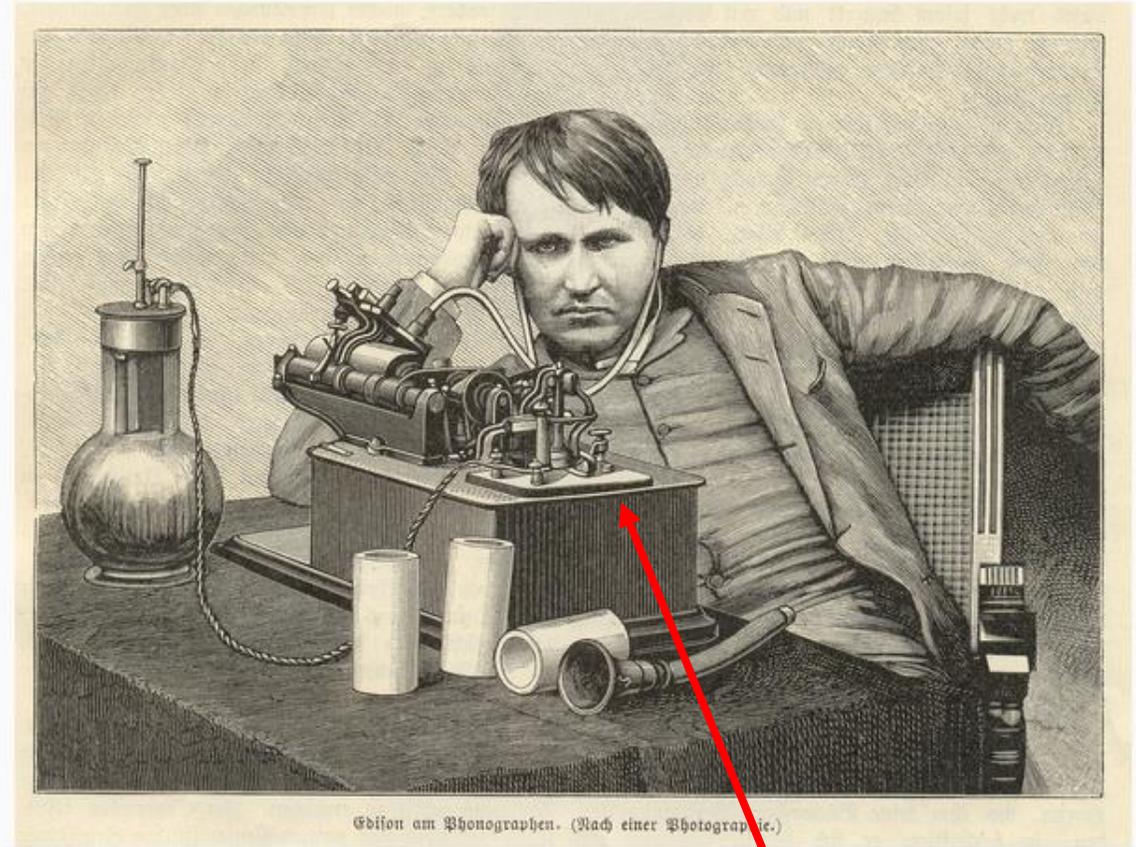
(Picture of Thomas Edison, Louis Bachrach, Public Domain)

War of the current



(Picture of Thomas Edison, Louis Bachrach, Public Domain)

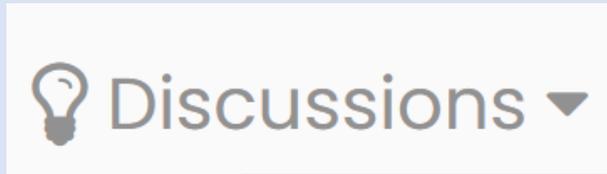
Thomas Alva Edison (February 11, 1847 – October 18, 1931) was an American inventor and businessman who has been described as America's greatest inventor.



Mouse-over blue-ish framed Edison left, opens picture shown right as overlay.

Users can start a discussion or participate in existing ones.

