High-throughput printing and assembly on stretchable substrate - A use case: smart ECG patch

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ELASTRONICS

Agenda

- VTT in brief
- Hybrid integration and high-throughput manufacturing
- Stretchable electronics and wearables
- Elastic ECG patch – technology demonstrator

VTT's status as performer of R&D work

BASIC RESEARCH

UNIVERSITIES

APPLIED RESEARCH

VTT

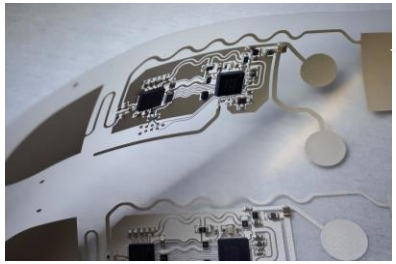
DEVELOPMENT

INDUSTRY

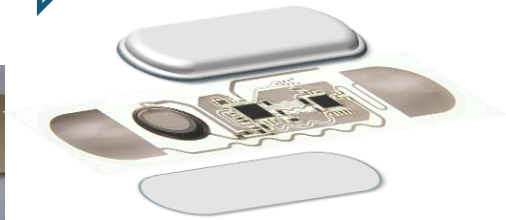
Motivation toward high-throughput manufacturing

Hybrid integration

Layout printing on flexible and stretchable substrate

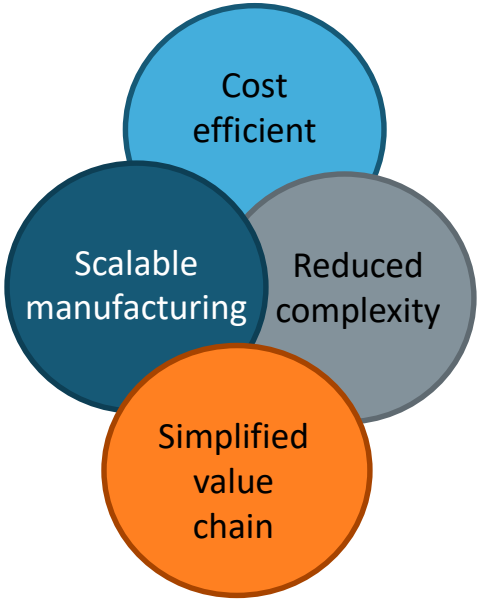


Chip bonding and assembly of microelectronics components and securing the interconnections



