

2nd MEETING OF THE DOCTORAL PROGRAM IN CIVIL ENGINEERING

DESIGN AND OPTIMIZATION OF A NOVEL SPEED BUMP FOR ENERGY HARVESTING FROM VEHICULAR TRAFFIC USING A PIEZOELECTRIC CANTILEVER DEVICE

Speaker

Gonzalo del Castillo García

Supervisors

Daniel Castro Fresno

Elena Blanco Fernández



- ✓ Study and classify existing traffic energy harvesting devices.
- ✓ Characterize different types of piezoelectric materials and device configuration to determine which maximizes energy production of our device in working conditions.
- ✓ Design and build a speed bump prototype able to harvest part of the energy lost by vehicles passing through a speed bump and use it to power LED devices for lighting and beaconing purposes.
- ✓ Evaluate its performance in terms of power generation capacity, battery charging, structural integrity and life cycle.

Journal Publications

- ❑ Gonzalo del Castillo García, Elena Blanco Fernández, Pablo Pascual Muñoz, Daniel Castro Fresno (2016): ***Energy harvesting from vehicular traffic over speed bumps: A review.*** Journal of Urban Technology. Impact factor: 0.978
- ❑ Gonzalo del Castillo García, Elena Blanco Fernández, Alejandro Alonso Estébanez , Daniel Castro Fresno (2016): ***Analysis of power output of a low frequency piezoelectric cantilever device.*** Journal of Energy Engineering. Impact factor: 1.343
- ❑ Gonzalo del Castillo García, Elena Blanco Fernández, Alejandro Alonso Estébanez, Daniel Castro Fresno (2016): ***Novel speed-bump design and optimization for energy harvesting from vehicular traffic.***

Patents

- ❑ Gonzalo del Castillo García, Elena Blanco Fernández, Alejandro Alonso Estébanez, Daniel Castro Fresno, Carlos Real Gutiérrez (2016): ***Speed bump design for energy harvesting from traffic***. Applicant: Coprosa S.A.

Training courses

- ❑ EDUC Basic and Advanced Training Courses (2016). Duration: 80 hours. Organiser: Doctoral School of the University of Cantabria.
- ❑ SPSS statistical software. Basic, medium and advanced training courses (2014). Duration: 27 hours. Organiser: Construction Technology Applied Research Group (GITECO).

COMPETENCES ASSESSMENT

| Basic competences | Science and Technique | Technology | Training courses | Results | SWOT analysis | Workplan | Mobility | Funding | Ethics |
|--------------------------------|-----------------------|------------|------------------|---------|---------------|----------|----------|---------|--------|
| CB11 | ✓ | ✓ | ✓ | | | | | | |
| CB12 | | | | ✓ | | ✓ | | | |
| CB13 | | | | ✓ | | | | | |
| CB14 | | | | | ✓ | | | | |
| CB15 | | | | ✓ | | | | | |
| CB16 | | | | ✓ | | | | | ✓ |
| Capacities and personal skills | Science and Technique | Technology | Training courses | Results | SWOT analysis | Workplan | Mobility | Funding | Ethics |
| CA01 | ✓ | ✓ | ✓ | | | | | | |
| CA02 | | | | ✓ | | | | | |
| CA03 | | | | | | ✓ | | ✓ | |
| CA04 | | | ✓ | | | | | | |
| CA05 | ✓ | ✓ | ✓ | | | | | | |
| CA06 | | | | | ✓ | | | | |



**THANK YOU
FOR
YOUR ATTENTION!!**

Gonzalo del Castillo García
castillog@unican.es