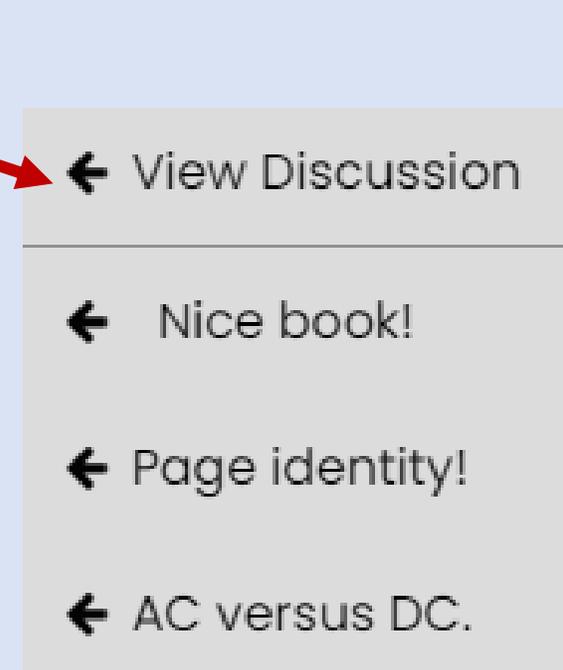
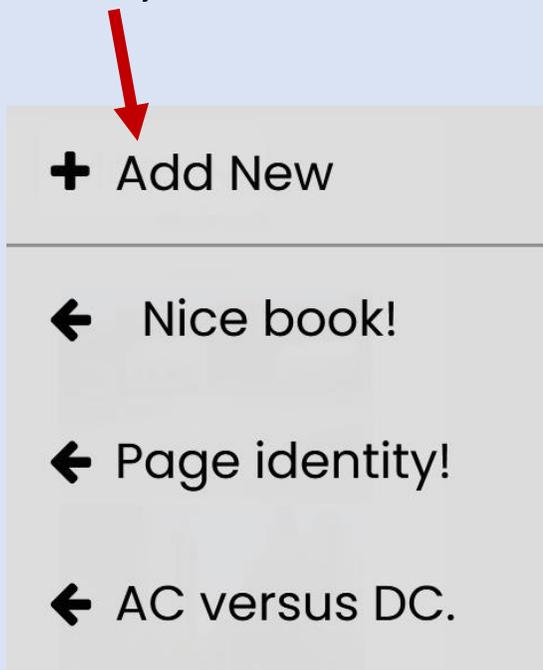
On top of each page the word “Discussions” is shown:



Grey, to see all discussions in the document, blue if one already exists on that page →



A click on either shows all discussions in the document and permits to start one, or to view the discussion on that page:



A short discussion on direct current (DC) vs. alternating current (AC)



Anonymous

AC versus DC.

AC (Alternating current, Wechselstrom) has won over DC (Direct Current, Gleichstrom) I have read, and Tesla after all won with AC the competiton to build a powerplant at Niagra Falls. But I have also seen the statement that DC is making a comeback. Is this correct?

15-Oct-2020 11:42 AM



H.M

Yes, this is true to some extent for two reasons: The first one is that high AC voltage lines loose more energy per 100 miles than DC high voltage lines. Since now good techniques are available to convert AC into DC and change the voltage of DC (still more difficult than for

AC) it makes sense to use DC for transporting electricity over long distances. The second reason is that accumulators (batteries) store or produce DC, and this has become important because of electric cars and photovoltaic elements (solar cells) that produce DC.

15-Oct-2020 11:47 AM



Anonymous

Thanks, HM for the explanation!

15-Oct-2020 11:48 AM



M.F

Since photovoltaic cells (also called solar cells) produce DC this has to be converted often into AC, e.g. when

Type your comment below

B *I* Ix

Post

Other interactive features:

NID allows to define user groups. Thus, some information may only be visible for members of certain groups (like employees of a company, or students of a certain class, or it could be a private note)

Messages can be sent to members of a group.

Categories of documents can be defined, and the search provided can be applied to one document or to all in one category.

Users have good support to find documents based on metadata available for the document.

Help to find documents of interest



NETWORKED INTERACTIVE DIGITAL BOOKS

Search for metadata like title, author, publisher

Enter author, title or subject



Metadata Full-Text



+132 Books

Explore by categories



Read Online

Feel free to read online



Searchable

Books with searchable text

Library Collections



Other Features

NID documents can be put into a hierarchy of categories
(see previous page)

NID search can be applied to a single document or all
documents in a category

NID allows different language interfaces and automatic citation
creation

Further features

The Table of Contents (ToC) button appears on every page of a book with a table of contents. I.e., if we are on any page, we do not have to go back to the beginning of the book for the ToC, but can look at it right on the page.

