Lean and Pitch Motoribike Angles Measurement System

Immagine che contiene testo, Carattere, logo, Elementi grafici

Descrizione generata automaticamente

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1. OBJECTIVE AND REASONS

In motorbikes, knowing lean and pitch angles is crucial to create safety control system such as Traction Control (TC) and Anti-Lock Braking System (ABS). In motorsports are also used for Anti Roll over systems and Launch Control.

There actually is no choice of the sensors which can be used: during turn any accelerometer would not work beacause a dynamic equilibruim would make it return a null acceleration value in the respective planes. Then the only way is to use Time of Flight (ToF) sensors and use trigonometry to estimate the angles values through the same relationship. The only difference is the sensors positioning 2 as in the picture below and a third one aligned with one of the firsts just in the rear.

Immagine che contiene diagramma, linea, schizzo, disegno

Descrizione generata automaticamente The relationship is: where L is the distance between the 2 sensors.

For common use bikes this kind of measurement systems are used only during the tests phase and not actually sold to the custmer due to lack of reliability in certain conditions such as wet asphalt. However they are vital to check software sensing of lean and pitch angles such as Kalman Filters or other Observers.

1. MATERIALS

* 3 ToF Sensors Vl530X
* Arduino Mega 2560
* Bluetooth Module HC06
* SD Module

1. STATIC TESTS

* Setup
* Results

1. DYNAMIC TESTS

1. POSSIBLE IMPROVEMENTS