Exciting Science Group

www.excitingscience.org

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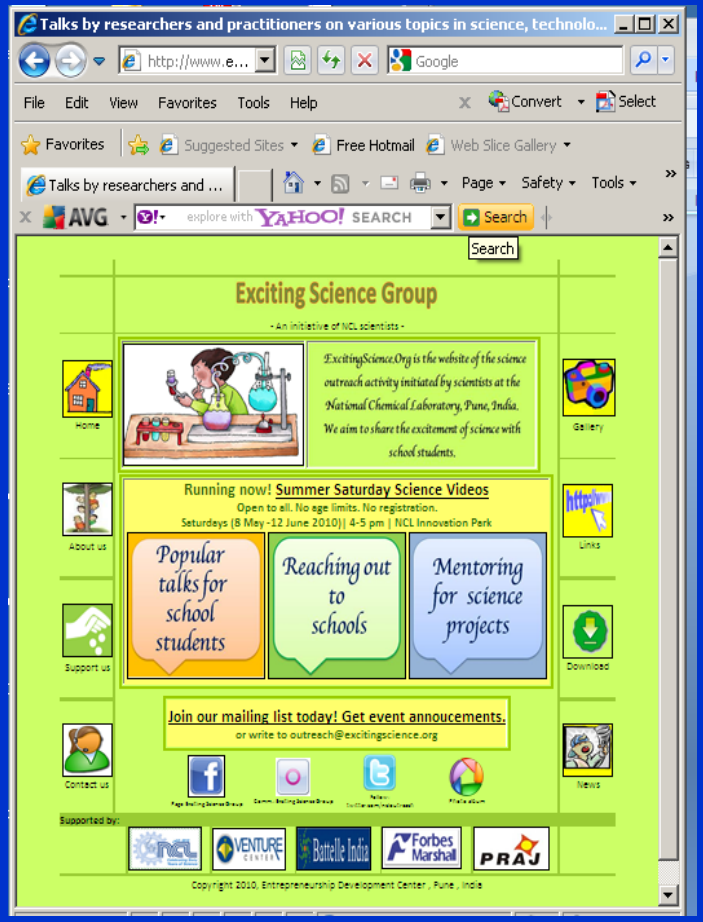


Exciting Science Group

To excite school students about science and technology

Volunteer group of CSIR-NCL scientists and IISER-P faculty

The idea is ***NOT*** to teach science, but to communicate the joys/thrill of doing research.

Key element: Create interface between students and practising researchers (“real” scientists)

Exciting Science Group: Activities

Popular Science Talks (once a month on Sunday morning at Venture Center)

School Outreach Programme (work with 3 PMC schools)

Weekly science clubs

Summer internships at NCL

Workshops: Chemistry, Scratch programming, etc.