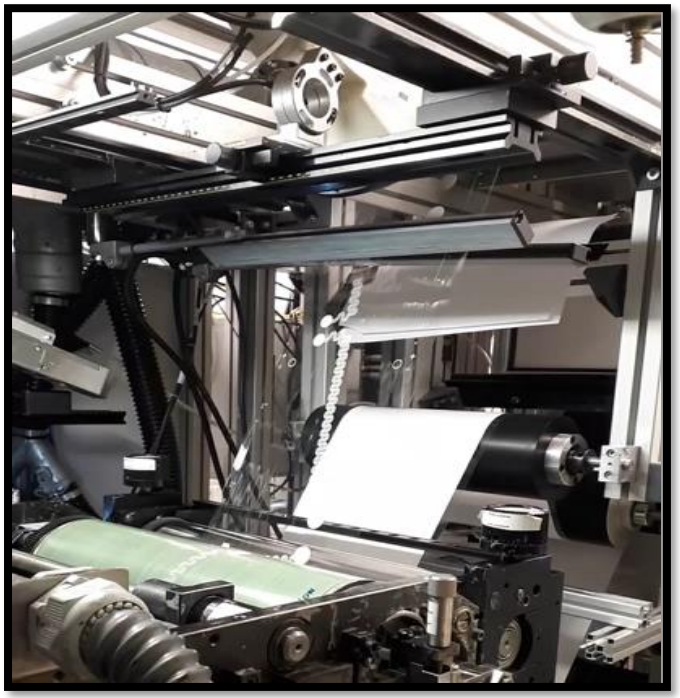
Post-processing and Packaging

High-throughput manufacturing

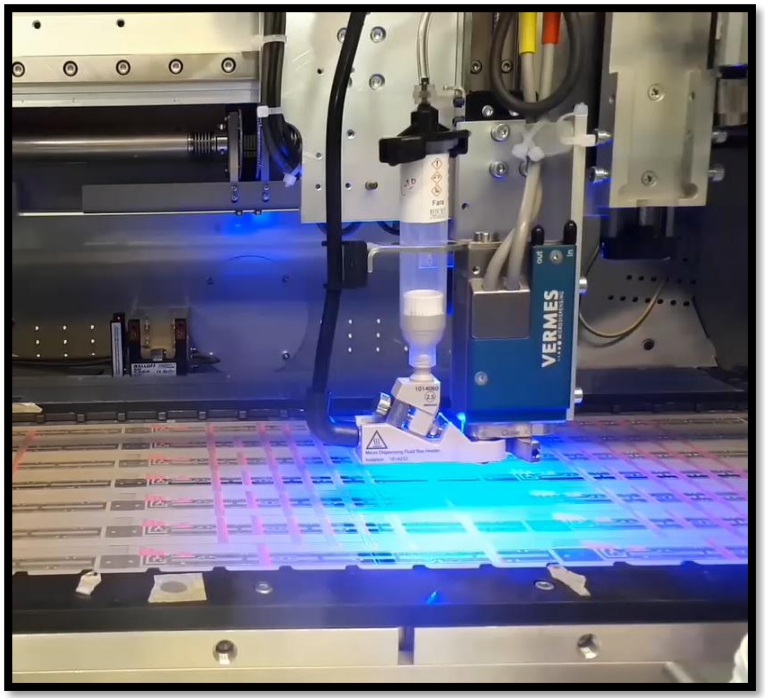


Roll-to-roll printing and automated assembly process in action (I)

R2R printing of stretchable epidermal printed conductors

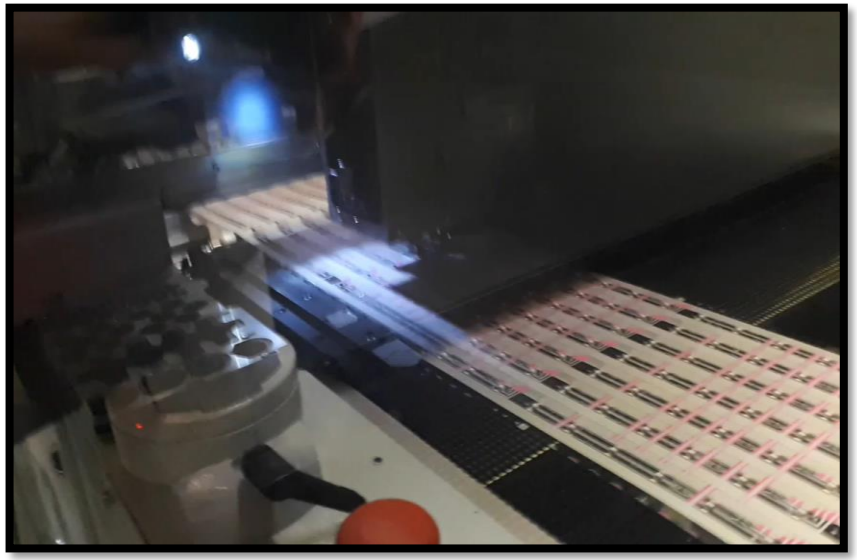


Automated dispensing of conductive adhesive (Flexible LED roll)

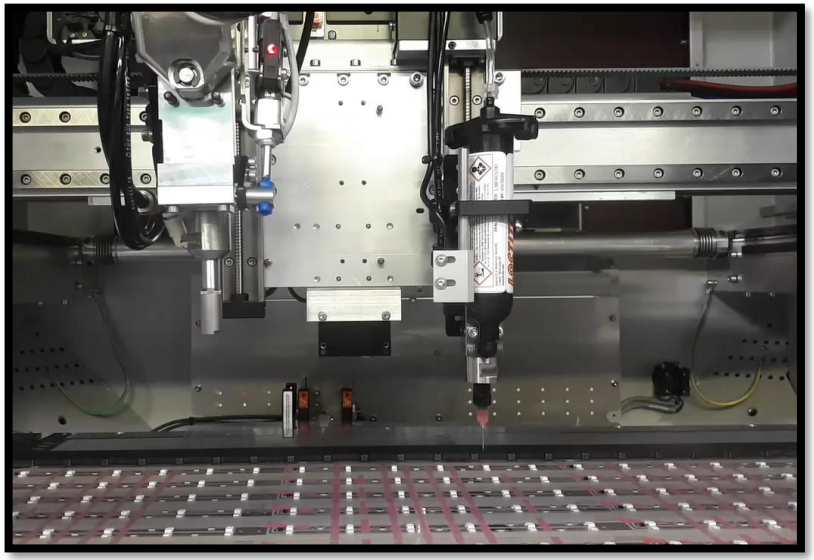


Roll-to-roll printing and automated assembly process in action (II)