We also show what the result of what typical searches look like: They find words but also objects in a certain class. In the first example notice that the word „person“ occurs only twice in the document, but a picture of a person more often as shown by the little picture icons. Then we search for the object „tie“ in the same book <https://nid.iicm.tugraz.at/Home/ViewBook/127>, and for „bottle“ in a different book.

On the page after this we show how information is extracted from document pages for semi-automatic linking in the future.

Page 10 of the document <https://nid2.isds.tugraz.at/Home/BookDetail/297>
Note the „Table of contents“ (Toc) button in the left upper corner and see result of clicking it on the next page.

TU Graz Research

10 Physics

Annotation

Search

Table of contents

10 Discussions Settings Full Menu

Login

Feedback

Rainbow-Coloured Combs and Sunlight

After only a few months at Graz University of Technology, Birgitta Schultze-Bernhardt has already brought two renowned research grants to Graz: an ERC Starting Grant and the FWF START Prize. With these in her pocket, Schultze-Bernhardt wants to generate more (UV) light at the Institute of Experimental Physics at Graz University of Technology.

Birgit Baustädter

Portrait: TU Graz research 2020-2#24

The sky in front of the wall-sized window is the colour of fresh concrete. Today, sunrays find no gap in the cloud cover. It is more pleasant inside, in Birgitta Schultze-Bernhardt's office. There is water from coffee cups and warm ceiling light. The fact that the cloudy sky swallows the ultraviolet sunrays does not bother the physicist. After all, in future she wants to make her own UV rays.

UV radiation is very high-energy radiation. When it encounters matter or gases, the interactions are very frequent and very strong and, because it is also emitted by the sun, this makes it particularly relevant for research. Yet it is also difficult because there is currently no laser source that can emit such high-energy light directly. "I was already working on creating a frequency comb for the UV range during my doctorate," says the researcher. "A frequency comb is a laser ruler, so to speak, by which I can measure radiation with great precision and broad band," explains Schultze-Bernhardt. For her research she uses a method of converting infrared light into UV light – an unfortunately very inefficient method: a lot of laser power is lost, so it has to be started at a very high level in the first place.

ERC STARTING GRANT AND START PRIZE

In two projects, rooted like a tree in the same thematic ground and branching upwards, she wants to create a new approach to UV spectroscopy. The Electronic Fingerprint Spectroscopy (ELFIS) project was awarded the FWF's START prize in spring and focuses on the lower UV range. In the summer, the researcher was awarded an ERC Starting Grant from the European Research Council, which now allows her to devote additional attention to the high-energy UV range. "With these funds I can establish a special laser source and two high-power amplifiers in Graz," she says, looking forward to the years of research ahead of her.

The results of her work are intended, on the one hand, to improve precision spectroscopy and, on the other, to be used in applied research, for example in atmospheric research: "We could use them to investigate how the sun's UV light affects the gases in the Earth's atmosphere and thus, for example, find out the exact conditions under which these gas molecules react to form new molecules or simply decompose," she explains, adding, "We physicists always want to know everything down to the last detail."

Toc available on any page, e.g., opened here on page 10

TU Graz Research 10 Discussions Settings Full Menu Login Feedback

- Front Cover
- Last Page
- Editorial: Vice Rector Horst Bischof
- Hydrogen: Electricity Storage of the Future?
- Commentary: Alexander Trattner
- **Rainbow-Coloured Combs and Sunlight**
- Battery Safety Center Graz
- Newsflash
- Fields of Expertise
- Advanced Materials Science
- Human & Biotechnology
- Information, Communication & Computing
- Mobility & Production
- Sustainable Systems

Annotation Search Table of contents

10 Physics

PORTRAIT
TU Graz research
2020-2/424

Rainbow-Coloured Combs and Sunlight

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Birgit Boustädt



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Notice that a search can also locate objects.

Here the word person was found on p.13 and p.15, but 2 pictures of persons were found on p.4.

P.4 of the document is shown on next page!

← → ↻ 🏠 🔒 https://nid.iicm.tugraz.at/Home/ViewBook/127/3/view ☆ 🔍 Suchen

Options Summer 2019

Annotation ✎

🔍 Search

Search in book ▾

person

🔍 Search

Search results for: person

Showing 1 - 54 out of 54

- 4 🖼️ ...**person** ...
- 4 🖼️ ...**person** ...
- 6 🖼️ ...**person** ...
- 7 🖼️ ...**person** ...
- 7 🖼️ ...**person** ...
- 7 🖼️ ...**person** ...
- 13 ...today to provide every **person** with ...
- 15 ...every **person**. Due to distribution challenges, ...
- 21 🖼️ ...**person** ...

