

Exciting Science Group

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NAGMAGIC



AGENDA FOR TODAY

- Distribution of participation certificates
- **Guru:** How to Improve Your Project Entries
- **Shraddha:** Guide to Participating in IRIS, Google Science Fairs
- Q&A
- Announcement: Projects selected for one-on-one mentoring

CONGRATULATIONS
ON HAVING TAKEN THE FIRST STEP

viz.
SENDING IN A PROJECT ENTRY

HOW TO IMPROVE YOUR SCIENCE FAIR PROJECT

K. Guruswamy

RECAP: What is expected from a science fair project

Science Fair projects:

- Science projects
(where one asks a question)
- Engineering projects
(where one makes a “device”)

90% of entries to ESG fair were
engineering projects

RECAP: What is expected from a science fair project

In both kinds of projects, we look for:

(I) INNOVATION:

- What is innovative?

Science: What is new about your question?

Engineering: What makes your device special?

Need to compare with existing literature,
existing devices

Effectively presenting your INNOVATION

What was missing:

Science projects:

Precise definition of the question being asked

- I observe a phenomenon (say, birds nesting) and can quantify number of nesting birds.

OK, but what is the question???

- I wish to genetically modify disease vectors

What then? What is new/different?

Effectively presenting your INNOVATION

What was missing:

Engineering projects:

Precise definition of the question being asked

- I wish to use algae or flue gas as an energy source

These approaches have already been used.

What is new/different about your approach?

- I will build a robot for X application

Again, what has been already reported? What differentiates your project as novel?

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

Effectively presenting your INNOVATION

SUMMARY

- Must have a CLEAR question/engineering concept
- Must be able to CLEARLY establish YOUR NOVELTY

Has anyone already asked this question?

Has anyone made a similar device to solve the same (or a different) problem?

Has anyone made another device to solve the problem of your interest?

Establishing your INNOVATION

LITERATURE SURVEY is essential

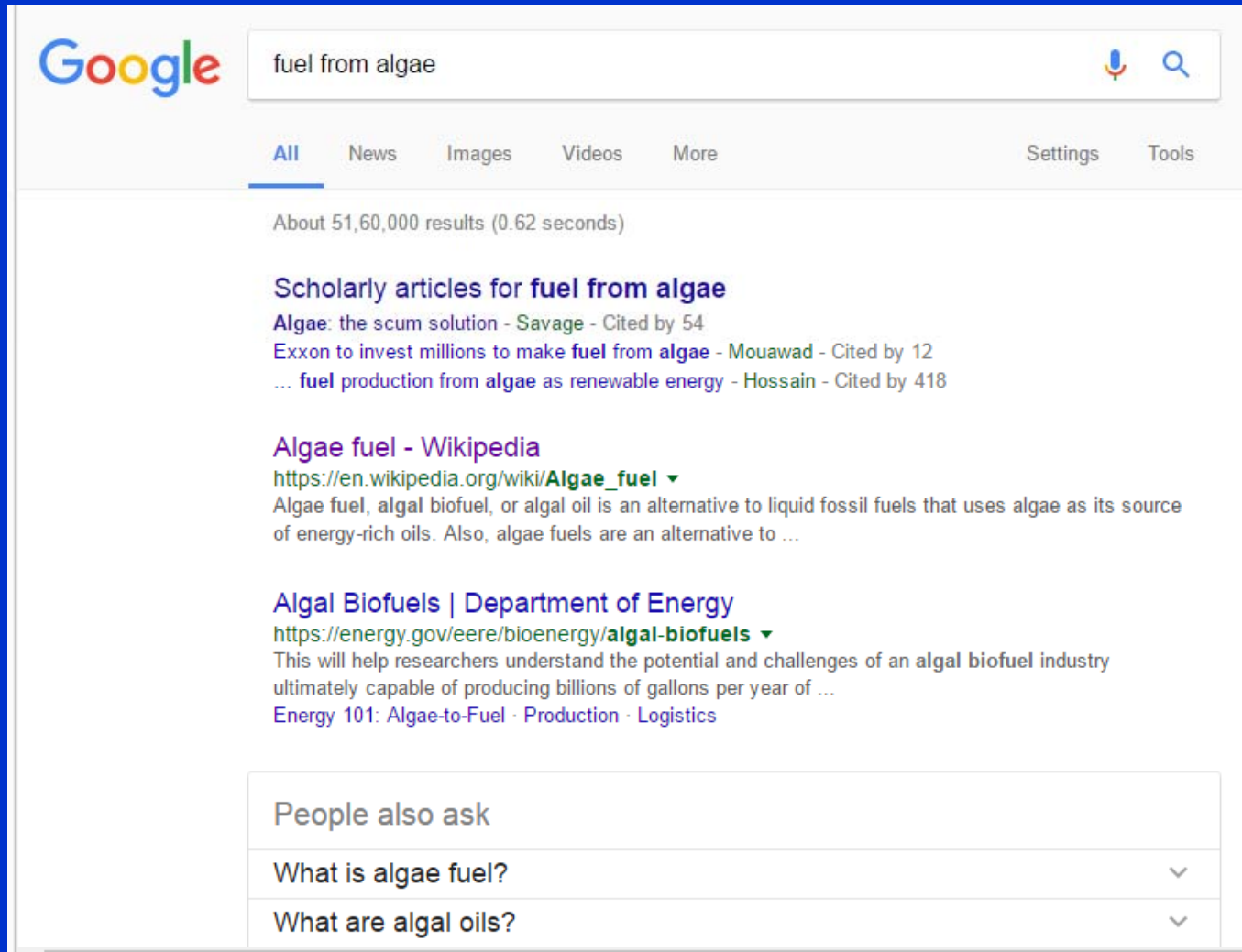
Can use google.com; scholar.google.com;
patents.google.com
to establish prior knowledge in this area

