



PEGASO

FIT FOR FUTURE



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A smart wearable sensors system for counter-fighting overweight in teenagers

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PEGASO Fit for Future: WHY

- The rapidly increasing prevalence of overweight and obesity among children and adolescents reflects a global ‘epidemic’ worldwide.
- Due to the associated serious medical conditions, it is estimated that obesity already accounts for up to 7% of healthcare costs in the EU.
- Obesity in younger age groups has been recognized as an alarming key predictor for obesity in adulthood.



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Childhood Obesity Facts

- Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years.^{1, 2}





PEGASO Fit for Future: WHY

- Counterfigthing overweight and obesity is a WHO recognized priority

The screenshot shows the WHO website's navigation bar with 'Programmes' selected. The main heading is 'Global Strategy on Diet, Physical Activity and Health'. A sidebar on the left lists related topics. The main content area features a section for the 'Commission on Ending Childhood Obesity' with a photo of two children and a text box explaining its formation in May 2014. A blue arrow labeled 'Who' points to this text box. Below, a navigation bar includes 'Diet and physical activity', 'Commission on Ending Childhood Obesity', and 'Diet and physical activity: a public health priority', with a blue arrow labeled 'How' pointing to the last item.





PEGASO Fit for Future: HOW

- Challenging teenagers in the context of their own areas of interest, Pegaso – Fit 4 Future – is a EU funded ICT project that aims to promote **sustainable behaviours** geared towards achieving healthy lifestyles.
 - Behaviour-change techniques are applied as a preventative measure to accomplish positive behaviour change outcomes.
-
- The **behaviour change platform** is targetting teen agers in **preventing obesity** and related comorbidities in a positive message and approach through the use of serious games and wearable monitoring systems.



PEGASO Fit for Future: HOW

- Technological platform: the smartphone.

The User Requirements defined through user participation confirms the almost 100% diffusion and the willingness to use this device as service platform.

Smartphone has become even more important than outfit (www.wired.it, from NYT, Aug. 2014).



Safer Internet Center in Italy
Survey on 8.000 students,
aged 11-13:
95% mobile/smartphone
coverage.
Feb. 11, 2015





PEGASO Fit for Future: HOW

The implemented actions correspond to a positive message and tools dedicated to teenagers, for improving their lives in 4 directions like in the compass:

- move ➡ active lifestyle
- play ➡ serious game, engagement
- eat ➡ food education and pleasure
- share ➡ social technology

Build your Life Compass



User Participation in co-design tools is crucial to achieve the best compliance.





PEGASO Fit for Future: HOW

- Individual monitoring represents a crucial point for PEGASO success.
- Wearable Sensors will be used to collect data about teenagers' physical and behavioral habits.
- A Wearable Device, such as a bracelet or a shirt embedding smart textiles, allows a continuous monitoring of the physiological parameters in an unobtrusive and comfortable way.





PEGASO Fit for Future: HOW

Wearable system for non intrusive monitoring are the emerging trend technology.

Accepted by end-user and teenager in particular.

Wearables for teens are nothing like the boring calorie counters marketed to adults. Instead, a whole new breed of wearable tech is emerging that that is targeted at helping young people do the things they want to do, like **play, game, and relate.** Tapping into and extending imagination, and engaging social behavior, wearable technology for teens could have a huge impact on the teen-focused **gaming and entertainment** industries.

Serious Games are becoming and diffusing as a new tool for learning, training and improvement. Also this choice seems to be winning.

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WEAR YOUR LIFE
KEY BAND AND HD CHAMPS

Disney, Mattel, Xbox, and PlayStation take note; wearables for teens are here, and they are about to disrupt your business.

Wearables for teens are nothing like the boring calorie counters marketed to adults. Instead, a whole new breed of wearable tech is emerging that that is targeted at helping young people do the things they want to do, like play, game, and relate. Tapping into and extending imagination, and engaging social behavior, wearable technology for teens could have a huge impact on the teen-focused gaming and entertainment industries.





PEGASO Fit for Future: HOW

- Some statistics affirm that there is a lack of utilization of these products, specially sports and activity monitors, close to six month of use. For this reason, to strengthen acceptance and continuous use of the wearable devices by the users could be reached involving the users since the beginning of the devices development, using a User Centred Approach.

Focus Groups (international, >200 teenagers recruited)

	Participants (male and female aged between 13 and 17)		
	Italy	Spain	United Kingdom
Phase 1	75	28	45
Phase 2	27	30	14
Phase 3	66	28	94



PEGASO Fit for Future: HOW

System Codesign



UCD approach & Co-Design

- **Stage 1: Introduction**
- **Stage 2: Name Introduction**
- **Stage 3: Warm up Activity**
 - Use of Technology for Health Purposes
 - Use of Gaming for Health Purposes
 - Use of Social Network for Health purposes
- **Stage 4: Main Activity**
 - Theme 1: Technology for healthy living. Impressions on the use of technology for healthy living
 - Theme 2: Features of Technology. Features that technology should have to be interesting for teenagers. Short/Long term usability, physical features, incentive/disincentive
 - Theme 3: Use of Technology in different contexts. Schools, home, gym, clubs etc..
 - Theme 4: Information sharing: people that teenagers would like to connect with, share information. Friends, parents, teacher and experts. Notification and feedback system.
 - Theme 5: Current awareness or use of technologies.
- **Stage 5: Post Discussion prioritization.**
- **Stage 6: Summary and close up**





PEGASO Fit for Future: HOW



All the participants demonstrated a great interest in wearable sensors, considering them comfortable and useful for the monitoring of their lifestyle.



the Visible Sensor line



the Hidden Sensor line

Samples and prototypes of PEGASO Smart Garments.