News in brief

Written by: Katherine Letzall



© Shutterstock.com

Swift climate action could prevent runaway Arctic warming

The frozen Arctic tundra holds what has been described as a ticking time bomb for climate change.

Permafrost, land that has been frozen for, in some cases, thousands of years, represents one of the largest natural reservoirs of organic carbon in the world. When permafrost thaws, soil microbes start to break down organic material into carbon dioxide and methane, both greenhouse gases that contribute to global warming.

This process is one of the great uncertainties in climate models. It is especially worrisome since major methane emissions from natural sources could lead to a feedback cycle, which leads to continued warming and even more emissions as more permafrost thaws. A study by researchers from IIASA, Canada, Denmark, Norway, and Sweden, however, shows that swift action to limit human-caused emissions could prevent this cycle of Arctic warming and emissions.

IIASA researcher Lena Höglund-Isaksson contributed to the study, which used scenarios to put Arctic emissions into the context of total global emissions. The study is the first to quantify the relative contribution of the two sources to global warming and provides new evidence that meeting the targets set under the Paris Agreement could avoid runaway thawing and emissions from Arctic permafrost.

"It is important for everyone concerned about global warming to know that humans are the main source of methane emissions and if we can control humans' release of methane, the problem of methane released from the thawing Arctic tundra is likely to remain manageable," says Höglund-Isaksson. "If we can only get the human emissions under control, the natural emissions should not have to be of major concern."

Extreme temperatures hit rural residents harder

Extreme temperatures bring greater mortality risk to people living in China's rural communities than in urban areas, according to IIASA research. The disparity between urban and rural mortality risk was found across the entire population, but was greater for women than men, and for people over 65.

The researchers used six years of detailed weather, air pollution, population density, and mortality data from Zhejiang Province to estimate the numbers of urban and rural deaths attributable to hot and cold temperatures.

The findings suggest that by omitting important differences between rural and urban areas and populations, previous studies may have underestimated the overall impact of extreme temperatures



on population mortality.

"These findings go against the assumption that urban residents are at higher risk due to the urban heat island effect, which raises temperatures in cities compared to surrounding areas," says IIASA researcher Stefan Hochrainer-Stigler, a coauthor of the study led by 2016 Young Scientists Summer Program participant Kejia Hu in collaboration with other researchers in China and at IIASA.

IIASA researcher and coauthor Wei Liu says, "While fast urbanization

is taking place, in the developing world there is still a large percentage of population living in rural areas. They are more likely to be working long days outdoors and also to have poor public health system coverage. Both these factors lead to greater vulnerability."

Further info: Hu, K., Gao, Y., Hochrainer-Stigler, S., Liu, W., Sun, L., Yang, X., Zhang, J., Hu, P., et al. (2021). Evidence for Urban-Rural Disparity in Temperature-Mortality Relationship in Zhejiang Province, China. *International Journal of Environmental Research and Public Health*, 18(12), 6607. DOI: 10.3390/ijerph18126607



The study gives a first estimation of the energy required to fill this gap. Providing air conditioning for all who need it would require an increase in energy consumption of 14% of current global residential electricity consumption. Since air conditioning units however tend to use a lot of energy, the researchers point out that increased air conditioning access could come with high costs and environmental impacts, unless equal attention is paid to energy efficiency and building design.

IIASA researcher Alessio Mastrucci led the study. He says, "Filling the

We feel it is impressive that the algorithm detected this heavily clad person as such and the man from the back!

We show two more examples, where we look for the object „tie“.

Search in book

tie

Search

Search results for: tie

Showing 1 - 4 out of 4

- 24  ...tie ...
- 24  ...tie ...
- 25  ...tie ...
- 25  ...tie ...

It is remarkable that even with the very small objects, the algorithm recognizes them as a "tie"!

