

4th year students mechatronics / graduation project 2015 - 2016

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Concept development e-Bike Balance system for e-bikes



Why to develop ideas for an e-Bike Balance system?

Elderly have often user problems with an e-bike:

- higher speeds → reduced response speed
 - physical limitations
 - heavier e-bike
 - step-on/off actions
- } (one-sided) fall from (almost) standstill position

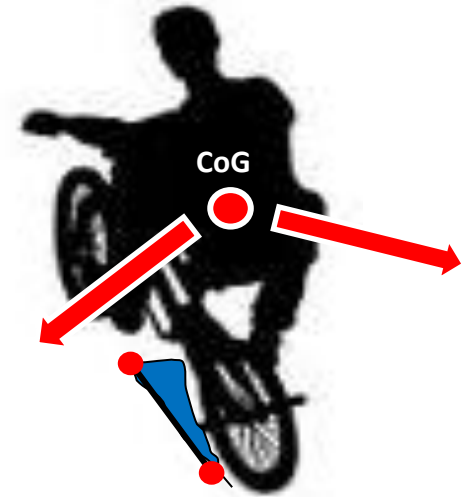
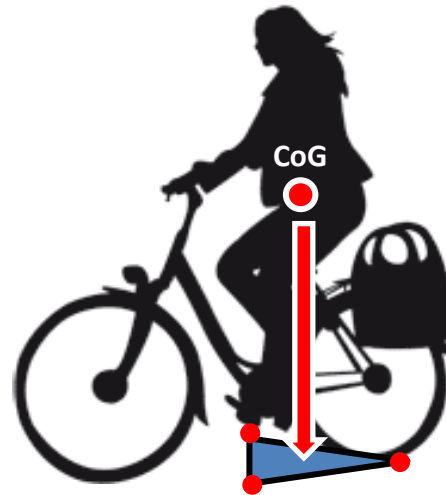
Market

- e-bike is a growing market
- elderly 50+ of which 60% are e-bike users

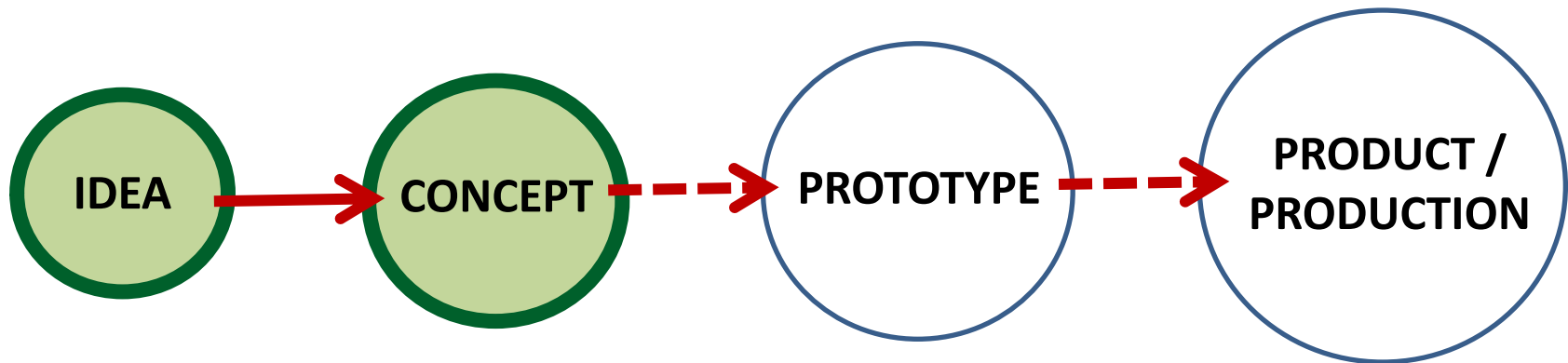
Idea e-Bike Balance system → How does it works?

At slow/walking speed of the e-bike to standstill position:

- 2-balance wheels get road contact + rear wheel road contact
- form a “triangle balance area” in area falls CoG of the e-bike/biker
- biker stops → remains seated → easy to step-on and to step-off



Concept → can e-Bike Balance perform as a new product?



Objective concept study / project

- At standstill position remain seated without falling
 - by development of an electric working concept system
 - and automatic activation at slow-/walking speed to standstill position, by means of sensors