PEGASO Fit for Future: Results

- Tests, interviews and questionnaire results
- Some preference to use sensorized garments only during exercise, not all day. (*"If I wanted something in my clothes I would rather wear a wristband that is more discrete"*).
- Foreseen garments' price is acceptable, and availability on the market with different design, materials and colors will match users' expectation.
- Very interested on data collected using these garments, especially during their sport activity, to assess their improvements.
- Very positive is the comfort in use of the garments, compared with bracelets. This is due to the embedded smart textile sensors that make garments to be allowed for use playing sports (e.g. during the volleyball training sessions they can't wear anything like bracelets or necklaces but they can wear smart garments).





PEGASO Fit for Future: Results

- Proactive activity: wearables codesign

Teens gave feedbacks on the garments' features and some sketches. They had to choose among some templates of t-shirts, bras and vests and to design their favourite one.

Help us to design the New Pegaso Smart Garments!!

Step 1
Define your favorite shirt/bra

↳ choice of T-shirt ↳ choice of Bra

Step 2
Place the sensor (exhibit it or hide it, as you prefer)

↳ choice of Pegaso Sensor

Step 3
Design your Pegaso Shirt, combining colours, materials and pattern!

RED, GREEN, BLUE, YELLOW...
...SPARKLE, FLUORESCENT...
...CUSTOM LOGO, PATTERN...

but remember

- 1 the electrodes are always placed at the chest level, attached to the skin!
- 2 you can place the sensor where you prefer, but it works better nearby the electrodes
- 3 finally, don't forget the Pegaso Logo!

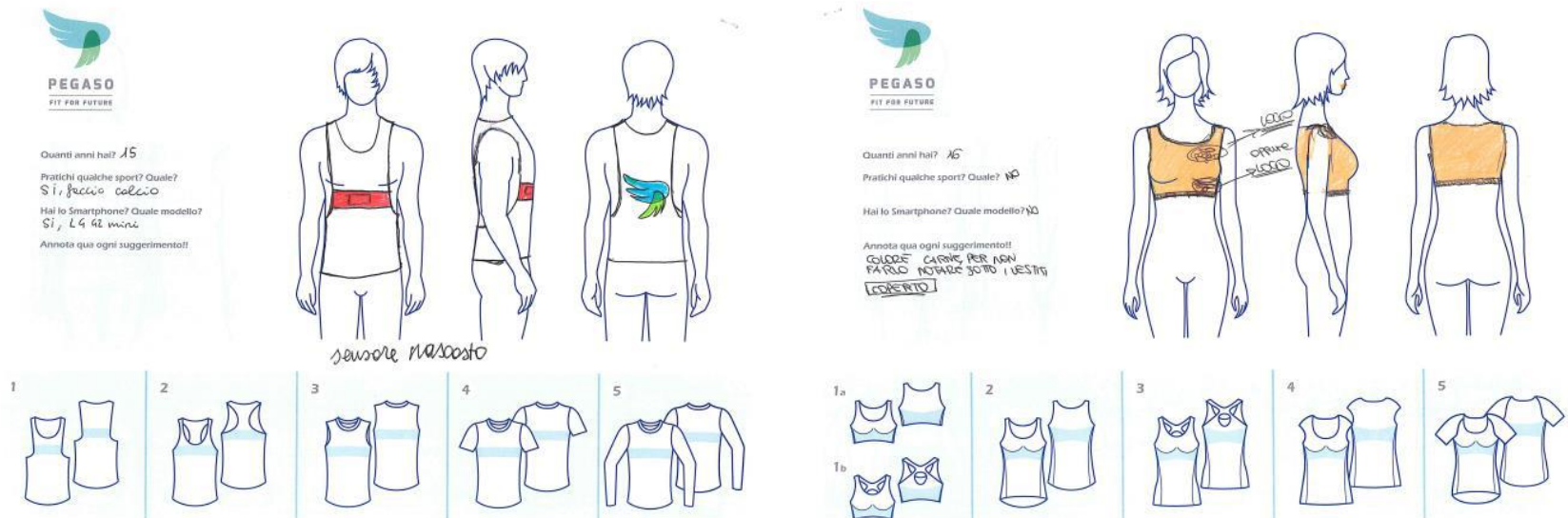
the electrodes' size





PEGASO Fit for Future: Results

- Wearables codesign
 - no unanimity on the sensor visibility
 - Preference for light and technical fabrics
 - garments' design is very important to be fashionable: Aesthetics of PEGASO system drives its acceptability.





PEGASO Fit for Future: Conclusions

The PEGASO framework will be validated by secondary school students.

4 validation pilots will be carried out in **Italy** (Lombardy), **Spain** (Catalonia) and **United Kingdom** (England/Scotland), involving about 400 students.

The validation will assess the following factors:

- System and Technology acceptance, usability and long-term use, together with motivation and engagement;
- Reliability in assessing the teen-agers lifestyles and their changes (with focus on the eating habits and on physical activities), that is strictly related to the efficacy of the sensors' network;
- Efficacy of the system in encouraging lifestyle change, that is the final impact for prevention.





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