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PATENT NAME:

APPARATUS FOR MONITORING DEFORMATIONS OF SMART ELASTIC TEXTILE

ShapeBender

Patent Slogan:
"See how it deforms"

INVENTORS (TEAM):

We are both researchers with the Laboratory for Geospatial Modelling, Multimedia and Artificial Intelligence, Faculty of Electrical Engineering and Computer Science, Institute of Computer Science, University of Maribor

Main topics: AI, GIS, Computer graphic

Asoc. Prof. Domen Mongus

Dino Vlahek, researcher

MOTIVATION…

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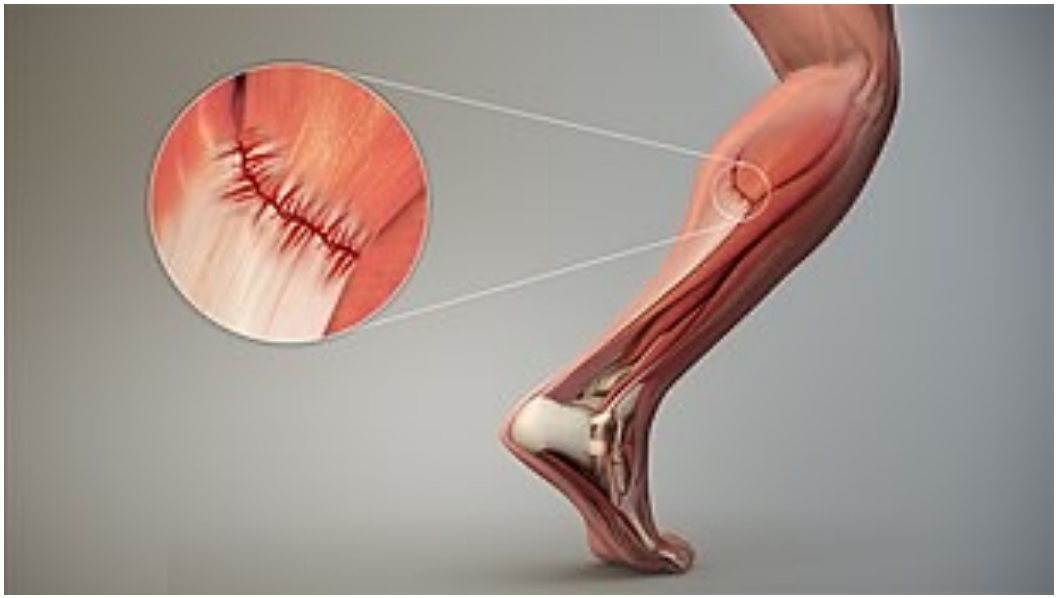
PROBLEM/OPPORTUNITY:

- *The technical problem:*
  - ***Monitoring of surface deformation*** *of conductive fibers embedded in smart elastic textiles.*
  - *Electromechanical parts and software* ***are not intelligent enough*** *to monitor surface deformation in smart elastic textiles.*



END USERS:

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- **Sportsmen**
- **Soldiers**
- **Elderly population**

- *End user's problem:*
  - ***Frequent Injuries of a muscle*** *during training or competition*
  - *Decline in muscle strength and functions of elderly*
- *Muscle injury prediction does* ***not exists:***
  - ***Performance problems*** *and* ***money losing*** *for the sportsman.*
  - *Military unit* ***readiness level decreased.***
  - *Decline in muscle strength and functions*
    - **decreased quality** of living for elderly

OUR SOLUTION:

A **wearable** system that creates a **DIGITAL TWIN** of smart textiles in real time.

- It provides a **real-time 3D reconstruction** for any textile surface straightforward.
- It enables to monitor their muscles during trainings or competitions or predict possible injuries.

TECHNOLOGY READINESS LEVEL:

TRL5/TRL6

HOW IT WORKS?