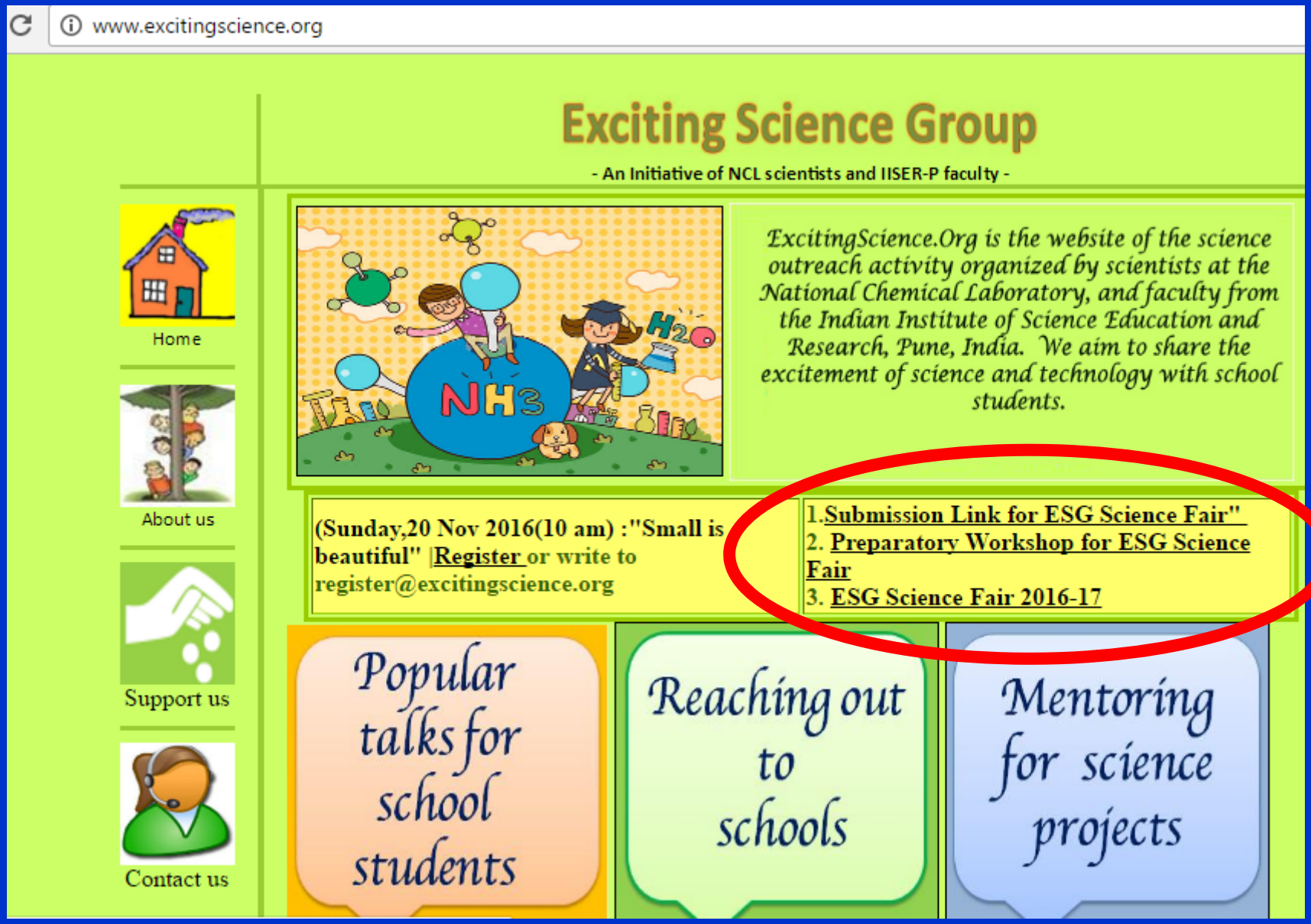
Science Quiz

Science Fair

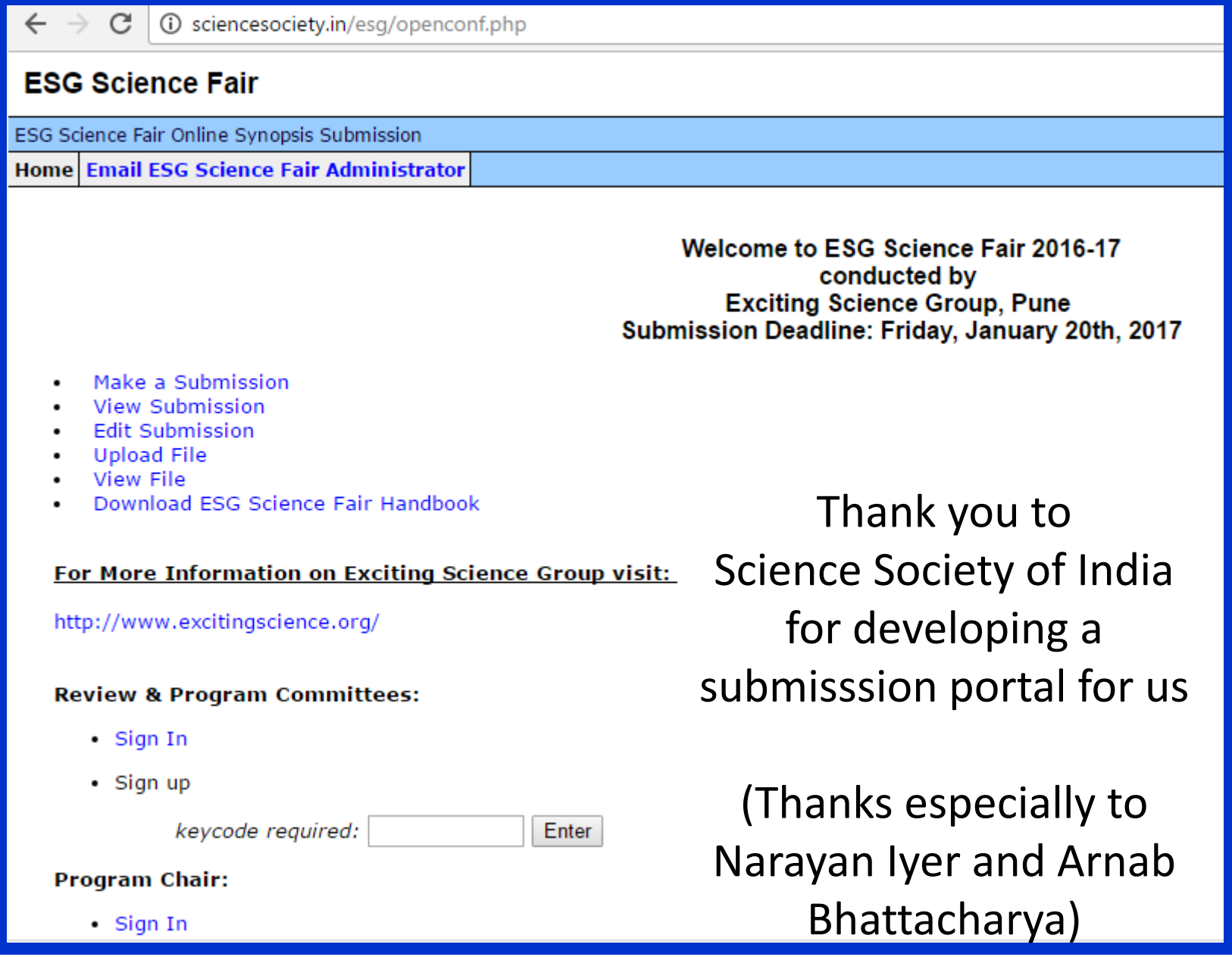
Developing a Research Project

Guruwamy Kumaraswamy
based on presentations made by
Narayan Iyer (SSI)
Arnab Bhattacharya (TIFR)
Chetan Gadgil and BLV Prasad (NCL)

Submitting a project



Submitting a project



Thank you to
Science Society of India
for developing a
submisssion portal for us

(Thanks especially to
Narayan Iyer and Arnab
Bhattacharya)

Submitting a project

Title of project
Details of team/guide
Subject category
Synopsis (< 250 words)
Details of project:
What is innovative about your work?
Where did you get the idea?
What work have you completed?
References
What is your guide’s contribution?

Submitting a project

Details of project:

8. Restricted Items/Regulated Research: If your research involves human subjects, vertebrate animals, potentially hazardous biological agents, hazardous chemicals, radiation, lasers, etc. , these may be either be prohibited, or possible only under specific guidelines.

Write "Not Applicable" if your project does not deal with restricted items / regulated research.

Submitting a project

Part 2: Supporting Data / Additional Information & Ethics Statement

A) Supporting Data/Additional Information

Please attach relevant calculations, graphs, diagrams, photographs, program code, results etc.
Any information that helps quantitatively support your project will be useful in evaluating your work

You will get an option to upload a file after submitting this form. Only one file can be uploaded, so please make a single pdf file and submit

B) Ethics Statement

Scientific fraud and misconduct are not condoned at any level of research or competition.
Such practices include plagiarism, forgery, use or presentation of other researcher's work as one's own, and fabrication of data.

Fraudulent projects will fail to qualify for competition in this fair or affiliated fairs.

Research ethics

https://en.wikipedia.org/wiki/Research_ethics

From Wikipedia, the free encyclopedia

Research ethics involves the application of fundamental ethical principles to a variety of topics involving research, including scientific research. These include the design and implementation of research involving human experimentation, animal experimentation, various aspects of academic scandal, including scientific misconduct (such as fraud, fabrication of data and plagiarism), whistleblowing; regulation of research, etc. Research ethics is most developed as a concept in medical research. The key agreement here is the 1964 Declaration of Helsinki. The Nuremberg Code is a former

Plagiarism

plagiarism

/ˈpleɪdʒərɪz(ə)m/

noun

the practice of taking someone else's work or ideas and passing them off as one's own.
"there were accusations of plagiarism"

Common forms of student plagiarism [edit]

According to "The Reality and Solution of College Plagiarism"[28] created by the Health Informatics department of the University of Illinois at Chicago there are 10 main forms of plagiarism that students commit:

1. Submitting someone's work as their own.
2. Taking passages from their own previous work without adding citations.
3. Re-writing someone's work without properly citing sources.
4. Using quotations, but not citing the source.
5. Interweaving various sources together in the work without citing.
6. Citing some, but not all passages that should be cited.
7. Melding together cited and uncited sections of the piece.
8. Providing proper citations, but fails to change the structure and wording of the borrowed ideas enough.
9. Inaccurately citing the source.
10. Relying too heavily on other people's work. Fails to bring original thought into the text.

https://en.wikipedia.org/wiki/Plagiarism

Fraudulent Projects

Fabrication of Data
Falsification of Data

(not fraud but not good practice)
Overinterpretation of Data

So, you want to do a research project

Where do you start?

