If the ax is dull and its edge unsharpened, more strength is needed but skill will bring success.

- A wise king
Researcher – What comes to your mind?
Research could be fun!
What?

Process of Steps Used to Collect & Analyze Information to Increase Our Understanding of a Topic or Issue

1. Pose a Question
2. Collect Data to Answer the Question
3. Present an Answer to the Question

1. Electronic Cooling
   - Mobiles, PC

2. AC – Power Consumption

3. CFD - Aero
   - Bird flies, Fish swims

4. Sensors
   - Skin, High Temperature
Relations

1. How best can I help mankind?
2. Optimize to reach the everyone!
How?

Fundamentals are important

Core subjects –

Self Discipline

Set goals & Accomplish

Regular Discussion with Supervisor

You cannot underestimate his/her experience
Research Ethics?


http://www.nap.edu/catalog/12192.html
Where do we learn Ethics?

Parents
Family
Friends
Mentor
Religious beliefs

Discussions in labs...

Courses dealing with ethical issues
Why bother about Ethics?

You are entrusted by somebody
Somebody is going to trust your results
Fabrication?

Making up data/results
& recording/reporting them
Falsification?

Manipulating research materials, equipment, changing or omitting
Plagiarism?

Using ideas or words of another person without giving appropriate credit.
What are the reasons of Plagiarism?

"Really? Someone told me it's not plagiarism if they're dead."

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Soon or Later?

... ethical violations get exposed.

A Chemist... has been found guilty of plagiarizing and/or falsifying more than 70 research papers published in a wide variety of Western scientific journals between 2004 and 2007, according to documents from his university, copies of which were obtained by C&EN.

Some journal editors left reeling by the incident say it is one of the most spectacular and outrageous cases of scientific fraud they have ever seen.

Research Ethics is an integral part of graduate research.

- Proper Citation
- Report your Genuine work
How?

• Look for a real Problem (Lit.)
• See how you can solve it
• Remember the time-frame
• Have fun in solving
• Ask enough basic questions
• Do it as group
You are Rich!
Research is Exciting **But**
Future Needs **Your** Intervention

He is no fool who gives what he cannot keep to gain that which he cannot lose.

- Jim Elliot