Concept → development e-Bike Balance system

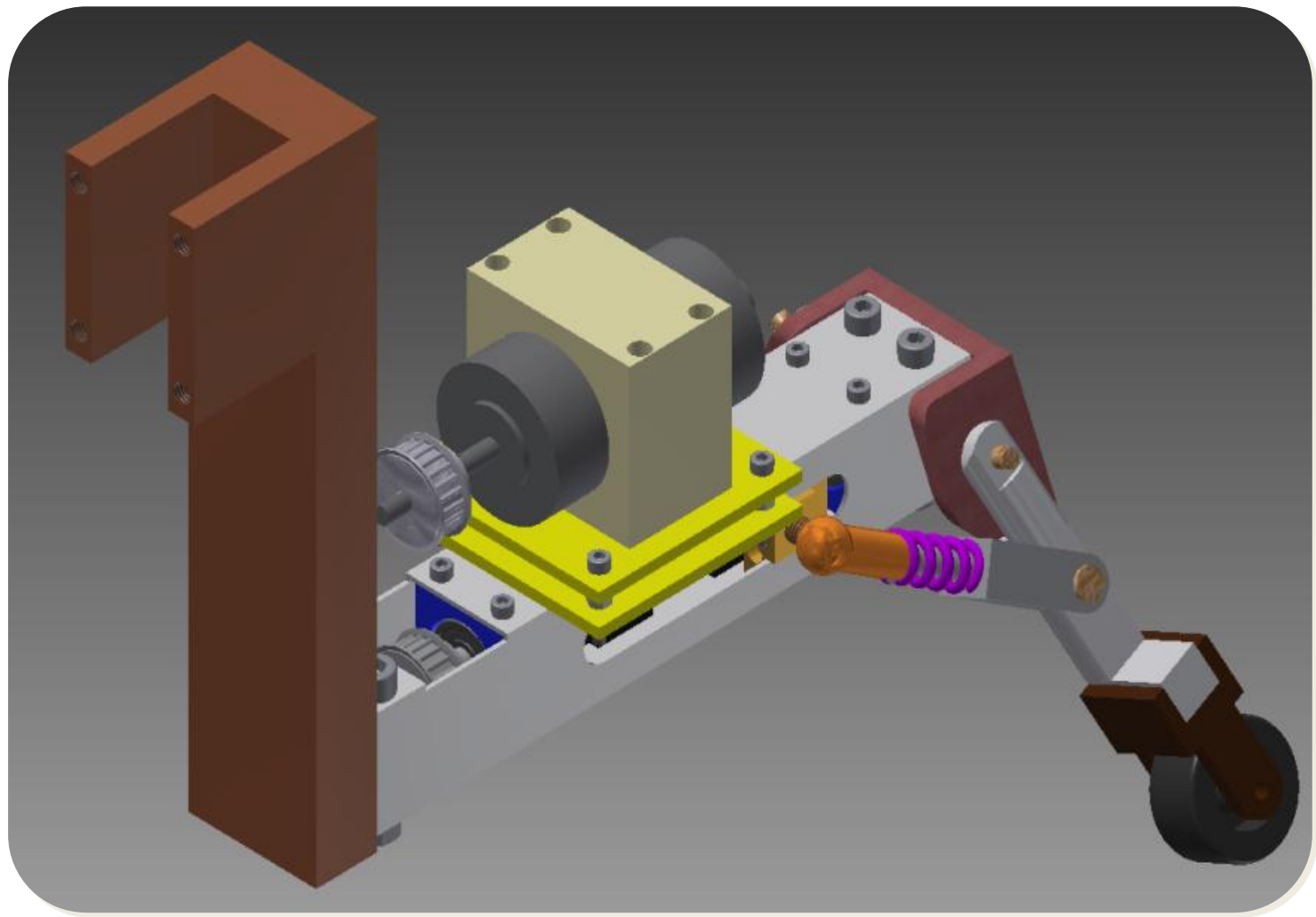
Problem

- e-bike producer → no information 36V e-management system!
- information needed for:
 - software update / e-circuit
 - automatic activation
 - e-power supply, etc.

Alternative concept execution

- manual activation 12V e-motor / 12V battery on the e-bike
- sensors 12V / not all types directly available
- PLC available for function programming / 230V!

Concept e-Bike Balance → Summa Engineering - CAD model



Concept e-Bike Balance / manual activation on the e-bike



Future product integration → balance wheels in rest position directly below the pedal shaft

Test in the Summa Engineering Fab Lab → Conclusion



CONCLUSION

Concept activated → e-bike stops → e-biker remains seated without falling

e-Bike Balance → a new product → market driven

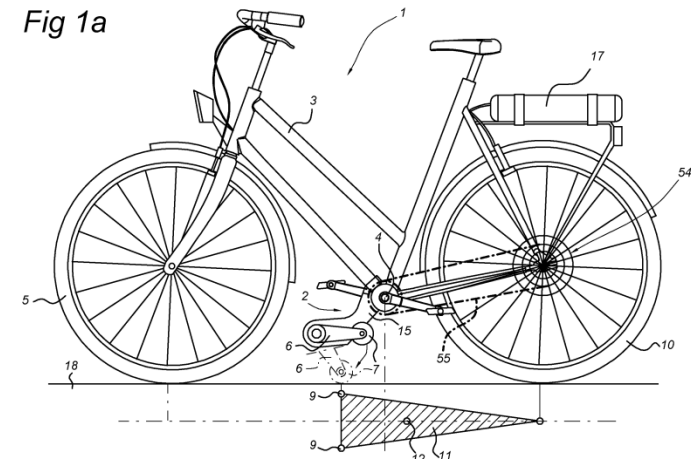
Safer biking with an e-bike + integrated e-Bike Balance by:

- **more safety → driven by government and e-bike market**
- **less physical actions → remain seated, less step-on/off actions**
- **more traffic overview → better in seated position → rest, comfort**
- **less risks → less injury and damage cost**

Granted patents

- **NL 2006580 – NL 2008615**
- **DE 20 2012 101 280.4**

Applications for full- or support e-drives two wheelers
(frontwheel- or rearwheel- or mid/pedal motor driven)



Market development → e-bike + integrated e-Bike Balance

➤ More focus on safety

Determined by market and legislation

➤ Insurance aspects

Determined by market, accidents/personal injury, material damage and e-bike theft

e-bike + e-Bike Balance
More safety, comfort and anti-theft options

NL market e-bikes (*)

276.000 e-bikes sold 2015

28% total market share 2015

**e-bike +
e-Bike Balance
development**

e-bike market
development
(*) = all types



**Targetgroup
e-bikers**

2006

2010

2013

2015

2016

2017