

Research activity of the mOve research group in the field of electronic motorcycle control: past and future

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Abstract

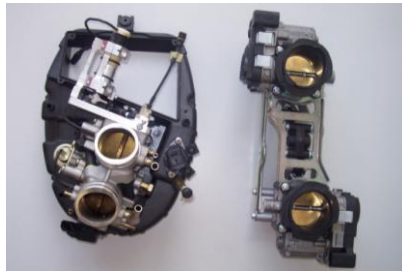
This contribution has the goal of presenting and briefly discussing the research activity developed by the mOve research group at the Dipartimento di Elettronica, Politecnico di Milano (TU Milan) in the field of electronic control systems for motorcycles, in the last five years.

The interest in electronic control in motorcycles boosted in the last few years, both in academic and in industrial research centers, since it is particularly challenging from many point of views:

- motorcycle dynamics are (much) more complicated than four-wheel vehicles dynamics
- the sensitivity of the average motorcycle driver to dynamic performances of the vehicle is very high
- severe constraints of cost, space and weight
- severe instability issues

Motorcycle control hence is far from being a simple re-casting of “traditional” control systems developed for automotive applications.

Figure 1. Examples of full-by-wire body throttles for motorcycles.



The research activity in this field has been developed along many streams:

- suspensions electronic control (in particular semi-active control)
- steer-damping electronic control
- traction control (with and without ride-by-wire systems)
- braking electronic control
- stability control (still the most challenging and unexplored sub-system)
- electronic control of gear-shift
- virtual dashboard (for data logging and controller tuning)

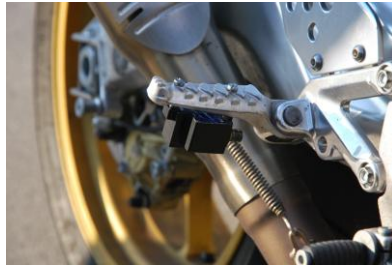
Another interesting research stream is related to light electric vehicles: light vehicles (light motorcycles) are the best candidates to be fully electrified, for short and mid-range personal mobility.

In the presentation all the research activity developed by the research group in the last years along such research stream will be briefly presented and outlined. Also, future direction of research will be discussed.

Figure 2. A motorcycle equipped with electronic suspension on a test-rig.



Figure 3. A laser sensor for lean-angle estimation.



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