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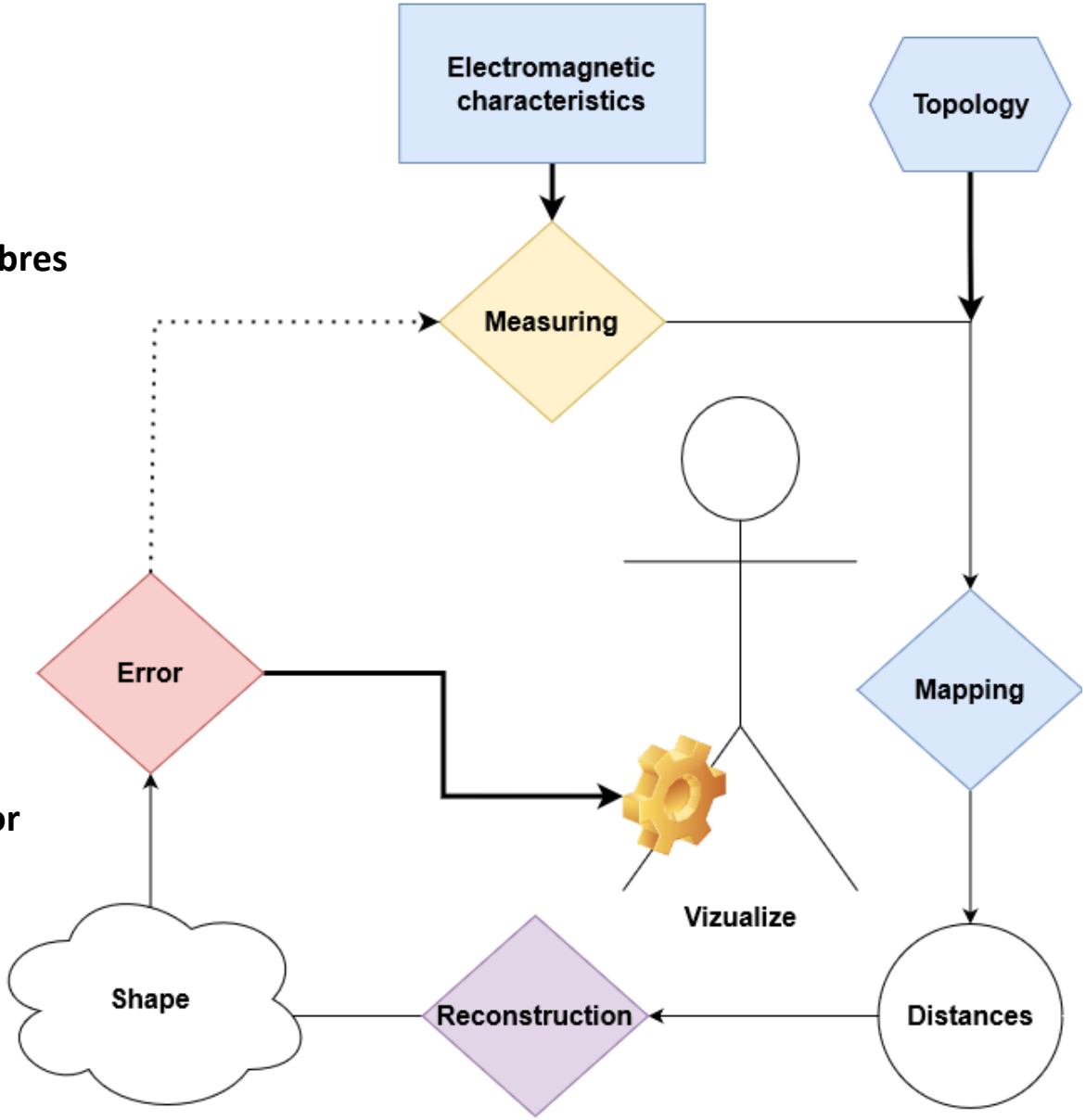
- How it Works?
  - Measuring electromagnetic characteristics of conductive fibres
  - Mapping electromagnetic characteristics into distances
  - Reconstruction of a shape
  - Calculating reconstruction error



