

34322 Communication Network for Control and Data Acquisition
Mini-project
Using LoRa for telemetry in projects with moving sensors
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1 Introduction

At DTU, several student teams are working with building cars for different purposes. For example, the Ecocar is competing for driving the furthest possible on a liter of fuel, the Solar car is trying to drive on sunpower only, and Vermilion Racing is building an electric racecar to compete in Formula Student. The Vermilion racecar is the inspiration for this project, where the topic is to investigate if LoRa is a suitable technology for wireless telemetry in situations, reading sensors on a high speed moving vehicle in real time.

A concrete case is that the car in the summer is shipped to Italy, where the car is gonna race on the Riccardo Paletti di Varano 'de Melegari racetrack, near Parma. On the track, the distance between the car and the paddock where the team are during the race, is approximately 600 meters, and the biggest distance from one point to another on the track is just shy of one kilometer. The terrain on and around the track is mostly unobstructed.

2 Technology

In Formula 1, each car is equipped with over 300 sensors, generating 1.1 million datapoints between the racetrack and the pits[2]. Through the years, Formula 1 has adopted new technologies and have traditionally been on the forefront of wireless technology. Different proprietary WiFi solutions have been used for telemetry between the cars on the track, and recently, 5G has been adopted to be used for telemetry[1]. As 5G is still relatively new, we may not have coverage at the track, so it is safer to base this discussion on 4G/LTE.

2.1 LTE

LTE has one big advantage over LoRa, in that it has a much higher bitrate at 300 Mbps download and 75 Mbps upload, or even higher with newer LTE technology[3].

References

- [1] Fastco Works. *Connected at 200 mph: How 5G is transforming auto racing and beyond*. 2019. URL: <https://www.fastcompany.com/90379283/connected-at-200-mph-how-5g-is-transforming-auto-racing-and-beyond>.
- [2] Rich miller. *How Cloud Data-Crunching Power Accelerates the F1 Racing Experience*. 2021. URL: <https://datacenterfrontier.com/how-cloud-data-crunching-power-accelerates-the-f1-racing-experience/>.
- [3] Lars Staalhagen. *Mobile Networks for Data Communication*. 2022. URL: <https://learn.inside.dtu.dk/d21/1e/content/102624/viewContent/392011/View>.