ENCE461 Wacky Racers Assignment Critique

Jack Duignan, Group 33, Hat board

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1 Strengths

In this section describe what you think are the strengths of your design, PCB layout, and overall wacky racer are.

The group 33 wacky hat had three main strengths. First the design of the PCB was very clean with a large number of testpoints and no components on the back. This allowed for quick assembly and easy debugging as the traces visable. Second, the board had the ability to be powered from both battery and USB. This was achived using a header which could be bridged to bypass the H-bridge and supply VBUS directly to the 5V plane. This was extremly useful allowing for testing of the radio without a battery. Third, the software was modularesed and well documented allowing both the hat and car to work on each others problems without explination needed. This simplified debugging.

2 Weaknesses

In this section describe what you think are the weaknesses of your design, PCB layout, and overall wacky racer are.

The wacky hat had three weaknesses. First the buzzer was powered off the 3V3 without a resister in parallel. This meant that the sound produced was quiet and in the end a resistor was soldered across the buzzer terminals. Second, the linear voltage regulators had there bypass pins pulled high which stopped this working luckly these could be pried up from the PCB and the fault was rectified without needing to replace any components. Third the control system spesifically the sensitivity of the y-axis (turning) was very high making the racer hard to control at slow speeds this was mitigated somewhat; however more needed to be done.

3 Improvements

In this section describe what you would like to have done differently with the advantage of hind-sight.

The hat could be improved by: powering the buzzer off 5V with a resistor in series, leaving the 3V3 linear regulators bypass pins floating, and by implementing more gradual sensitivity on the y-axis.

4 Contribution

In this section describe what you perceive as your contribution to the project compared to the other members of your team.

I had four main contributions to the project. First, I created the base sechematic used for both the wacky hat and racer which included the SAM4S and radio, GPIO and power supplies. Second, I completed around half of the PCB tracing and layout for the wacky hat. Third I wrote the majority of the software for the wacky hat including the main schedular, acceleromiter interfacing, and the buzzer code. Fourth I completed some debugging of the wacky racer including radio comunication and scheduling.

5 Recommendations for future students

In this section describe recommendations (with reasons) for future students doing a similar project.

The main recommendation is to start early and leave a large amount of time for the PCB as this is cricual to get right. My team spent a long time on the PCB and schematic design and becouse of that had to do functionally no rework making the rest of the project much easier. Secondly I would incouge other students to read through the provided libraries as they contain a lot of great examples of well writen code and give a good starting point for the software. Finally I would recommend that students design the system with the race in mind with tunning paramiters that can be used to change how the controller handles. As this give them a huge advantage in the race.

6 Recommendations to improve project

In this section describe your recommendations (with reasons) for how the project could be improved.

I think that another milestone should be added after radio communication which assess the performance of the racer, hat system. Then the race should be pushed to study leave or everything moved a week forward. Second I think that it is imperitive that more lab slots are added on another day with the ability for students to ask questions of the first day then be assessed on the second. This is nessasary as the current system does not really allow for any of the actual software design to be completed in the labs.

7 Peer assessment

There are two assessments to fill into the table:

My board		Whole system	
Name	Score	Name	Score
Jack Duignan	3	Jack Duignan	3
Ethan Wildash-Chan	2	Ethan Wildash-Chan	2
		Isha Patel	2
		Daniel Hawes	3

8 Workload

Racer				Hat				System integration			
Des	Bld	SW	Test	Des	Bld	SW	Test	Des	Bld	SW	Test
4	1	4	4	37	7	45	10	1	0	10	15