Robotextherapy
MSCA - Individual Fellowship

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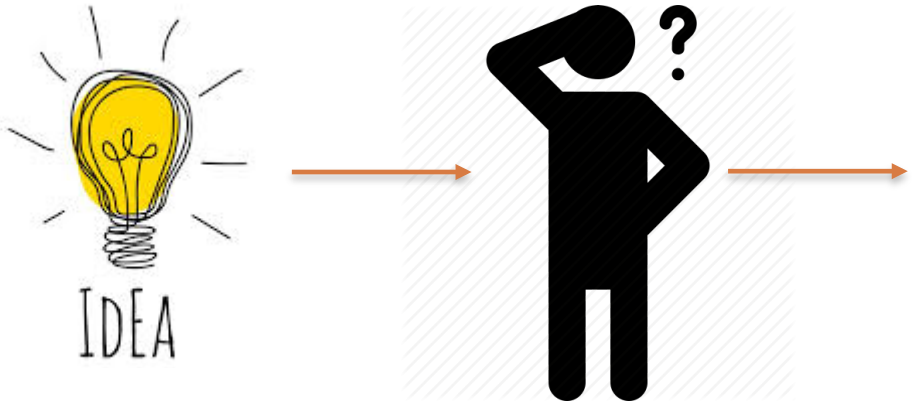
ROBOTEXTHERAPHY PROJESİ NASIL ŞEKİLLENDİ

Textile-based soft wearable robotic mechanotherapy

- Konvansiyonel tekstiller
- E-textiller (çoğunlukla sensör teknolojileri)
- Post-doktora sırasında soft robotics labratuarında yeni aktüator teknolojilerini deneyimleme fırsatı



Nerde kullanılabilir??

- Yavaş hareket kabiliyeti
- Önemli miktarda güç üretimi
- Giyilebilir
- İnsan hayatına etkisi

Mechano-theraphy

ROBOTEXTHERAPHY PROJESİ NASIL ŞEKİLLENDİ

Textile-based soft wearable robotic mechanotherapy

Orjinallik

- Actuation sistemi
- Actuation sisteminin tekstillere entegresi
- Yumuşak robotlarda kapalı devre kontrol sistemi
- Bu sistemin mechano-therapy alanında kullanılması

Multidisipliner

- Tekstil
- Elektrik Elektronik
- Malzeme
- Mekatronik
- Fiziksel Tedavi

İnternasyonel

- Türkiye
- İngiltere
- ABD
- İtalya
- Çek Cumhuriyeti

Intersektorel

- Üniversiteler
- Fiziksel Tedavi Ürünleri Firması
- Yardım kuruluşları

DESTEK

- Başarılı proje örnekleri

- Marie Currie Başvuru Klavuzu - H2020 Programme Guide for Applicants Marie Skłodowska-Curie Actions Individual Fellowships (IF)
  http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_fo r_applicants/h2020-guide-appl-msca-if-2018-20_en.pdf