INNOVATIVE FEATURES

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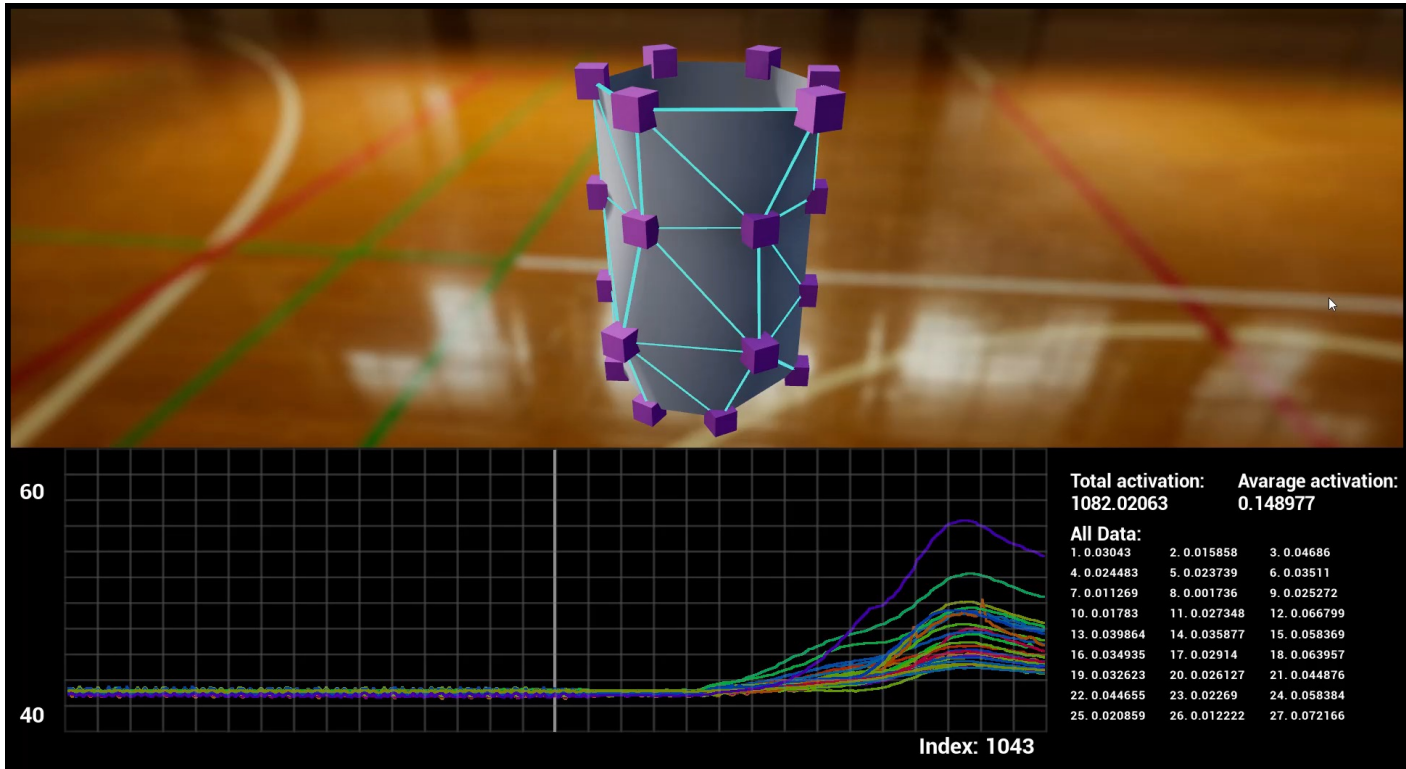
- **Mapping electromagnetic characteristics into distances**
- **Reconstruction of a smart textile shape**
- **Calculating reconstruction error**
- **Visualization in real time**
- **No cables**



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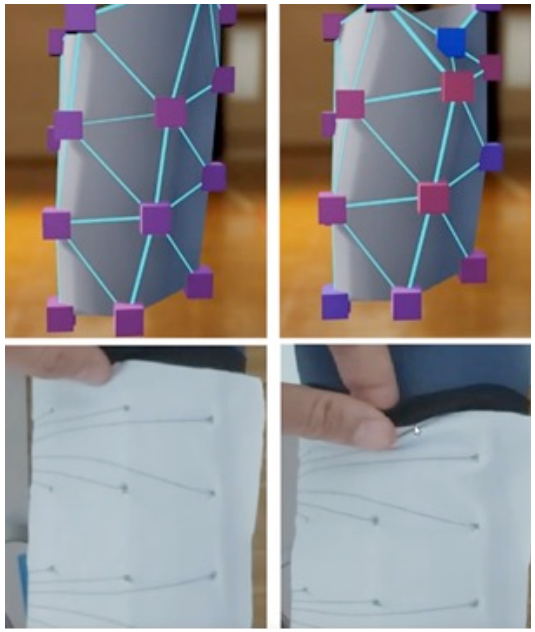
VALUE PROPOSITION:



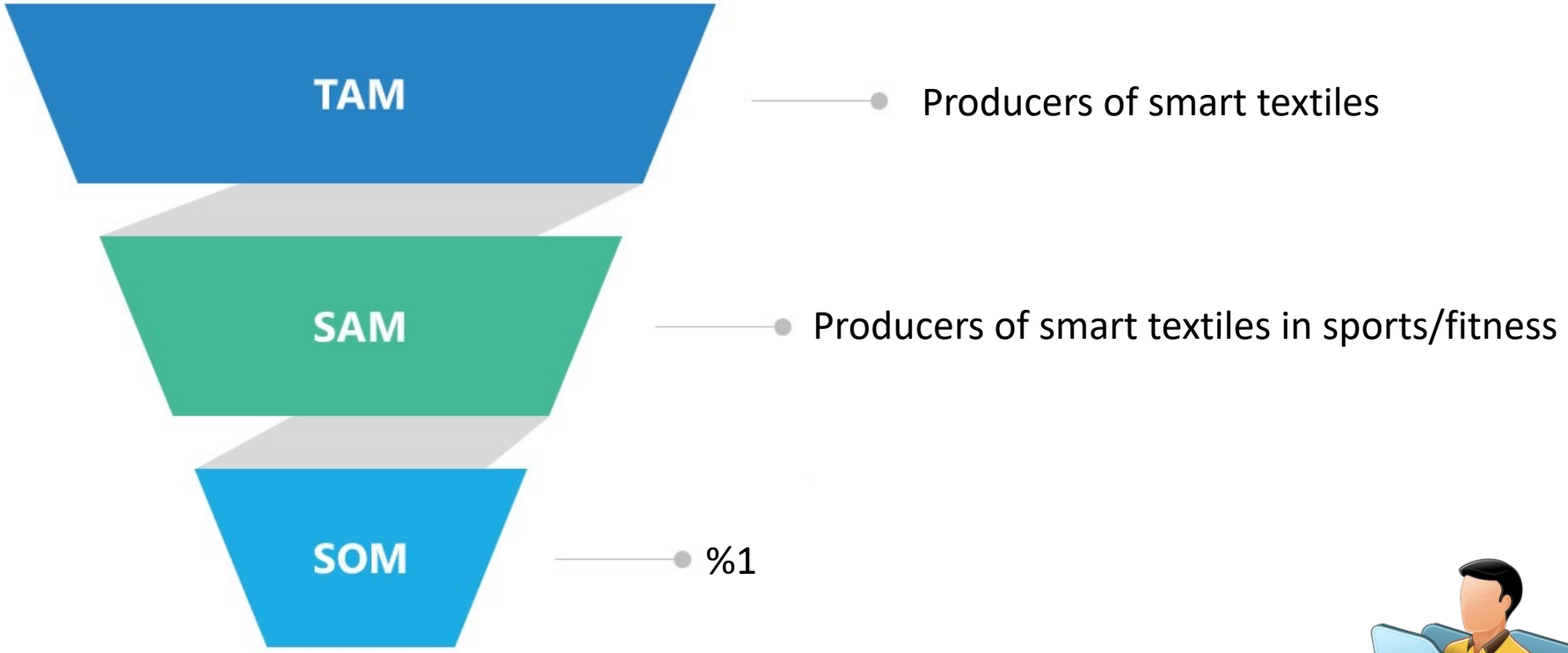
"Just wear and see your muscles behaviors."

Ease of use, wearable

Visualization of the muscle

Muscle injury prediction

TARGETED CUSTOMER/USER SEGMENT:



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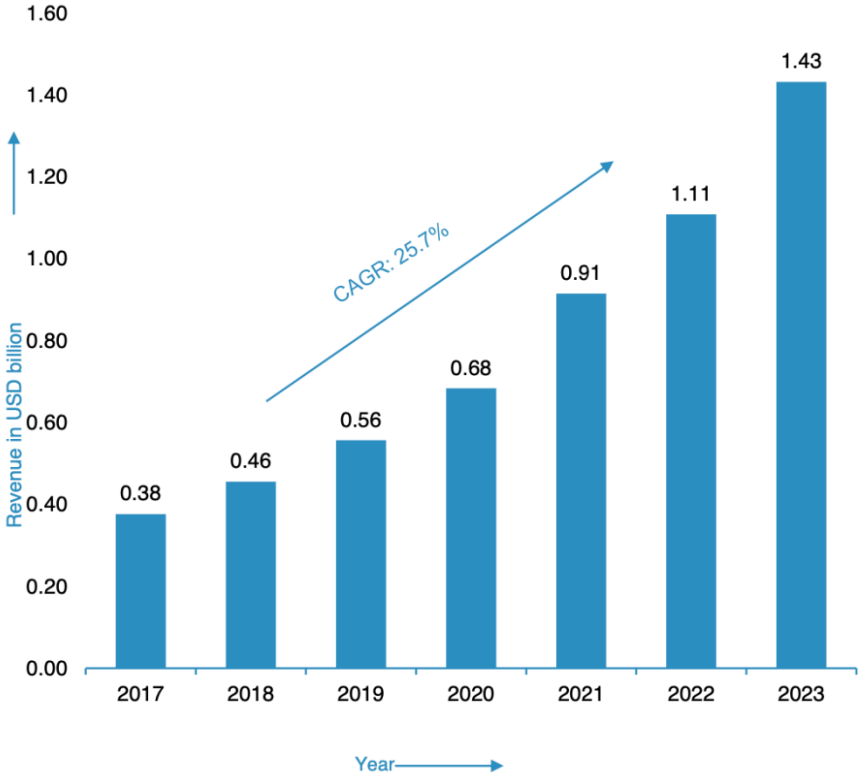
MARKET SIZE/GROWTH:

