Central Robotics
Central Region Robotics Trust

Design Diary / Logbook Guide

A design diary is the documentation and record of progress, objectives, and knowledge gained. It records not only the things that worked, but also the errors and mistakes made i.e. someone should be able to recreate the process using only the design diary, and ultimately have a duplicate robot at the end.

The logbook records what was done on a daily basis; who did what and when. Keeping it separate helps to single out useful information from progress reports.

Design Diary Instructions

- Books should not have pages that can be removed.

- Date and initial all entries.

- Page numbers and titles on each page.

- Write legibly - the diary is useless if your teammates (or judges) can't refer to it later.

- Caption all diagrams/pictures.

- Go for a physical book that stays with the robot - not a digital diary as it is too easy to change existing entries.

- A digital folder containing the CAD model, codes, backups, photos, and videos should be used to supplement the diary.

- You should be able to drop tools/stop work for the day, and somebody else should be able to pick up exactly where you left off.

General Points

- If you cannot justify something by using evidence (such as envelope calculations), you should not do it.

- Write EVERYTHING down; it will save you when you least expect it to.

- Nothing is free: there is ALWAYS a cost.

- The robot will never be perfect (fact of life). Continual improvement is the next best thing.

Analysis

Timeframe: Approx. 2 weeks

Task	Notes	Pages
List Game Objectives		
Rules Analysis	Note special rules, limitations, and gaps in the rules.	
Calculated expected scores	Envelope calculations for: ● Max score possible ● Min score ● Expected scores from a typical match ● Target scores	
Define team goal for target score	e.g. "Primarily score using method B. Aiming to get an average of 25 points per match"	
Team Roles	Roles can be done by more than one person, one person may do multiple roles e.g. ● Captain ● Tactician ● Builder ● Coder ● Driver ● Coach ● Scout	
Strategy Development		
Autonomous	● Sequence of events ● Map of path taken ● Expected points ● Notes of lessons based on performance of team/other teams	
Driver Control	● Scoring plan	

	- Defence plan - Contingency for certain events eg no partner, "dump" maneuver by opposition - Ideal sequence - Notes of lessons based on performance of your team/other teams	
Driver Skills	- Plan for scoring - Ideal sequence - Preloads - Expected Points - Notes of lessons based on performance of team/other teams	
Programming Skills	- Programming skills - Ideal sequence - Scoring path and map - Expected points - Notes of lessons based on performance of team/other teams	

Design

Timeframe:
    Initial Design: Approx. 1 month
    Development: Until end of season

Task	Notes	Pages
Conceptualise	For each concept: ● Concept sketch with title and labels of each part ● Pros/strengths ● Cons/weaknesses ● Expected motor setup ● Gear ratios/calculations ● Sensor type/location ● How does it meet your team strategy? ● Reasoning behind each aspect of the design (time, effort, past experience, forum, youtube, calculations etc) Keep the design simple, and fix things in code rather than rebuild the robot.	
Code block diagram	Describes main segments of code, main variables	
Wiring diagram	● Cortex ● Batteries ● Motors/ports; Torque, speed mode ● Sensors ● Power expanders	
CAD	● CAD one half of the design; use mirror feature for the other half ● Don't add screws/nuts/washers unless you are highlighting a very particular way of doing something. Only do that once in the model as an example.	

	Adding too many "small" components will slow down the CAD computer. ● Justify each piece. i.e Why use the larger piece of metal if it adds weight? Why the HS chain and not the smaller chain? If you can't justify it, don't add it. ● Print pictures for design diary.	

Build / Test

Timeframe: All season

Task	Notes	Pages
Build	- Build to CAD design - Build to quality the first time - it causes less issues later - Take pictures/videos of the build process/specific details (like axle spacings). Stick critical pictures into design diary. - Save backups of the completed CAD model in separate folders in case you need to revert back to an older design. Copy the file to a backup folder (don't forget to date) eg "robot v2 2017-03-04". - Make backups versions of completed, functional code like with the CAD model.	
Test	- Do this before competition. - Check functions of mechanicals; does the robot meet your goals/expectations - Make required changes (note in diary what the changes are and why you did them). - Train the driver and coach, use teammates as stand in opposition robots to mimic competition scenarios.	
Competition	Note the results of each of each match, make brief notes on what happened eg "20-10 vs team 1234A, won auton, tipped, game objects catch/jam under intake".	

	● You don't need to mention minor event details such as: "motor wouldn't work. It was plugged in the wrong way" or "arm disconnected because a screw fell out". Note errors that are persistent. ● At the end of each scrimmage (not at school next week, NOW), evaluate whether the goal was met or not, by how much, and things to change.	
Repeat	● Compare test results to success criteria. ● Update criteria. ● Improve ● Repeat	