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- S
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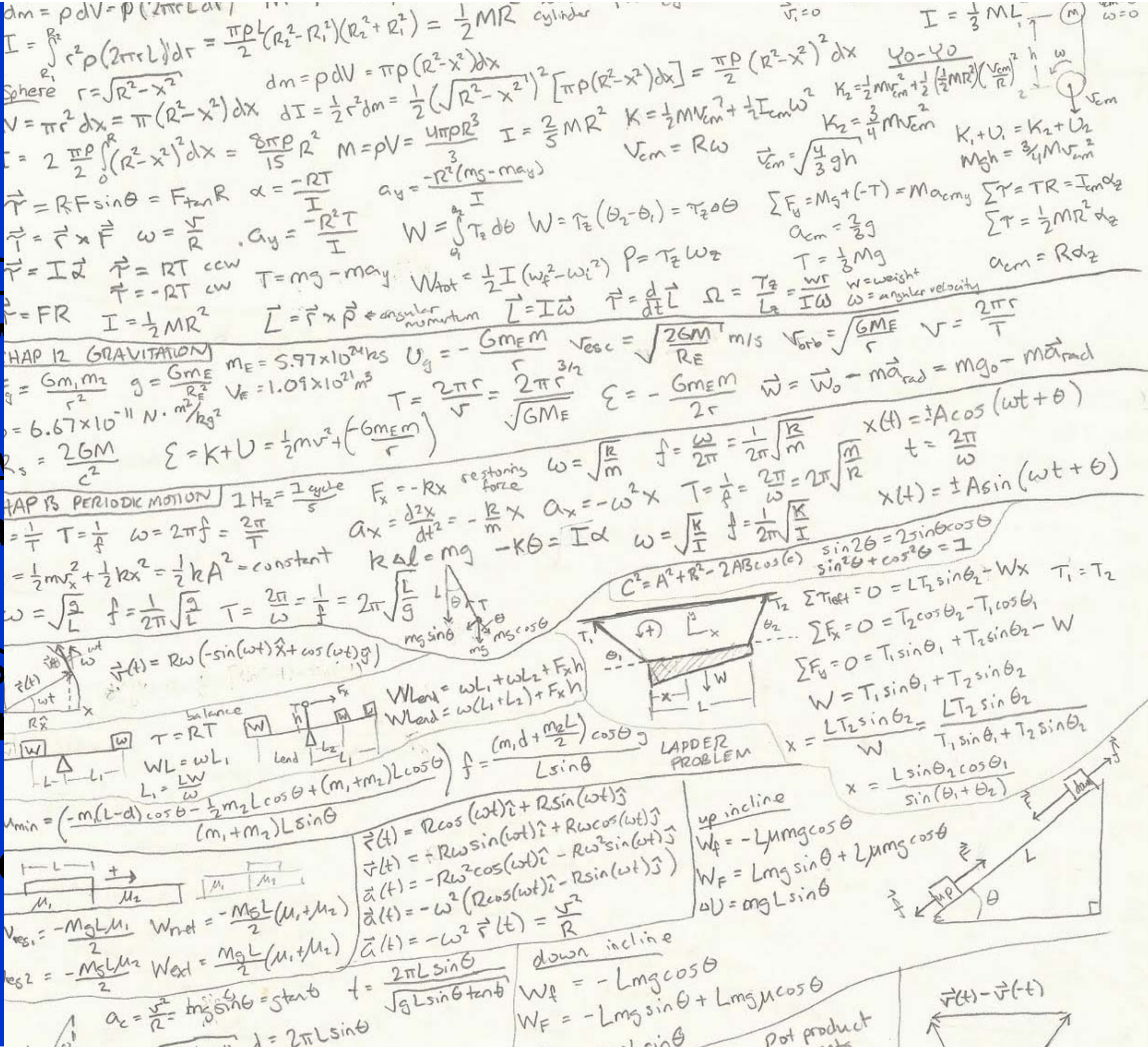


CHAP 12 GRAVITATION
HAP 13 PERIODIC MOTION
LADDER PROBLEM
up incline
down incline
Dot product

Most Important

NO THERMOCOLE MODELS!

NO GLITTERY CHARTS AND NOTEBOOKS

SCIENCE projects, not ART & CRAFT projects!!

Slide taken from Arnab's talk

Research based projects?

Challenges:

- Almost all local/national science fairs encourage model-making, pedagogical posters
- Students, and teachers, not aware of simple research based ideas that can be turned into excellent projects
- Evaluation of projects at school level fairs do not emphasize criteria appropriate for research

Slide taken from Arnab's talk

Not a standard school lab expt.!

#1 Pitfall – most students/teachers think a research project is like an experiment done as part of the school curriculum!

Experiments typically done (shown?) in high-schools are

- Very routine and predictable
- Usually planned to be completed in fixed time, with a pre-determined result that has to be demonstrated for “success”
- The best way to turn off kids from science!

Slide taken from Arnab’s talk

What is Research?

Usually

- We don't know the answer before starting out…..
- So we ask questions, make hypotheses, make observations/ do experiments to prove or disprove our hypotheses…

- No fixed end-point, can modify path of depending on what is done, and upon making interesting observations

- Here, we are talking about ORIGINAL research (not something you can look up)

Slide based on Arnab's talk

What is / isn't a Research Idea?

To start with, come up with an idea – either based on your experience, or in discussion with a guide.

We are looking only for original research ideas

What we do NOT consider a research idea includes (a) simply repeating an experiment from a book, viz. adding acid to metal to generate hydrogen or neutralizing acids with bases or germinating seeds; (b) essays on science topics, viz. an essay on the environment or nuclear power, etc.; (c) models that demonstrate what is already known, such as generation of electricity by windmills, or visualization of a geometric solution, etc.; (d) making claims without basis, viz. without an experimental design or calculation.

We want your research idea, NOT something that you looked up on the internet and copied verbatim.

What makes a good project?

- **Innovation** / **Novelty / Creativity** (has to be there somewhere, maybe in a very limited way)
- A structured, systematic approach to the problem
- Well-documented work (log books)
- An appreciation of the “what is so exciting about this”

(Slide taken from Arnab’s talk)

Common tips

Helpful hints

- Use available resources fully – *anyone* can be a guide
- Maintain a log book – record of the thought process, and original data is a must!
- Starting off with a hypothesis and proving it is incorrect can also be good science
- Control experiments are often forgotten
- Appropriate measurements – e.g “V only, no I”
- Solid conclusions – repeatability, practicality, knowledge of limitations of data

(Slide taken from Arnab’s talk)

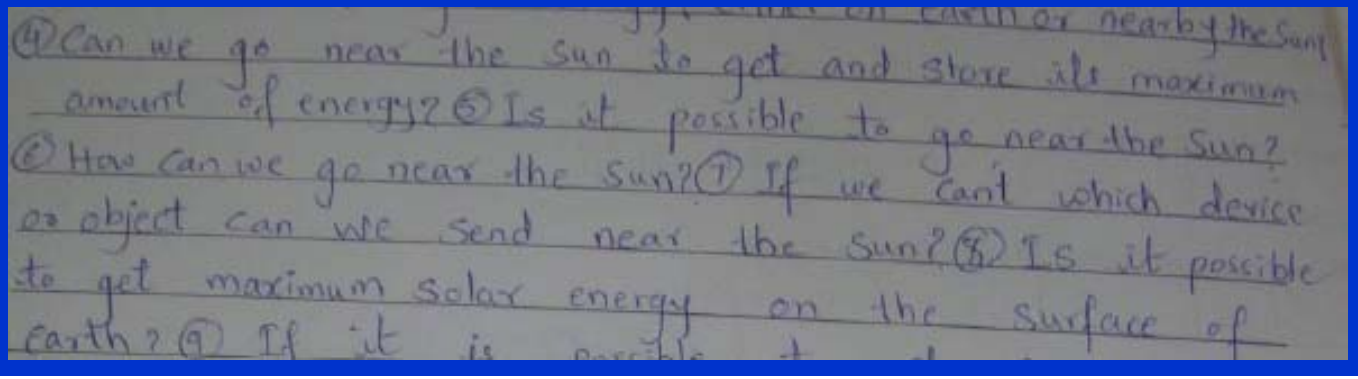
Select your topic

- Choose a topic that interests you - you'll have a lot more fun (and probably learn more)
- Check all the resources around you.
  - For eg. - If you are doing a project on Eucalyptus leaves, ensure that you have the Eucalyptus tree in the surrounding region where you live
- Literature survey helps define questions
  - Books
  - Wikipedia
  - scholar.google.com, www.scirus.com or www.pubmed.gov

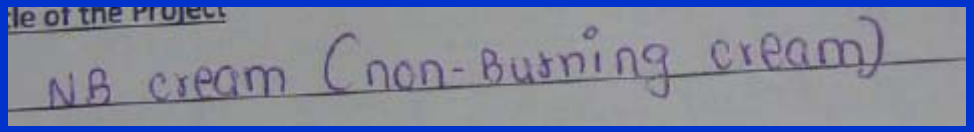
(taken from Chetan/Prasad't talk)