Not important that you thought of something by yourself. IF someone else had the same idea first, then your idea is not considered NOVEL.

VERY important to spend time on this.
Also, excellent way to learn and get new ideas

Establishing your INNOVATION

In your report, state what is in the literature



Even a wikipedia page on this



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The Free Encyclopedia

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Algae fuel

From Wikipedia, the free encyclopedia

Algae fuel, **algal biofuel**, or **algal oil** is an [alternative to liquid fossil fuels](#) that uses [algae](#) as its source of energy-rich oils. Also, algae fuels are an alternative to common known biofuel sources, such as corn and sugarcane.^{[1][2]} Several companies and government agencies are funding efforts to reduce capital and operating costs and make algae fuel production commercially viable.^[3] Like fossil fuel, algae fuel releases CO₂ when burnt, but unlike fossil fuel, algae fuel and other biofuels only release CO₂ recently removed from the atmosphere via photosynthesis as the algae or plant grew. The energy crisis and the [world food crisis](#) have ignited interest in [algaculture](#) (farming algae) for making [biodiesel](#) and other [biofuels](#) using land unsuitable for agriculture. Among algal fuels' attractive characteristics are that they can be grown with minimal impact on [fresh water](#) resources,^{[4][5]} can be produced using saline and [wastewater](#), have a high [flash point](#),^[6] and are [biodegradable](#) and relatively harmless to the environment if spilled.^{[7][8]} Algae cost more per unit mass than other second-generation biofuel crops due to high capital and operating costs,^[9] but are claimed to yield between 10 and 100 times more fuel per unit area.^[10] The [United States Department of Energy](#) estimates that if algae fuel replaced all the petroleum fuel in the United States, it would require 15,000 square miles (39,000 km²), which is only 0.42% of the U.S. map,^[11] or about half of the land area of [Maine](#). This is less than 1⁄7 the area of [corn](#) harvested in the United States in 2000.^[12]

According to the head of the Algal Biomass Organization, algae fuel can reach price parity with oil in 2018 if granted production [tax credits](#).^[13] However, in 2013, [Exxon Mobil](#) Chairman and CEO [Rex Tillerson](#) said that after committing to spend up to \$600 million over 10 years on development in a joint venture with J. Craig Venter's [Synthetic Genomics](#) in




A conical flask of "green" jet fuel made from algae

And, many patents

← → ↻ Secure | <https://patents.google.com/?q=algae&q=fuel>

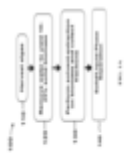
Google Patents



About 25,255 results ordered by relevance ▼ grouped by classification ▼ 10 results / page ▼
[Download \(CSV\)](#)

C11B1/108?
Production of fats or fatty oils from raw materials by extracting after-treatment, e.g. of miscellae

Methods of and systems for isolating nutraceutical products from algae
[Grant US8084038B2](#) • Aniket KALE • Heliae Development, Llc
Priority 2010-04-06 • Filing 2011-04-06 • Grant 2011-12-27 • Publication 2011-12-27


A method of isolating nutraceuticals products from **algae** is provided. A method of isolating carotenoids and omega-3 rich oil from **algae** includes dewatering substantially intact **algal** cells to make an **algal** biomass and adding a first ...

