ENGINEERING JOURNAL (LOG) GUIDE

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THE VALUE:

Ability to produce informative engineering log is an indispensable skill in research discipline; especially if you someday wish to be an inventor. You will need to apply for patents based on your Inventions with proof to substantiate your qualifications. Such discipline is highly valued but, unfortunately, vastly neglected. Such quality is a rare commodity in engineering.

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An informative journal is essential for all engineering and research work, particularly when working in teams. As a team member, it is your responsibility to maintain an engineering journal.

We heavily emphasizes education over competition, with competition merely serving as a vehicle to its primary goal—educating pre-college students in AI and robotics research. Therefore, maintaining an informative log should be a fundamental requirement of all engineering work.

This Engineering Journal is **NOT about after-thought documentation** of your work; it is a **DATED LOG to show your progress** starting right from the design to deployment.

Engineering, including hardware and software development, is a cyclic process. However, there MUST BE a good level of design work/ project planning before any level of implementation is done. Prototyping in software and hardware steps is also a part of the design stages.

Good record keeping serves as an excellent tool for:

- Reference for future issues or clear reference for team members,
- Allowing you and others to verify your work.
- Reproduce design accomplishments or confirm test results

Engineers are often unable to reproduce, nor verify design accomplishments or confirm test results due to sloppy record-keeping.

That said, there's a balance to be maintained when cultivating this skill in pre-college students. It's especially important to keep journal entries concise, with a general rule of **under 20 words per log point especially for middle schoolers**. This approach strengthens the habit while ensuring the log remains efficient and informative.

DO'S:

- **Be concise**. You are **not** going to write an essay. No long paragraph
- Bullet-point your SUMMARIZED ideas.
- Sometimes, keywords may be sufficient.
- Try to summarize each points in less than 20 words – for easy lookup.

WONDER WHAT SHOULD GO IN THE JOURNAL, ASK YOURSELF THIS QUESTION:

- Will the information be good enough for me and others to reference if the same issues arise?
- What information do I need to write here in order for me and my team mates to be able to verify my work or even reproduce if similar problems happen?
- Any surprise experience that came up today that may be worth to reference in the future.

DON'TS:

NOT a document done as an afterthought.

Do not just dump any non-informative content.

(this is an excellent process. This helps you to recollect thoughts. This steps can easily further stimulate your ideas and also plan ahead.)

WHAT GOES IN YOUR ENGINEERING JOURNAL

ONE SIMPLE BIO PAGE:

This is only applicable if it is for a team and you need to submit this journal to others, such as a competition. You can do this anytime, as timeline does not apply.

For Your team bio.

Introduce operational logistics, such as forum for communication, meetings frequency, location(s), etc.

WHAT SHOULD BE IN THE DAILY LOG:

- DATE and Name
  - If it is a team, you should log "who" writes the log
- Collection of design concepts including:
  - CAD if it is hardware. It does not need to be professional quality, but just legible enough for you or others in the team to reference in the future.
  - E.g. keep your hand-sketch copy
  - If digital journal, save an image of it into the log
  - redesigns, plans, and schematics

  - flowchart or uml, if applicable.
  - ideas, calculations, innovations, and test results
- Daily tasks
  - may be formulated at different levels of abstraction ranging from high-level, strategic concerns, etc.
  - **be concise.** It is *less likely* you or your teammate will sift through the written information it is a long-wounded paragraph.
  - **Important:** THIS IS NOT AN ESSAY, but a quick snapshot of something worth to reflect on. If you have to write a paragraph for your entry, keep a single paragraph for each single point. Remember that you are not writing essay, but steps/stages of your work with valuable information.
- Daily issues and solutions: (if any) . See the sample table in the Appendix below.
- New Ideas | Thoughts: (if any)
  - Any design work (this is particularly important before any level of implementation).
  - Any new findings, ideas, any follow up, etc.
  - Remain concise
  - See the Appendix below for same examples.

- **Figures/Drawings/Tables** **(this is particularly valuable)**
  - Use numbered labels for figures (i.e. graphs and illustrations) and tables so you can refer to them more easily within the text.
  - It's best to place figures and tables where they are referenced in the text
  - Numbered labels should be placed underneath figures but above tables.
  - A caption should appear underneath figures and tables.
  - Try not to use such phrases as "In the table below…". Instead say "In Table 1, it can be seen that…". It is desirable to have the reference to the figure and the figure itself on the same page. If that can't be done, the artwork should be on the immediate next page.
  - Titling a figure as "Fig. 1" is insufficient. It must have a descriptive title such as: "Fig. 1 System Block Flowchart for…".
- **Research** (if any)
  - Should include all the reference to investigation work that you use or spark your ideas, if any

APPENDIX

SOME LOG STATUS EXAMPLES:

POOR, useless ! ☹	GOOD, informative : 😎
Planning today	Initial planning and design – go here to see the plan. (i.e. hyperlink to your design plan, even just an image).
Started my code	Create the high level framework for : Navigation portion (just prototypes) Abstracted APIs (just prototypes)

	The simulation text map (just prototypes)
Finish up navigation portion today	Complete navigation using B.F.S. backtracking. Have tested with a 10x10 map. See the map. (i.e. hyper link to the map image) Still need more sample maps to test.
A lot of issues today. Finally fix them.	Can't get around the 90 degree turn Can't quite see the S if it is side way

ISSUES/SOLUTION LOG EXAMPLES:

Issues	Solution | reminder, if any
Hardware …	…
Software …	…