Automated assembly of bare die LED on flexible substrate (LED roll)



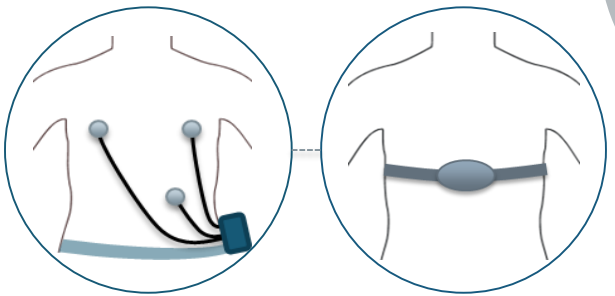
Automated dispensing of supporting adhesive around the assembled LEDs (LED roll)

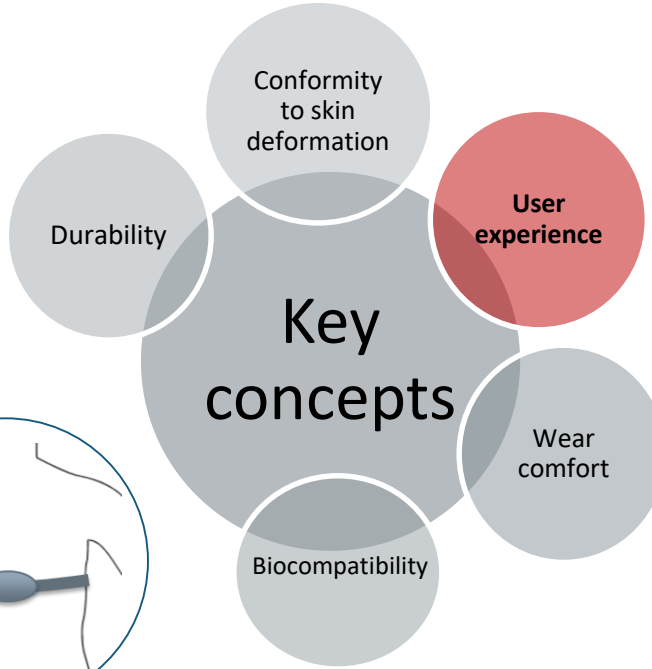


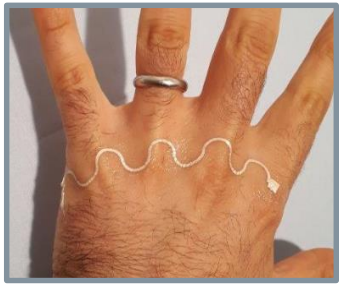
Stretchable substrate for wearables

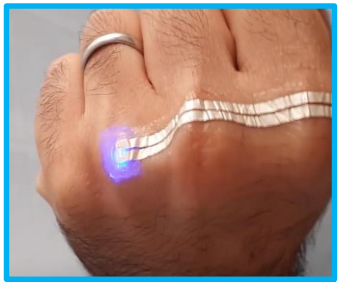
Rigid bulk electronics

Ultra-thin, Conformal electronics



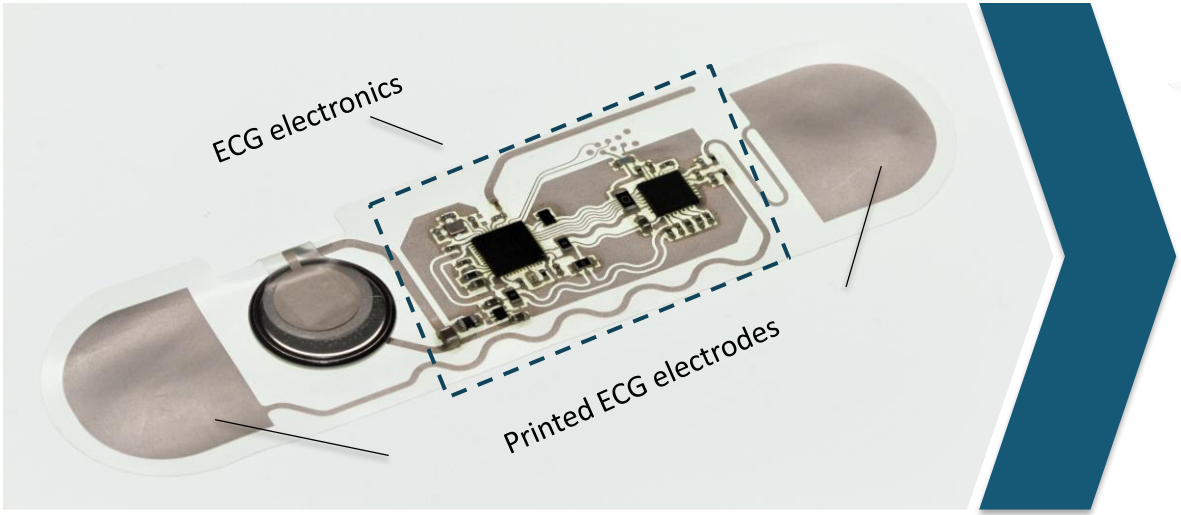


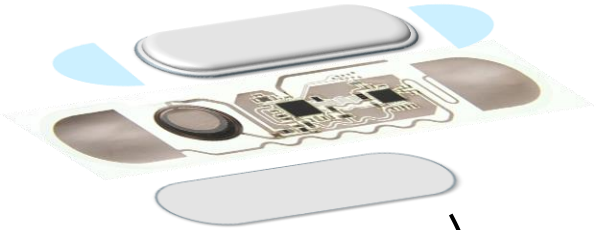


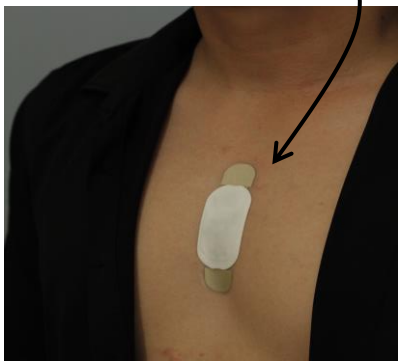


Transition toward skin patch solutions

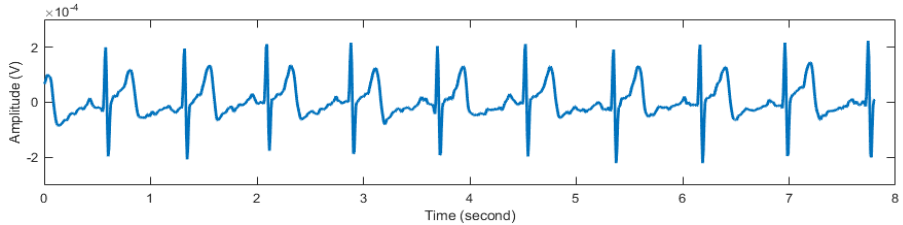
Elastic electrocardiography (ECG) device – A technology demonstrator







- Fully integrated ECG recorder on ultra-thin (100 µm) elastic substrate
- Fabricated through automated sheet-fed processing