→ [Search within classification C11B1/108 \(11,785 results\)](#)

F03G6/005?
Devices for producing mechanical power from solar energy having a Rankine cycle using an intermediate fluid for heat transfer

Hybrid generation with alternative fuel sources
[Grant US7191597B2](#) • Arnold J. Goldman • Los Angeles Advisory Services, Inc.

Establishing your INNOVATION

After you've briefly summarized the literature
State what is different about your work

The humans' ability to express themselves using language, their ability to use tools and even the bias in their limb-usage hints at the complexity of human brain. But other animals, like birds, use tools too. Chimpanzees are known to have a bias in using their limbs too. So, we are trying to see if simple organisms like the larvae of *Drosophila Melanogaster* exhibit any bias during locomotion.

Unique aspect of your project

Not much work has been done on the brain of *Drosophila Melanogaster* larvae. Our project can answer some very important questions relating to the brain structure of *Drosophila* and maybe even humans.

RECAP: What is expected from a science fair project

The other thing we look for is

(II) **DATA:**

- What have you done?

Science: Methodology, Experimental description, Photographs/schematics, Results

Engineering: Methods, Proof of your device, data from your device, some calculations (efficiency, costing)

DATA: Documentation

Do you have a log book
(you absolutely MUST)

Scanned pages from log book are useful proof

This has your RAW DATA, IDEAS written as they happen (not copied in “fair” from notes on scraps of paper)

LOG BOOK/S

A LOG BOOK MAY BE DEFINED AS A NOTE PAD DIARY OR ROUGH NOTE WHEREIN AN EXPERIMENTOR DOCUMENTS THE

- **PLANING – novel idea**
- **OBSERVATIONS**
- **PHOTOGRAPHS**
- **RESULTS**
- **DISCUSSIONS**
- **REFERENCES**

ABOUT EXPERIMENTS ON DAILY BASIS WITH DATE AND TIME AND SOMETIMES SIGNATURE OF THE MENTORS /SUPERVISORS.



TYPES OF LOG BOOK

LOG BOOK CAN BE

- An OLD DAIRY – remembering book
- A NOTE BOOK / PAD
- A SMALL POCKET NOTE BOOK WITH PEN ATTACHED
- PAGES WHICH CAN BE later STAPLED
- PHOTOGRAPHS WITH NOTES WRITTEN AT THE BACK
- A VOICE RECORDED
- PRINTED PROTOCOL –TO FILL BY PEN
- PRINTED SURVEY /CONSENT
- PRINTED - FILL IN THE BLANKS



Slide taken from IRIS presentation

TYPES OF DATA COLLECTION

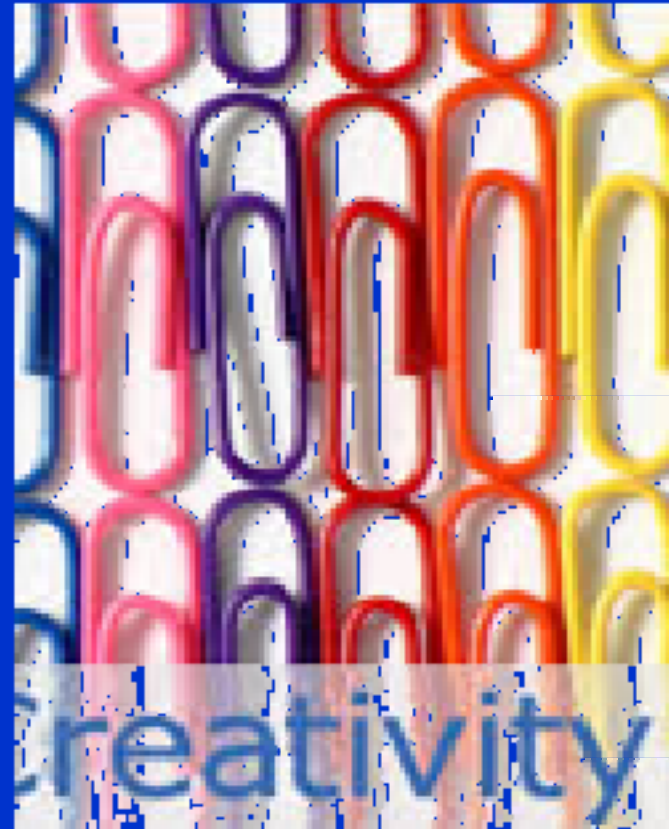
- PHOTOGRAPHS / HERBARIUM / SAMPLINGS
- VIDEO / POWER POINT PRESENTATIONS
- CONVERSATIONS / SURVEYS / CONSENTS / observations
- WORKING model – PROTOTYPES
- MATHEMATICAL MODELS
- COMPUTER DESIGNS
- ELECTRICAL CIRCUITS
- REPRESENTED BY HISTOGRAMS/PIE CHARTS ETC.
- SIGNIFICANCE /PROBABILITY / NUMBER OF EXPERIMENTS