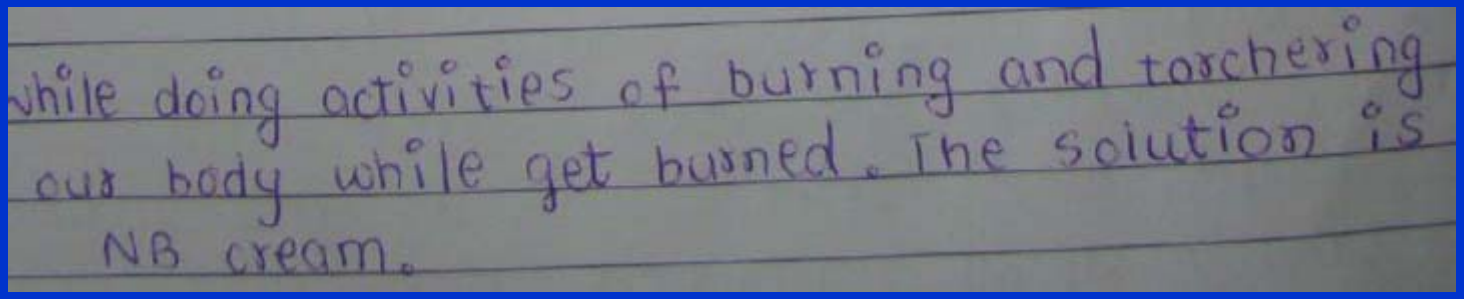
Let's consider some topics from previous fairs

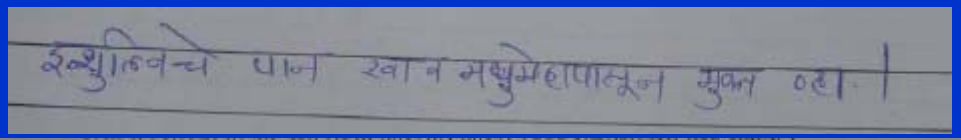
I want to make a earphone and a traslator, poor people who can't go classes for other languages by this they can speak or understand other I got this idea from a film named shamitabh In which a man who can't speak has given a earphon and a translator and the other man has a earphon what that man speak he can hear and by that earphone it goes in that trans--lator and can speak that wording which that man has speaken by that I got this Idea

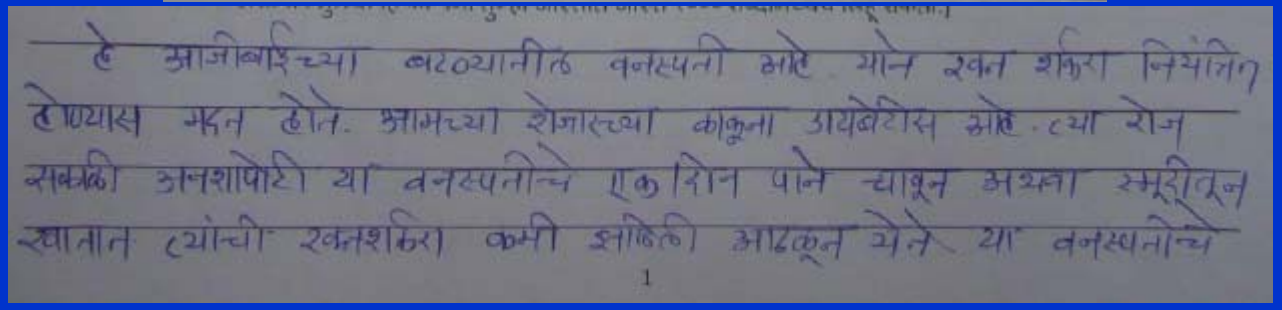

④ Can we go near the Sun to get and store its maximum amount of energy? ⑤ Is it possible to go near the Sun? ⑥ How can we go near the Sun? ⑦ If we can't which device or object can we send near the Sun? ⑧ Is it possible to get maximum solar energy on the surface of earth? ⑨ If it is

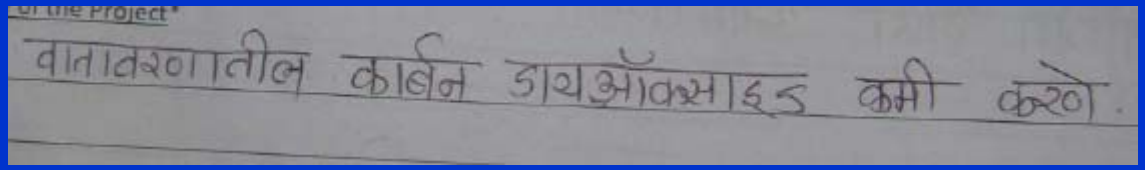
Your Research Ideas











You have an Idea. What Next?

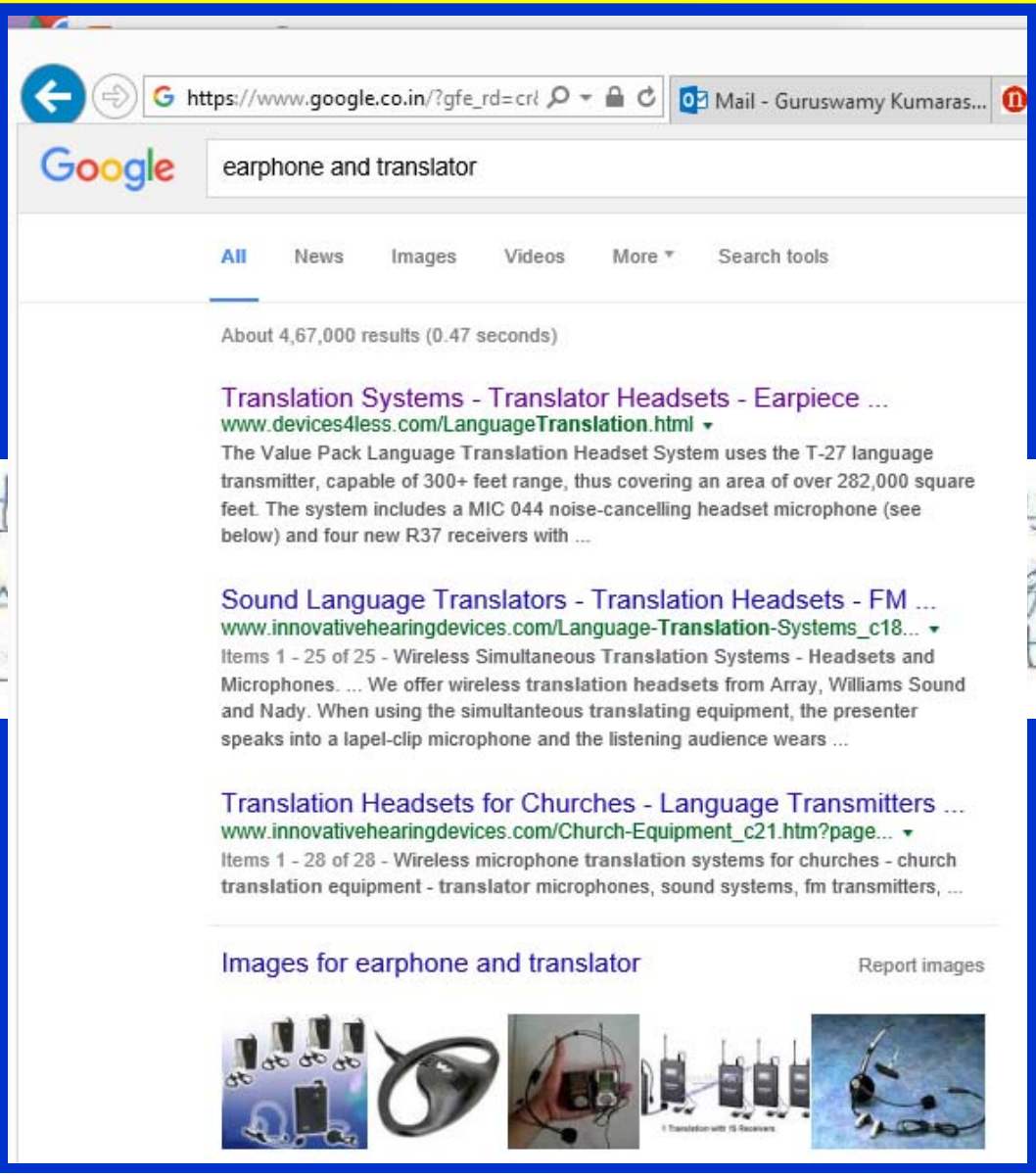
- Hypothesis: a tentative theory that can be proved or disproved through further investigation and analysis.
  - Usually one hypothesis for each question you have.
  - You must do at least one experiment to test each hypothesis.

