The 18mm Flight Computer Challenge

Overview

The challenge is to design a small, simple, low-cost altimeter flight computer for the Christchurch Rocketeers to use with their high school outreach program. This can be done individually or as a group of 2 and aims to get you through a complete end-to-end design where the winner will get their design manufactured and then possibly brought into real world use. You will be given a Github repository and this will be how the submissions are made, and as part of that the challenge also includes keeping and producing good documentation. This will include an A3 plan to update as you go and a user manual to submit with your design.

Brief

The goal is to design a small ultra-low cost flight computer for the Christchurch Rocketeers in their high school outreach programs. Its function is to record the max altitude of the rocket and display this to the user somehow on landing, and providing a way to reset this and launch again. How this is achieved is completely up to you, but it must be easy to use and understand for high schoolers with no electrical experience. Also keep in mind that this is an actual product so robustness, reliability and long service life are all important considerations!

The finished product must be no more than 18 by 100mm but smaller is better. Emphasis is put on being cheap, at most $50 per piece for a ~10 unit run and the less the better. Any additional functionality is considered a bonus but shouldn't increase cost.

Along with this you will be required to keep a detailed A3 plan and provide a user manual. Have a look below for what an A3 plan is, you'll be required to update this as you go to keep your design in scope and on target. To go with this you will also produce a user manual to accompany your design to explain its function and features. Think about also including instructions for how to order, assemble and build your product as well, ideally these are a long-term solution!

Out of scope:
- Software unless your design is chosen. Put some thought into it and talk about it in your pitch but no actual code is required.

Example design

Michael has done a timelapse of making the Glowstone flight computer which you can find HERE. This covers a lot of the basics of how to approach an end-to-end PCB design. Keep in mind that Glowstone is only one possible solution and is by no means the best. The Christchurch Rocketeers have also proved an example of what they currently use, the FlightSketch Mini. Finally as a good practical resource this book by Eric Bogatin covers some of the really important basics as well as more complex applications.

Timeline

Interim check-in: A3 plan and current design – 17th November 12pm
Final submission: All design files, A3 Plan and User Manual – 1st December 12pm
Pitch your design – TBC

A3 Plan

An A3 plan is a problem-solving tool first developed by Toyota. Its purpose is to capture the current state of your project and to keep your design on track. You will be given a template and are expected to use this and update it throughout. These will also be checked during the interim submission which will give you the chance to get some feedback.

User Manual

You will be given a GitHub repository to put all your design files in for submission, and with this you must produce a professional looking wiki user manual for your flight computer. This should be a short but detailed explanation of exactly how to use your flight computer and note its features, limitations and anything else that would be important for the user to know.

Design Pitch

At some point if shortlisted you'll have the opportunity to pitch your design to the Christchurch Rocketeers. This should consist of a short but effectively communicated overview of your design and why it would be a great fit for their needs. Think about if you need a powerpoint/brochure/additional documentation to support this. They will have already looked at your submission as well so look to sell it and be ready to answer any questions they might have.

Summary

This hopefully should be an awesome way to get some real-world experience on an end-to-end design project for an actual customer. Make sure that your design stays in scope and if you have any questions regarding this put them up in the discord. Keep in mind that the guidance is purposefully vauge and the scope for what you can do is really large, innovative solutions are encouraged here so long as they have a clear reasoning and benefit.

May the best design win, good luck!