Slide taken from IRIS presentation

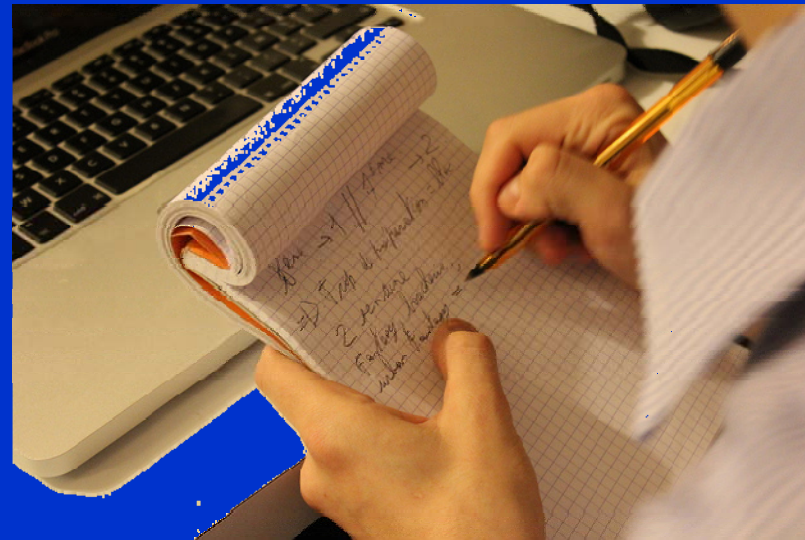
IMPORTANCE

- RECORD TO SHOW AS A PROOF
- HAS TO WRITE AND NOT TYPE
- DATE AND TIME HAS TO BE RECORDED
- ONE MAY FORGET SOME IMPORTANT OBSERVATION AFTER DAYS – SO IMPORTANT TO RECORD
- DISCUSSIONS WITH FRIENDS – POINTS MAY BE NOTED
- ALL NOTES LATER SHOULD BE USEFUL FOR PUBLICATIONS / PATENTING / PROOF / CREATIVITY



NO LOG NO MARKS

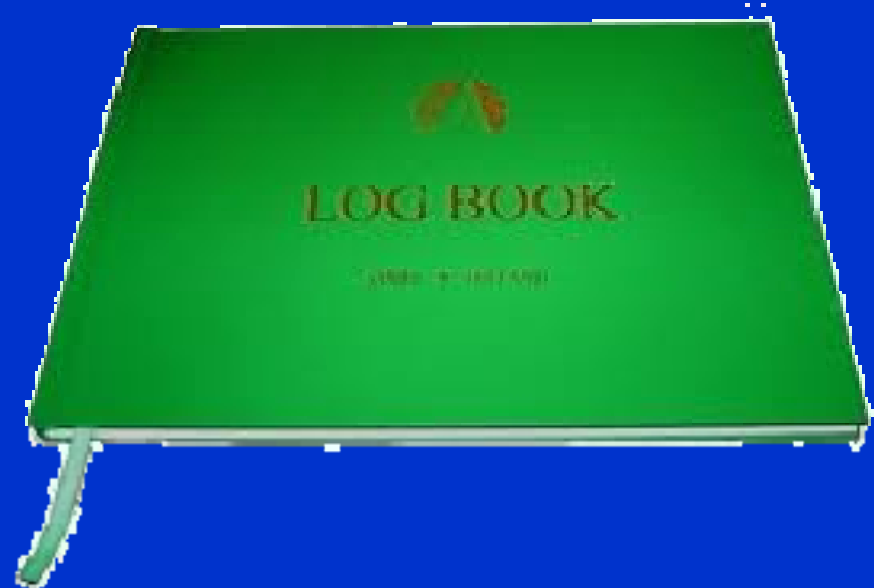
- DURING NATIONAL AND INTERNATIONAL FAIRS – THE JUDGES LOOK AT PROOF.
- LOG BOOK CARRIES - PERCENTAGE OF MARKS
- JUDGES JUDGE BY LOG BOOKS AND MAKE NOTES TO QUESTION THE FINALIST DURING INTERVIEW.
- LOG BOOK WITHOUT DATES ARE USELESS
- LOG BOOK ARE IMPORTANT DOCUMENTS
- COOKED UP LOG BOOKS HAVE ONE SINGLE INK COLOUR/ DATES WRITTEN LATER / COOKED UP DATA – **NOT ALLOWED**