You have an Idea and Hypothesis. What Next?

search the literature (using, for example, books, internet searches, google scholar, patent databases, etc.) to see if someone has already done what you are proposing to do

Is your idea novel?

Searching the Literature



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Two years ago, I was in your shoes. My boss in a previous job decided that we needed to buy translation equipment for some conferences that we were running, so she put me in charge of

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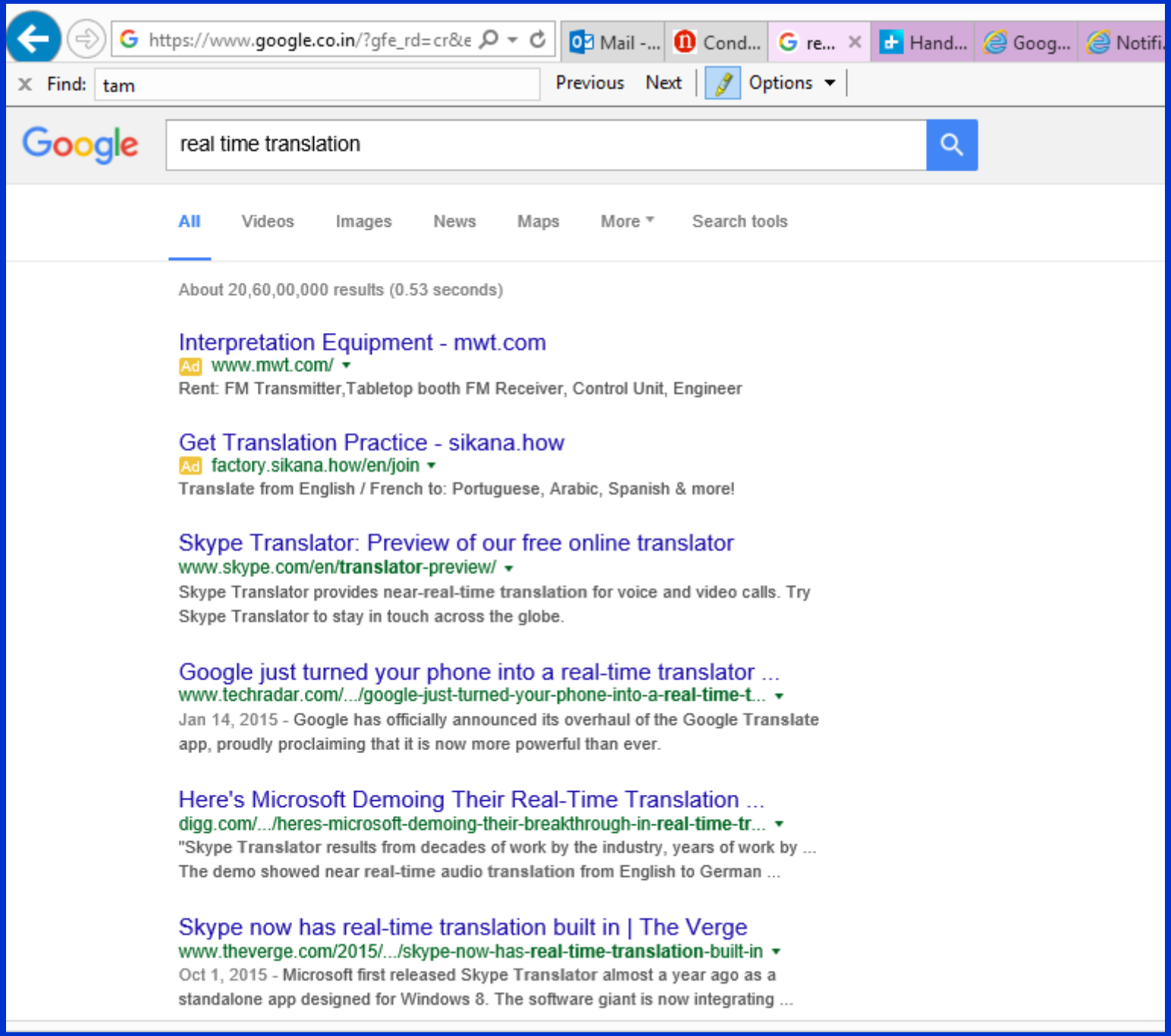
Or email:

will.ward@translationequipmenthq.com

Note: All equipment we sell is for interpretation using a LIVE human interpreter/translator. There is nothing that I know of that exists now that is able to produce a good quality audio translation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Jan 14, 2015 - Google has officially announced its overhaul of the Google Translate app, proudly proclaiming that it is now more powerful than ever.
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Oct 1, 2015 - Microsoft first released Skype Translator almost a year ago as a standalone app designed for Windows 8. The software giant is now integrating ...

like

Without A Country

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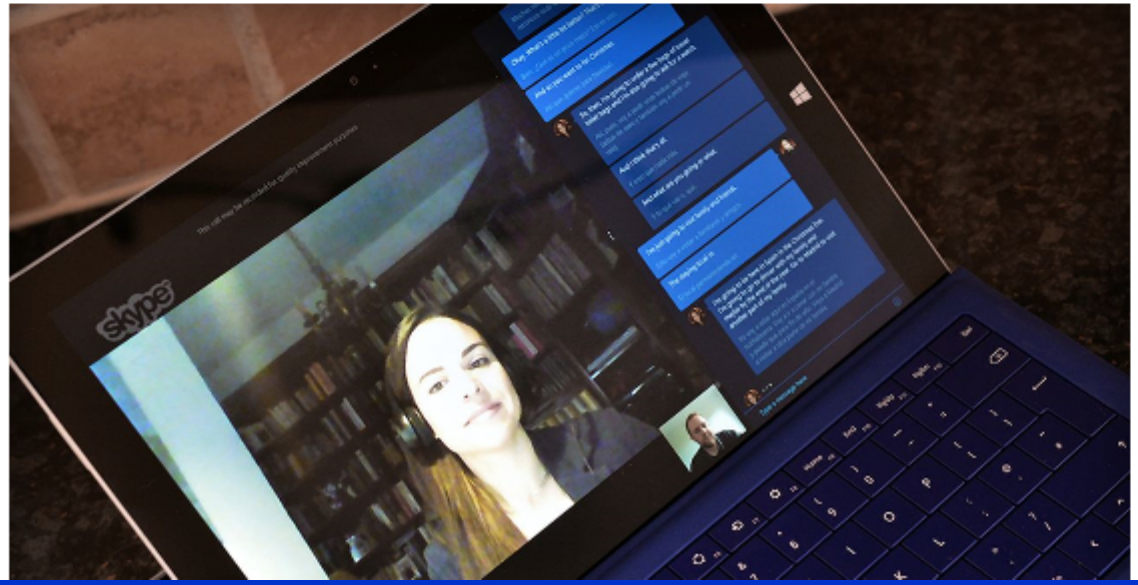
10 COMMENTS