Opinion

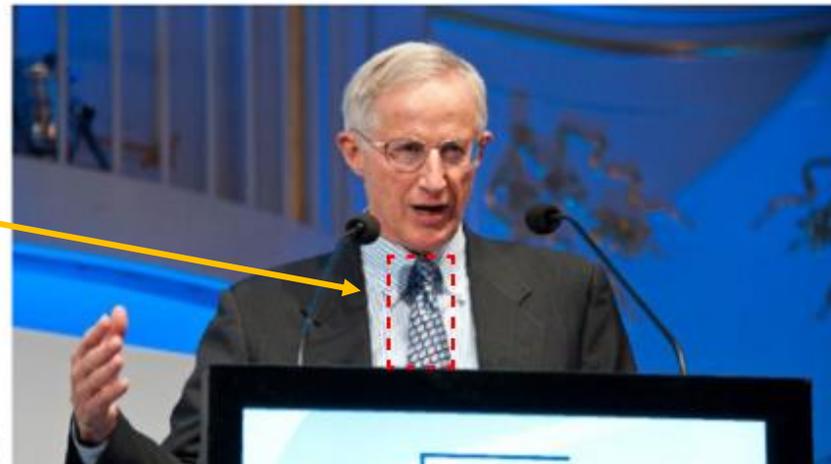
Embrapa visiting scholar **Mauricio Antonio Lopes** writes about how policies informed by science are contributing to advances in Brazil's agricultural sector.



A new approach to agriculture is emerging in the world's tropical belt

Bringing climate change and economics together

Q&A with **William Nordhaus**, recipient of the 2018 Nobel Prize in Economics.



way, the penalty to our living standards will be small. That's the main lesson. We need to find the right instruments and apply them in a gradual, appropriate way, with very high participation from different countries.

The second lesson is about international cooperation. We've basically made no progress in devising mechanisms to bring nations together. I think we have the wrong model in mind and we are going down the wrong road on international agreements.

Thus, NID allows to search for classes of pictures (“object classes”). Here is an example from another book, searching for „bottle“.

NID Object Detection Test

Search in book

bottle

Search

Search results for: bottle

Showing 1 - 5 out of 5

- 2 ...bottle ...
- 4 ...bottle ...
- 4 ...bottle ...
- 10 ...bottle ...
- 16 ...bottle ...



Using AI techniques for term extraction of pages as first step towards (semi-automatic) linking of material

INSTITUTE NEWS

Transcending the boundaries of science and policy

Written by: Ansa Heyl

In February, IIASA Director General and CEO Albert van Jaarsveld led a delegation from the institute to participate at the annual conference of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society. The focus of this year's event was on how science can bring together people, ideas, and solutions from across borders, disciplines, and ideologies to address the most pressing problems of our time. IIASA is uniquely positioned to provide extensive expertise on these topics, as they are fundamental to the institute's multidisciplinary approach and its commitment to the promotion of scientific cooperation at the local, regional, and global level.

IIASA organized two conference sessions as part of the proceedings, the first of which focused on cross-disciplinary science, while the second addressed science diplomacy. Delegates from the institute also presented a career



The session on science diplomacy looked at the role that IIASA science has played in building bridges across political divides since its establishment in 1972, and highlighted the institute's increasingly important role in the international discourse about sustainable development, particularly in terms of the SDGs. In light of rising tensions between East and West in contemporary geopolitics, speakers also reflected on how facilitating scientific training across borders through platforms like the IIASA Young Scientists Summer Program can aid in easing tensions between countries with troubled relations.

Science advice to government is a rapidly evolving field, but the number

Page Tags: science, agricultural, development, sustainable, policies, advice, land, scientific, global, systems

From another page

Page Tags: energy, electricity, africa, hydropower, sustainable, study, morocco, renewable, potential, assessment

The upper part of page 7 of (<https://nid.iicm.tugraz.at/Home/BookDetail/127>) where interesting terms ("tags") are extracted with option AI

Other features:

NID allows different modes of presentation (single page, double page, thumbnails, etc.)

NID allows links to a part of a page (“Transclusion”)

NID has quiz features built-in, two examples on next page

Different types of Quizzes are available

Multi-option quiz

Q. Where is Red Tower located

- Earth
- Sothern Part of Malta
- Northern Part of Malta
- Mars

 Submit

Multi-option quiz

Q. Where is Red Tower located

- Earth
- Sothern Part of Malta
- Northern Part of Malta
- Mars

Option 3: Correct

 Submit

NID uses the International Image Interoperability Framework : IIIF - <https://iiif.io/> .

This allows, e.g., to place two book pages from different servers side by side with different operations possible on the two pages.

Most of the famous libraries from Stanford to Harvard, to Bavarian States Library, etc. offer IIIF collections. Hence one can compare a NID book in one's own library with other books from completely different sources. Two examples on the next two pages.

Two pages from two different books! Left is from English book, right from German.