Slide taken from IRIS presentation

HOW TO WRITE A LOG BOOK ?

- THE LOG BOOK IS ESSENTIALLY TO SCRIBBLE NOTES AND OBSERVATIONS IN ONE'S OWN HAND WRITING.
- FIRST – TO WRITE THE DATE
- SECOND- TO WRITE THE AIM AND OBSERVATION/S OF THAT DAY
- THIRD – IF YOU HAVE DONE NOTHING AND HAVE GONE TO SEE A MOVIE – WRITE NO EXPERIMENTAL WORK DONE – WENT TO SEE A MOVIE.
- FOURTH – A SMALL POCKET NOTE BOOK CAN BE CARRIED IN A POCKET 24X7 – MIDDLE OF THE NIGHT OR DURING TRAVELLING - IF AN IDEA STRIKES – BEFORE YOU FORGET– WRITE IMMEDIATELY IN THE NOTE BOOK



Example – on the dot

- In our class (9c) we had a project instead of regular English lessons : We shot our own films!
- We had to make it all alone – writing our own scripts, then directing, filming and of course acting it out! Also our editors cut our footage, the composers chose the music etc.
- At the end of the project there we had wonderful results! Each of the groups had created a cool film.
- And there was a surprise: We celebrated the Oscars in our class! The winning group got a real Oscar from Mrs Divya for their film "*It's Party Time*"!



WHAT TO WRITE ?

- 27TH SEPTEMBER 2013
- AIM –we planned to go to BARC lab to meet the scientists
- Met Dr. Khurana – He gave an idea to get energy from water by splitting H and O using radiated bacteria.
- Photographs attached
- Made a prototype of the model
- Experiment failed.
- I tried to copy and make a false statement but my conscious did not allow to tell lies – so I corrected myself - not to have a devil in me.
- My experiment was successful since I followed the Scientific review committee's advice.
- Coaching camps 1, 2 and 3 helped me to improve my standards of experiments to the ISEF levels

Date	Feed time	Wet Diaper	Dirty diaper
06/05/2008	12:30	V	V

IRIS LOG BOOK

- MAINTAINING AND BRINGING A IRIS LOG BOOK IS COMPULSORY TO ALL THE FINALISTS IN THE NATIONAL AND INTERNATIONAL FAIR
- Date of start - 23-09-2013
- Maths theorem – novel ideas
- Reference from Vedic maths
- Discussed with Professor Raghunandan; IIT about the application
- $\sin\theta + \cos\theta = 1$
- Conclusions



MAKING OF A TRUE SCIENTIST

THOMAS ALVA EDISON CONDUCTED
MORE THAN 1000 EXPERIMENTS
TO FINALLY ENLIGHTEN WHERE
EVERY EXPERIMENT WHICH WENT
WRONG HELPED HIM NOT TO
REPEAT THE EARLIER MISTAKES
SINCE HE HAD AN

detailed,
dedicated

LOG BOOK

So
So should I



Slide taken from IRIS presentation

Major Problem in almost all your projects

NO DATA/PROOF IS PRESENTED

Where are photographs of your prototypes?

Where are the raw data taken using your devices?

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?

What is the cost of implementing the proposed project? (especially for engineering projects)

- Cost is estimated to be \$1Billion.
- OK, well – how will this project be feasible?

SUMMARY

Need to clearly state idea/ question/ engineering concept

Need to clearly establish your innovation

Need to provide data to back up your claims

Need to arrive at a conclusion, based on your data, that answers your original question, or demonstrates the advantages of your device

**That is all it takes for an award
winning project**

All the best

Thank you