Skype now has real-time translation built in

Not on Mac or mobile versions yet

By Tom Warren on October 1, 2015 09:00 am @tomwarren

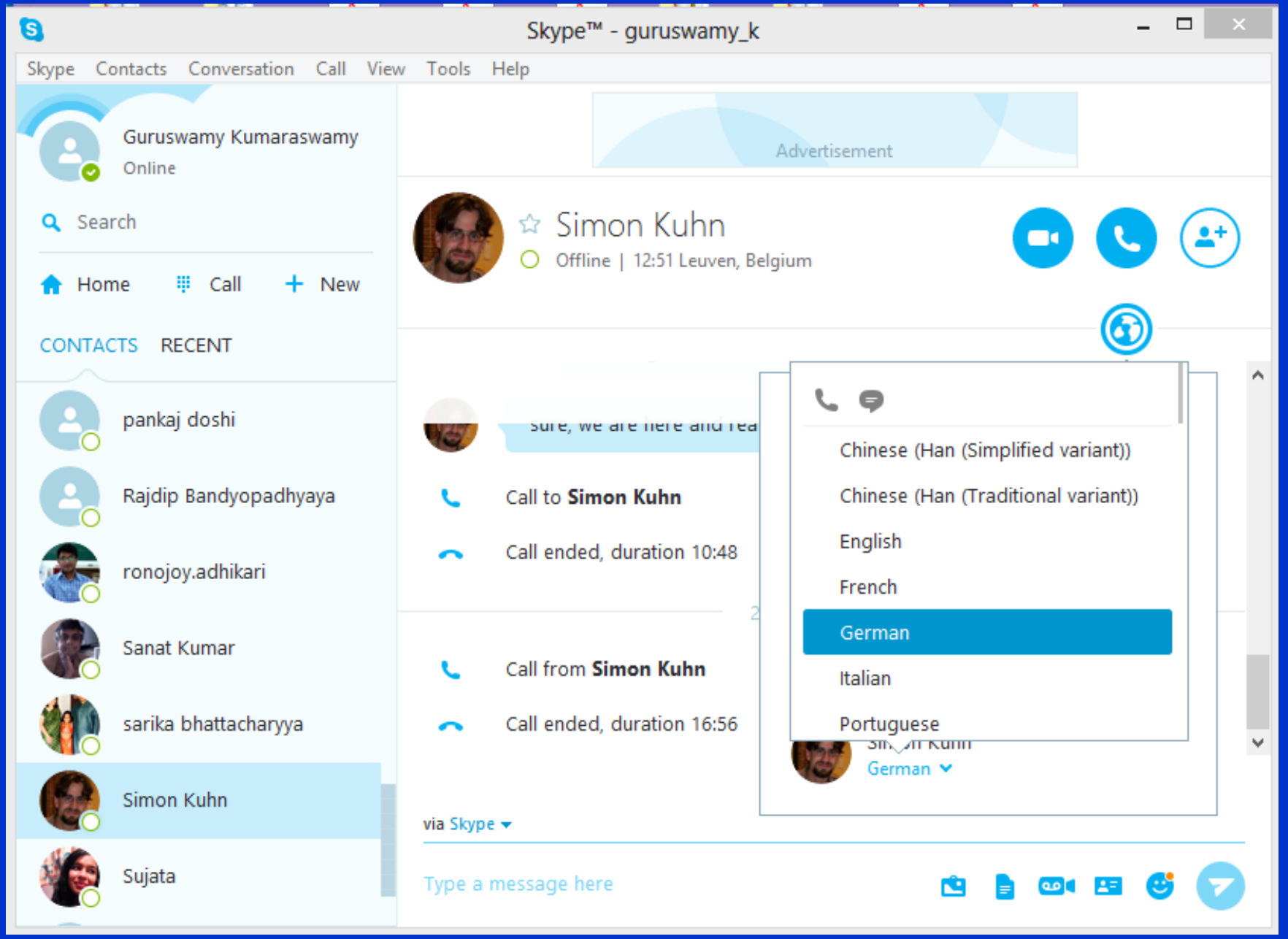


THE LATEST HEADLINES

Huawei and Leica strike phone camera partnership

BT must open up network to competitors, says British watchdog

Amazon paid $15 million for Woody Allen's new movie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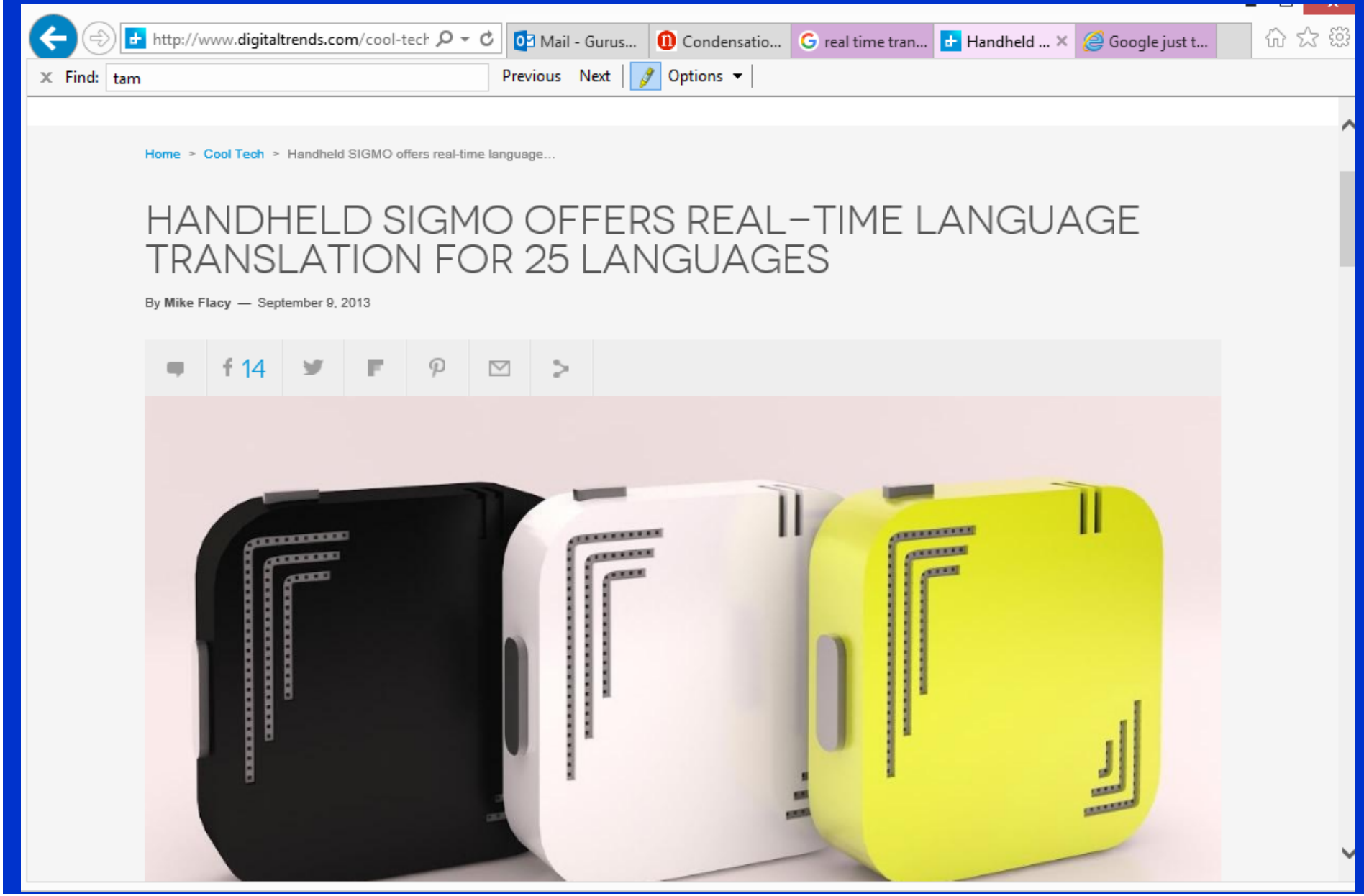