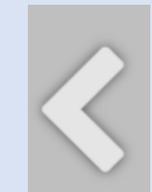
The importance of the specific, indeed unmistakable, character of a university lies in the particularly close link between scholarly research and teaching. In this way, insights are obtained which, as a further development of knowledge and in particular of the respective state of technology, justify the reputation of such an institution. Our world today is crucially shaped by technology, which entails both negative and positive aspects. The shared responsibility for our fellow human beings and for the environment is reflected in necessary decisions and programmes of action derived from them. Here, many contributions have been and are being made.

Fig.: Joanneum (Raubergasse 10) entrance gate with a row of coats of arms and a commemorative plaque (photo: H. Tezak)



Die Bedeutung und der spezifische, ja unverwechselbare Charakter einer Universität liegt in der besonders engen Verknüpfung von wissenschaftlicher Forschung und Lehre. Damit werden auch jene Einsichten erzielt, die als Weiterentwicklung des Wissens, im Speziellen des jeweiligen Standes der Technik, den Ruf einer solchen Einrichtung begründen. Unsere Welt von heute ist entscheidend durch die Technik geprägt, was positive wie negative Aspekte in sich birgt. Die gemeinsame Verantwortung für Mitmenschen und Umwelt findet ihren Niederschlag in notwendigen Entscheidungen und daraus abgeleiteten Handlungsprogrammen; hier wurden und werden vielfältige Beiträge erbracht.

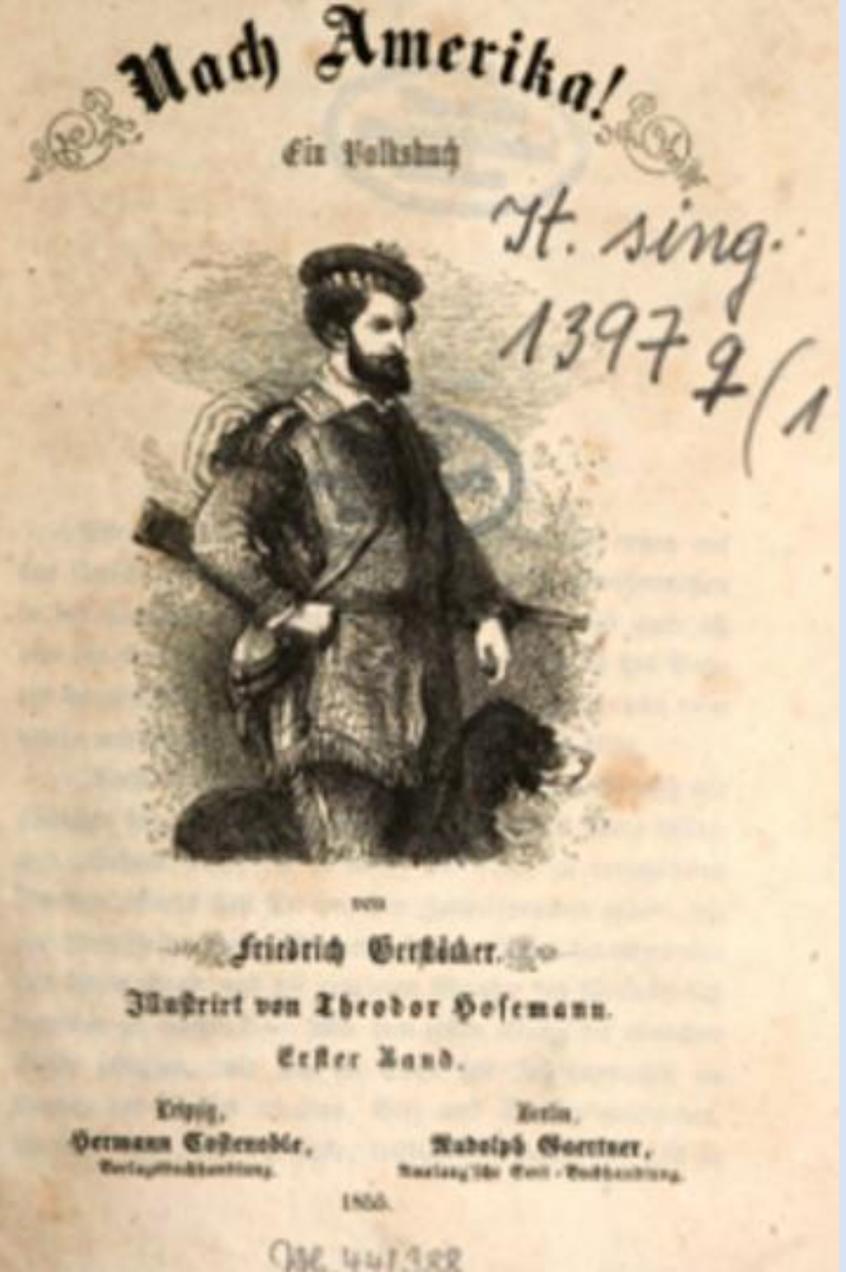
Abb.: Joanneum (Raubergasse 10) Eingangsportal mit Wappenband und Gedenktafel (Foto: H. Tezak)