Smart Fabrics Market: Revenue Forecast in USD billion, by Application, 2017-2023

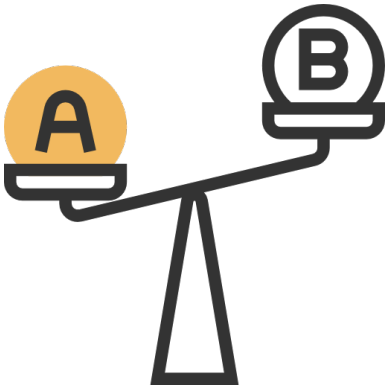
Application	2017	2018	2019	2020	2021	2022	2023	CAGR (%)
Fashion and Entertainment	0.24	0.29	0.35	0.43	0.57	0.68	0.87	**24.3**
Sports and Fitness	0.38	0.46	0.56	0.68	0.91	1.11	1.43	**25.7**
Medical	0.15	0.19	0.23	0.29	0.40	0.49	0.64	**27.9**
Transportation	0.34	0.41	0.50	0.61	0.81	0.97	1.25	**24.9**
Protection and Military	0.64	0.75	0.90	1.08	1.42	1.69	2.13	**23.1**
Architecture	0.48	0.56	0.66	0.77	0.99	1.14	1.41	**20.2**

Smart Fabrics Market : Revenue in USD billion, Sports and Fitness, 2017-2023



Categories:

- Wearable textile
- Working during dynamics
- Visualisation
- Real-time
- Injuri prevention
- EMG
- TMG
- AI



	Wearable textile	During dinamics	Visualization	Real-time monitoring	Injury prevention	EMG	TMG	AI
Adidas								
Nike								
Moxymonitor								
Liveathos								
CatapultSports								
Myontec								
Shapebender								

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DEVELOPMENT NEEDS/ROAD MAP:

- Tests in real environment:
  - Tests during the sport (in dynamic environment) must be completed.
  - We will test it at least 6 different sport types (running, cycling, football, basketball, tennis, skiing)
  - 10.000 $
- Production assembly
  - Smart textile and electronics from partners
  - Assembly line
  - 100.000$

Prototype is ready
June 2021

Tests in controlled environment
June 2021 - January 2022

Patent application + Tests in real environment
January 2022 - January 2023

Production assembly
2023

Production ready
2024

COMMERCIALIZATION MODEL

- Patent Licensing
  - *Exclusive/non-exclusive*
- Co-development to increase TRL
- Partnership for real environment tests

PATENT SCORE:

We used patent scoring matrix to understand the the power of invention in terms of market attractiveness, technology potential and team profiles. These 3 main criteria has different sub-dimensions that can be scored according to the stage of the technology (Explore, Validate and Launch).

Total Impact Score:	Early-Stage	Co-Development-Stage	Growth-Stage
High potential for licensing	>150	>180	>220
Intermediate potential for licensing	120-150	150-180	180-220
Low potential for licensing	<120	<150	<180

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PATENT SCORE:

VALIDATE Phase	
MARKET	89
TECHNOLOGY	60
TEAM	52
PATENT SCORE	202
PATENT SCORE %	82%

PATENT SCORE			
Investment Level	EXPLORE Phase	VALIDATE Phase	LAUNCH Phase
High Potential	>150	>180	>220
Medium Potential	120-150	150-180	180-220
Low Potential	<120	<150	<180

PATENT SCORE %			
Investment Level	EXPLORE Phase	VALIDATE Phase	LAUNCH Phase
High Potential	>%60	>%70	>%85
Medium Potential	%45-60	%60-70	%70-85
Low Potential	<%45	<%60	<%70

High Potential for Licensing