



















results obtained are very satisfactory. Thus, the decision to include gamification elements in the application may increase the use of the mobile app, and thus contribute to reduce the time to find a parking space and consequently reduce air pollution.

## 5. Conclusions

This paper describes a mobile app developed with the objective to contribute to reduce the time that an academic community takes to park their car, inside the campus of Escola Superior de Tecnologia e Gestão of Instituto Politécnico de Viana do Castelo. An initial study showed that most of the people generally struggle to find a parking spot, which means more time spent with the engine of the car running. This causes a higher level of air pollution, due to CO<sub>2</sub> and other greenhouse gases produced by the engine.

The main objective of the mobile app developed is to reduce ecological footprint caused by cars, by helping people to find a parking spot quicker and, therefore, reducing the number of pollutants produced by everyone. The app allows the academic community to have information about spots in the park where parking spaces are available. This information is possible to provide, given a crowd-sourcing-based approach, which combines gamification elements to promote the usage of the app.

The developed prototype was submitted to assessment by 10 different users. The adopted surveys allowed to conclude that, with the use of the mobile app, it is possible to reduce both, time, and gas emissions by 50.75%. The potential users considered the app to be easy and practical to use. Even considering the good results obtained, the app still has room for some improvements, namely on some design features that could be changed, such as the colors of the app. Also, it will be important to add other ways to provide people with XP, rather than just the medals. That will benefit the user of the app represents future work to be done.

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