ENGLISH VERSION
MARCO FUCHS



Power of Electricity and more Demo Booklet



Two pictures from different libraries: One in Graz, one in Munich!

As mentioned before, documents are usually opened with „Short Menu“
Switching to „Full Menu“ gives more options, among them „More“ („fancy“)
possibilities for annotations as shown on next page.

The screenshot displays the 'Book for Experiments' interface. At the top left is the logo and title 'Book for Experiments'. To its right is a page number '2' with a dropdown arrow. Further right are navigation links: 'Discussions' (with a lightbulb icon), 'Metadata' (with an 'i' icon), 'Change Layout' (with a grid icon), 'A.I.' (with a rocket icon), 'Settings' (with a gear icon), and 'Short Menu' (with a document icon). Below the top bar is a toolbar on the left containing: 'Annotation tools' (with a speech bubble icon), 'Image Manipulation' (with a pencil icon), 'Search' (with a magnifying glass icon), and 'Table of contents' (with a list icon). A 'More' dropdown menu is also present. The central area shows a photograph of a red brick building with two towers, situated on a hillside under a clear blue sky. On the right side, there is a vertical stack of utility buttons: 'Login' (with a lock icon), 'Book Details' (with a left arrow icon), 'Console' (with a question mark icon), 'Feedback' (with a speech bubble icon), 'Citation' (with a quote icon), and 'Transclusion' (with a square icon).

Fancy annotations



 The best view over the northern part of Malta is provided by the **Red Tower**, one of the 23 signal and watchtowers from the time of the Knights of St. John. 50 men were stationed here.

 Den besten Blick über das nördliche Malta gewährt der Red Tower, einer der 23 Signal- und Wachtürme aus der Johanniterzeit. 50 Mann waren hier einst stationiert.



 The best view over the northern part of Malta is provided by the **Red Tower**, one of the 23 signal and watchtowers from the time of the Knights of St. John. 50 men were stationed here.

 Den besten Blick über das nördliche Malta gewährt der Red Tower, einer der 23 Signal- und Wachtürme aus der Johanniterzeit. 50 Mann waren hier einst stationiert.



Blue Grotto on Malta

By choosing this icon, experienced users know what to expect: Some textual information. This and other special icons (for video clips, audio clips, etc.) are only available under Fancy Annotations.

Some further important features of NID documents

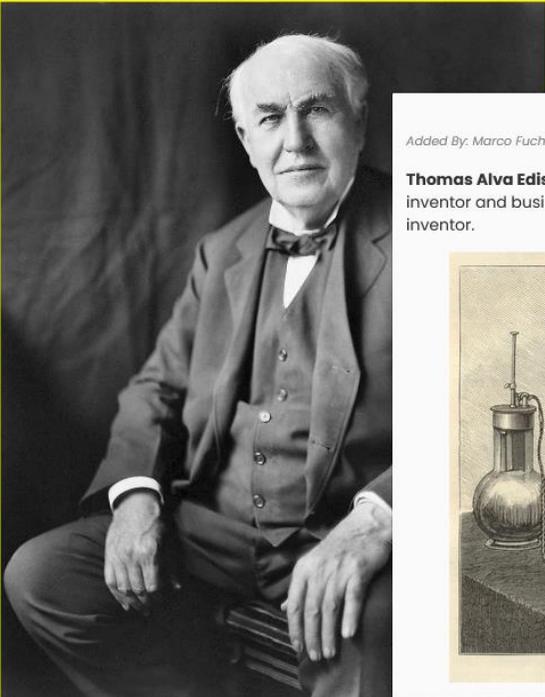
For each document it can be specified how many persons can use it at the same time. (One main reason is that a publisher may offer a document for a NID server for less money, if only one user can access it at a time, but more if more or an unlimited number of users can access it at the same time.)