- All the processing steps are truly roll-to-roll compatible



Wrap-up remarks

High-throughput hybrid integration allows cost efficient and scalable manufacturing

Pilot manufacturing is an essential step toward mass manufacturing and commercialization

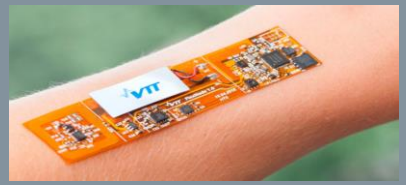
Hybrid stretchable electronics accelerates advances in wearable technology

Wear comfort is the key concept for usability of wearables and user adherence

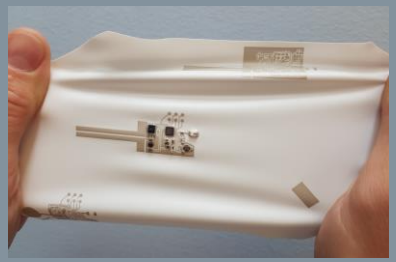
User adherence enables prolonged physiological data collection with wearable devices

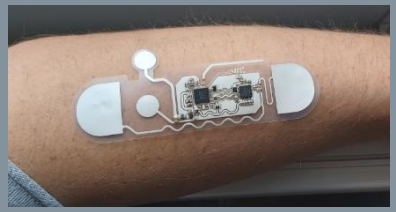
VTT's R&D towards skin-integrated patches

Flexible

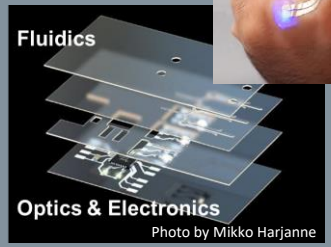


Stretchable





Epidermal



Credit goes to entire Elastronics team.

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VTT – beyond the obvious

Thank you!