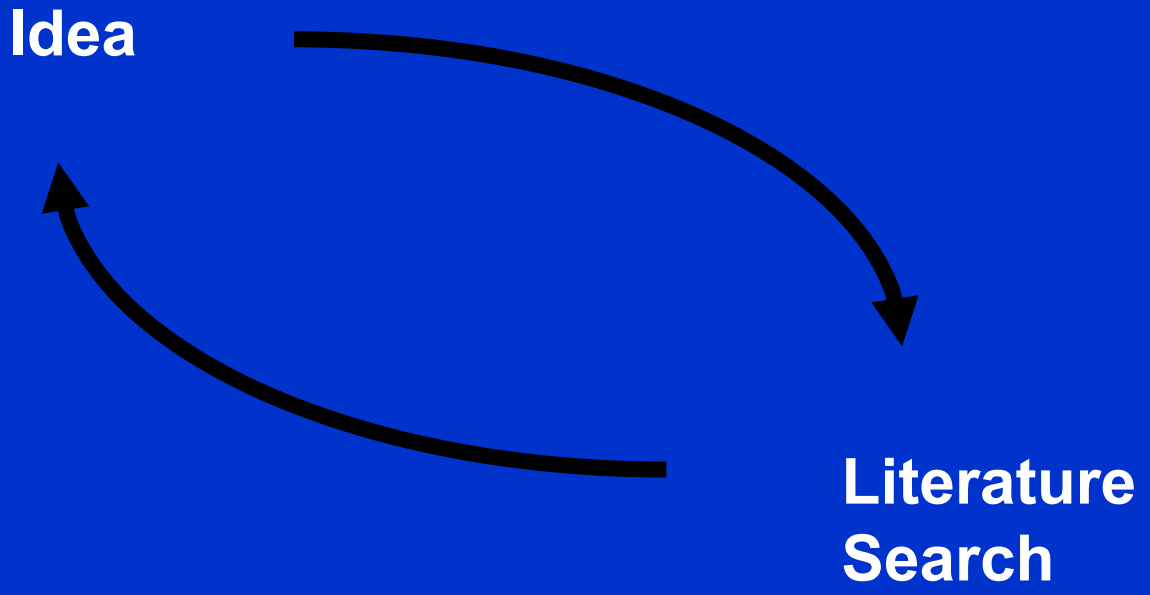
Simon Kuhn
Offline | 12:51 Leuven, Belgium
Call to Simon Kuhn
Call ended, duration 10:48
Call from Simon Kuhn
Call ended, duration 16:56
Chinese (Han (Simplified variant))
Chinese (Han (Traditional variant))
English
French
German
Italian
Portuguese
German
via Skype
Type a message here

How about a portable device that can translate?



Is this idea novel?

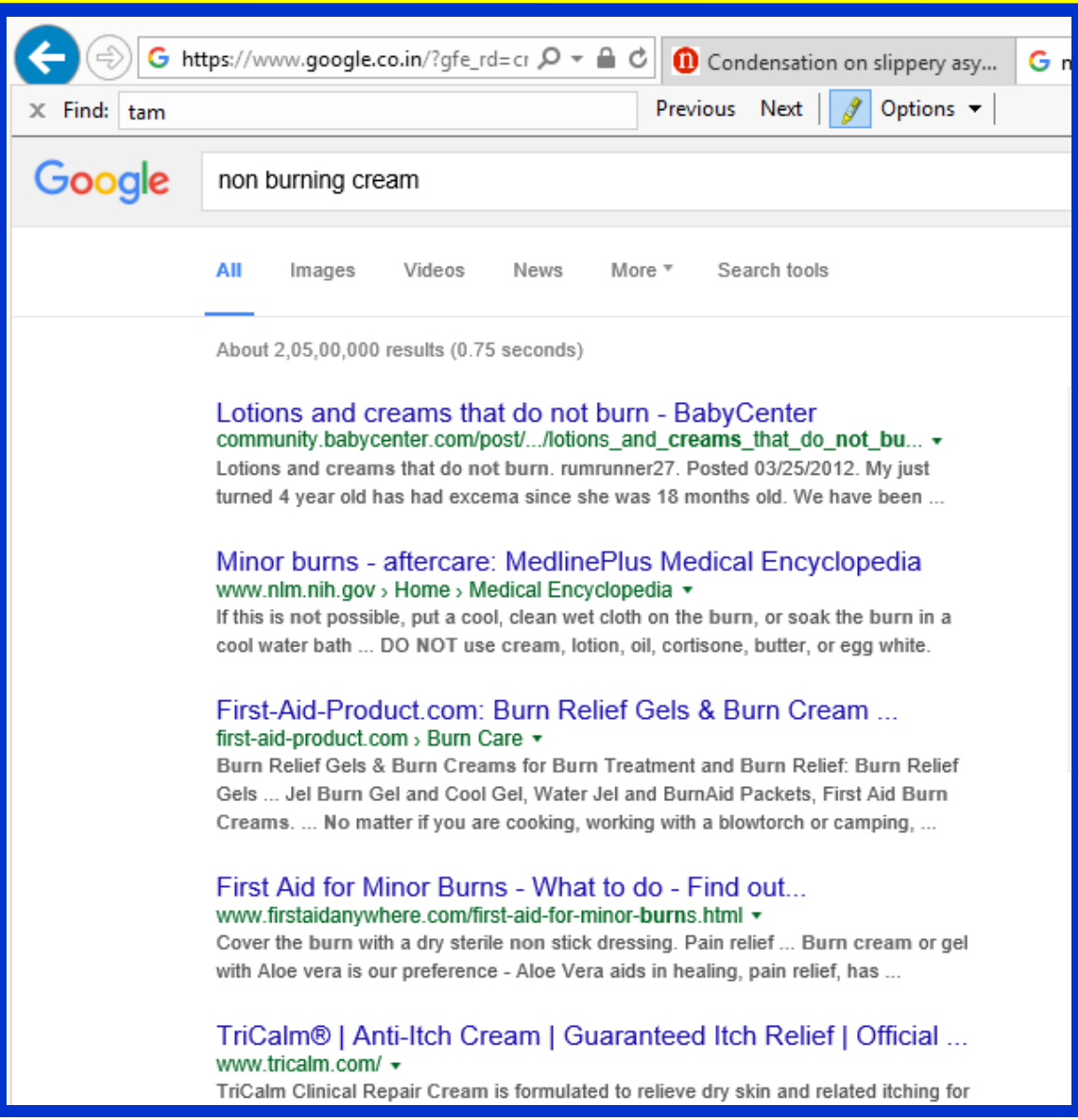


What can we do that is NOVEL?