Different groups of users with quite different access options can be defined, i.e. users of different groups can see different annotations. The next page shows <https://nid.iicm.tugraz.at/Home/ViewBook/199/5/view> on the left with an annotation on the „War of currents...” and a mouse-over on Edisons picture, not logged-in.

Then I log in. I have attached another picture of Edison and choose as group „Private“. Now the annotation „War of currents“ does not show, and the mouse-over Edison gives another picture, as shown on the right side.

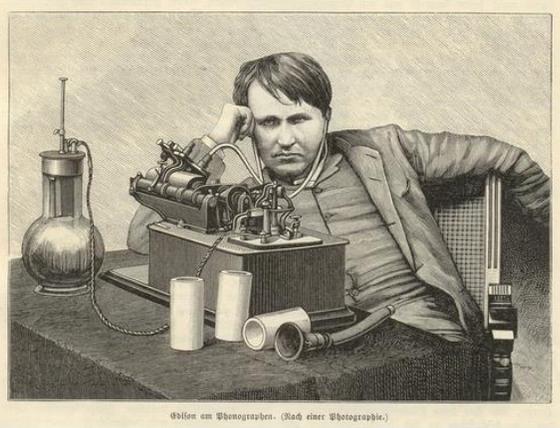
The page as it appears when I am not logged in: an annotation on „War of the currents“ and on mouse over a picture of Edison looking grumpy.

War of the currents with Thomas Alva Edison



Added By: Marco Fuchs on: 19-Oct-2020

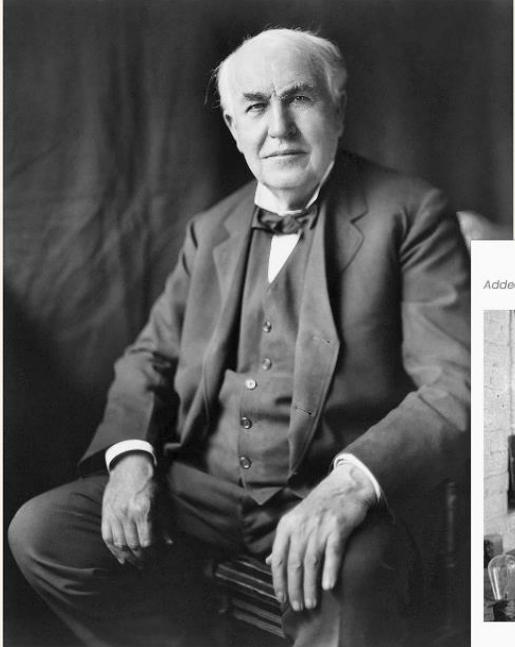
Thomas Alva Edison (February 11, 1847 – October 18, 1931) was an American inventor and businessman who has been described as America's greatest inventor.



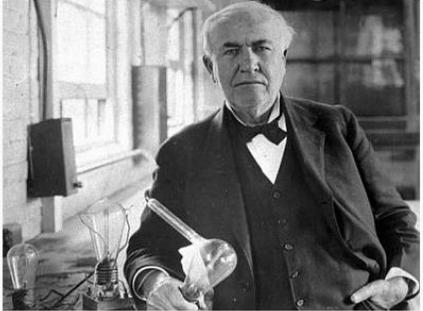
Edison am Photographen. (Nach einer Photographie.)

When I am logged in and choose „Private“ in the group setting I get another picture and no annotation on „War of the currents“

War of the currents with Thomas Alva Edison



Added By: H Maurer on: 17-Aug-2021



Other picture of Edison

If interested to see how different a document can be depending on the group, look at the document <https://nid.iicm.tugraz.at/Home/BookDetail/187> . Follow instructions and go through the document choosing as group „green“, „red“, or „Public“!

NID allows to use pictures of arbitrary (!) resolution and hence “deep zoom”. Here is a high resolution picture of a city, and then we zoom in on the place marked by a blue rectangle.





The pool was
5 mm in the
original picture
and is now
20 cm.

So we have a
zoom factor of
40 or more.

If you are interested in the NID system, contact me at hmaurer@iicm.edu

Thanks for your attention!

Hermann Maurer

Me: https://www.ae-info.org/ae/Member/Maurer_Hermann



NID: Have look at <https://austria-forum.org/af/AEIOU/NID-Books> (including 2 and soon three small mainly German video clips also reachable under https://www.youtube.com/watch?v=Rnb_gFFKGXc)