

Towards a Hardware-in-the-Loop test bench for zero-on-site testing and validation of railways signalling systems

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Signalling systems play a pivotal role in maintaining operations safety along the railway network. Nowadays, one of the most common railway signalling approaches is the Fixed Block (FXB) system (see Figure 1(a)), based on the subdivision of the railway line in predetermined blocks of fixed length position. A novel approach is represented by the Moving Block (MVB) signalling system (see Figure 1(b)), which relies on the absolute positioning of the trains on the line. Despite the potential benefits, the MVB technology has not been implemented yet in a real-world scenario.

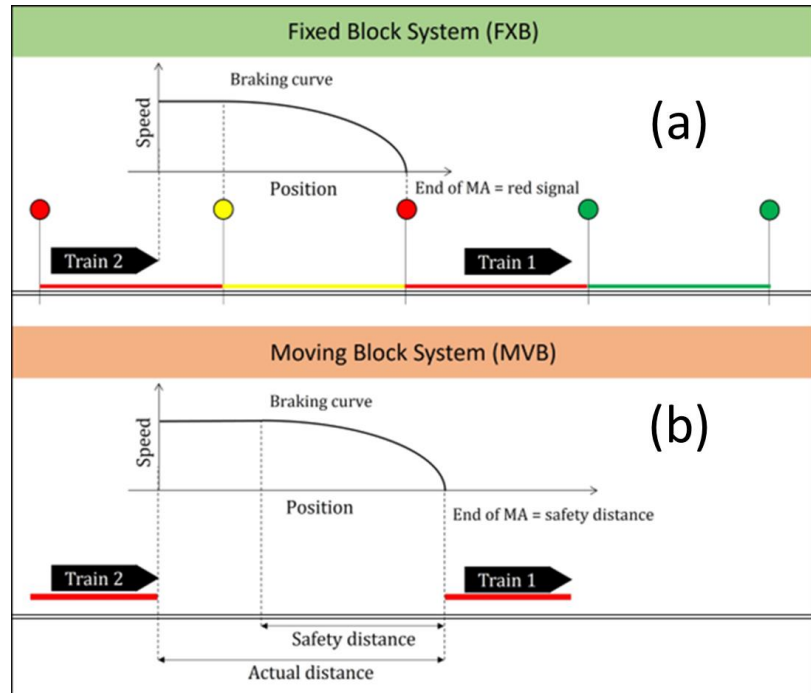


Figure 1: Schematic representation of: (a) FXB and (b) MVB signalling systems.

Before reaching this milestone, an extensive testing procedure must be performed. In this context, there is a great interest and attention to the development of testing tools, made of physical and virtual components, by which on-site testing could be drastically reduced, decreasing the time and costs required for this procedure.

Therefore, starting from a Simulink simulation environment already developed, the thesis aims at deploying some components of the tool in separate virtual or physical environments, such as evaluation boards and high-performance computers for real-time computation.

The thesis will be developed within the PNRR national research plan. Therefore, it will offer the candidate the possibility to work in a challenging and stimulating environment, in a multidisciplinary working group, composed also of industrial and other academic partners.