- Does a translator to/from Hindi exist?
- Does a translator to/from Marathi exist?

How does a translator work?
Fairly complicated.
Need to record sentence, then need to "understand" sentence (it is really difficult to understand English grammar, for example), then need to translate into new language

Another example



How can one proceed?

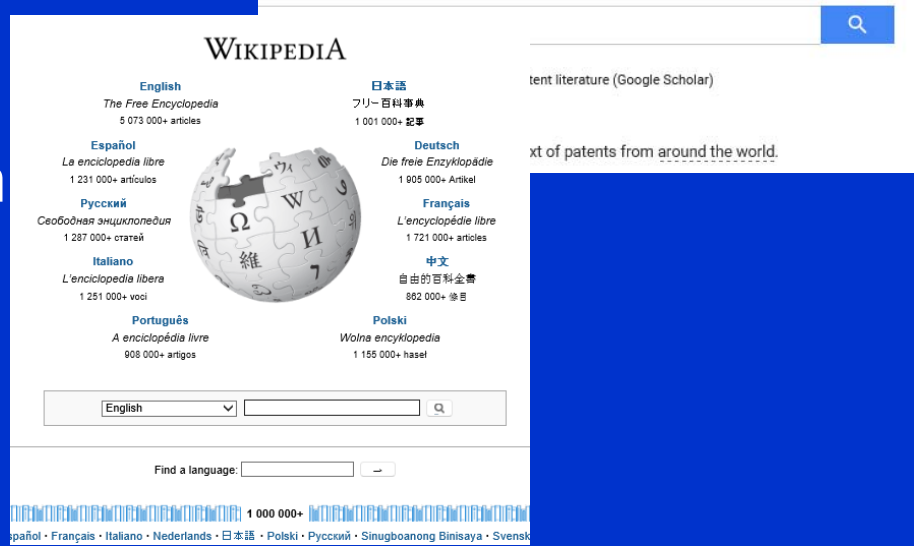
Alternate keywords?

Try a google search

Also try google scholar
http://scholar.google.com

or
google patents
http://patents.google.com

or
Wikipedia
http://www.wikipedia.org



Let us try doing this together

What next?

- √ You have an idea
- √ You've checked the literature and your idea is novel

What now?

EXPERIMENTAL PLAN: how to do the project?

(Taken from previous years)

QUESTION:
How do birds sense food?

- Do they see their food or do they smell it?

EXACTLY what experiment will you do to check this?

EXACTLY what experiment will you do?

Separate out effects of seeing food
vs smelling food

Decide what species of bird to study
Determine natural food
Keep food for bird – covered with transparent sheet so that the bird can see it (but not smell it)
Or make plastic replica (that looks like food but, obviously, does not have any smell)
Keep food for bird – covered with mesh so that can smell it (but cannot see it)

How exactly will you do this experiment?

Question 2: Can we use weeds as herbicides?

How will you plan this experiment?

- **Weed**
- **Weed extract**
- **Test on what plant?**
- **Statistics? How many plants?**
- **How will you determine effect on the plant?**

Question 3: Reducing helicopter noise

How will you plan this experiment?

- **Source of noise**
- **Change in blade edge / surface**
- **Design of wind tunnel**
- **Noise measurements**

What you should NOT do

Reducing noise from a helicopter blade

- I will build a machine that will be attached to the helicopter blade and will reduce noise

What is this machine???
How will it reduce noise???

Wild claims but no “design” for how to make such a fantastic machine

Good to have some calculations or estimates

Converting noise into electricity

- Energy cannot be “created”
How much energy is in sound? How much electricity can this generate and is it sufficient for any application?

We will tap into the brain (or study poisonous snakes)

How will you do such an experiment??

Finally, doing the experiment

Idea -> Hypothesis -> Experimental Design

Experiments:

Collecting data (Careful documentation; Maintain a lab note book – note down all details) – VERY important to maintain a log

Then, analyze data and arrive at conclusions supported by the data

Common Problems

- Abstract – Lot of pages; sometimes the message is lost – Express your idea in 250 words
- Not enough data provided, it is not clear if it is a mere idea or some work has been done
- Not enough novelty – bring out your novelty upfront
- Copied material – we hate it! & reject immediately
- If you have a prototype done – say a working prototype done!
- State your specific reference – don't hide! Don't say referred google or yahoo – state the exact internet site URL
- If you don't have complete data points – don't make any conclusion – state that it is in progress

(Slide taken from Chetan/Prasad's talk)

Web resources

- Science buddies - www.sciencebuddies.org

  A wonderful resource with many manageable projects at all levels, with a lot of step-by-step directions
- References – see Lib. of Congress list

  http://www.loc.gov/rr/scitech/tracer-bullets/environmentaltb.html

- Curriki - www.curriki.org
- Google
- Wikipedia

(Slide taken from Arnab's talk)

Science buddies

Free Science Fair Project Ideas, Answers, & Tools for Serious Students

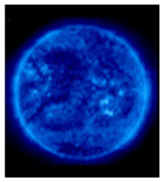
SCIENCE BUDDIES

Home | Project Ideas | Project Guide | Ask an Expert | Teachers | Competitions

Google™ Custom Search Search

Science Fair Project Resources

Science Fair Project Ideas



- Over 700 Project Ideas to choose from!
- Topic Selection Wizard: Looking for a science fair project? The Topic Selection Wizard will recommend a science fair project idea that is just right for you.
- Science Fair Project Ideas Directory: Browse through a list of all of our science fair project ideas organized by area of science.

Student Resources

- Science Fair Project Guide: A step by step guide to help you do a science fair project.
- Ask an Expert: Our online bulletin board staffed by volunteer scientists and top high school students ready to answer your science fair project questions.
- Advanced Science Competitions: Tips and techniques to prepare for an advanced science competition such as ISEF or Intel STS.

Science Buddies News

SCIENCE BUDDIES in Action

- Science Buddies in Action shows how real kids are using Science Buddies materials to create interesting projects with success! We want to hear your science fair stories, so please share them with us.
- Science Buddies Winner of a 2008 Parents' Choice Recommended Award in the Website Category *(September 10, 2008)* Read more...

Teacher Resources

- Teacher Resources: Everything teachers need to plan, manage, and evaluate a science fair or a science project in the classroom.
- Free Scientific Method Classroom Poster: A full color 26"x36" poster providing an overview of the steps of the scientific method.

Awards and Recognition

Announcements

Free, Full Color Scientific Method Classroom Posters. Request a Copy Today!

Project Ideas in Action

Slide from Arnab's talk

Science buddies

Free Science Fair Project Ideas, Answers, & Tools for Serious Students

SCI

Home | Project Ideas | Project Guide | Ask an Expert | Teachers | Competitions

Environmental Engineering Project Ideas

The human population on Earth is now more than 6 billion, and still growing. With more and more of us living an energy-intensive, modern lifestyle, the environmental stresses from human activity continue to increase. Greenhouse gases leading to global warming and fertilizer runoff resulting in marine "dead zones" are just two examples of large-scale environmental impacts from human activity.

With our environmental engineering science fair project ideas, you can begin to explore these kinds of problems.

K-5 Projects — Elementary School Project Ideas

Grades 6-8 Projects — Middle School Project Ideas

Grades 9-12 Projects — High School Project Ideas

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Science Buddies gratefully acknowledges its Presenting Sponsor

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Science Fair

Most importantly – have fun!

Thank you