- Net4mobility https://www.net4mobility.eu/less-exp-ncp.html

Taslak proje

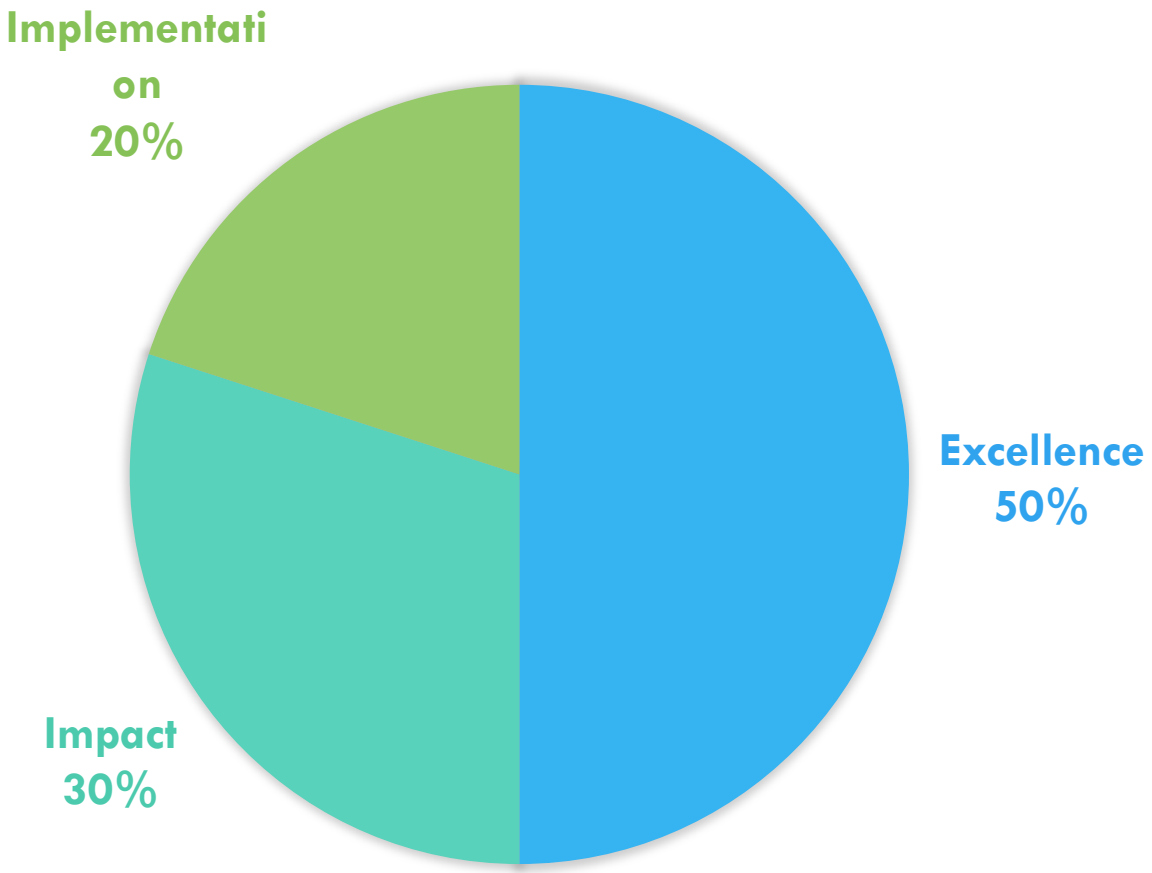
- TÜBİTAK

Proje ön değerlendirme desteği

- Danışmanlık (tübitak öm değerlendirmesi sonucu danışaman firmaya ödeme)

Projenin cilası

DEĞERLENDİRME SİSTEMİ



EXCELLENCE (Mükemmellik)

Quality and credibility, novelty, multidisciplinary and gender aspects

Introduction and Aim of the Action

Projenin en etki yaratacak kısmı

Mechanotherapy can be defined fundamentally as...

There are some STM devices using electrical stimulation[4] or pneumatic compression[5] to aid muscle recovery. However, **pneumatic compression devices are quite ...** On the other hand, **electronic textiles.. . A definition of this new technology** can be... However, **bio-feedback systems and actuation** that act in a direction from the textile **are far less considered**.

Genel eksiklikler

Projenin amacı

Thus, moving from the current efforts in the area of smart textiles**, I will carry out a fellowship to develop a ...This fellowship will be carried out in Marmara University, Turkey** mainly under the supervision of....

1. Tekil şahıs kullanın

As part of this research, I will carry out a **secondment at BioRobotics lab,** under the supervision of... Also I will have **a short visit to ...Company in Czech Republic** to learn new product development in physical therapy area.

Benzer EU proje örnekleri

The successful completion of the project will contribute to the development of rehabilitative technologies using state of art methods in line with other current Horizon 2020 projects such as; MEDLIGHT[8], WEARSUSTAIN[9], LIDWINE[10], TAGS[11], WoundCure[12].

Size katkısı

This interdisciplinary proposal is designed to build on my specific skillset in functional e-textiles from sensing and actuating perspective (please see my CV in section 4) **by providing me with advanced training in control and programming strategy in soft robotics area. ... I will also learn about principles of wound healing and soft tissue regeneration.**

Projenin başka potansiyel kullanım alanları

Moreover, this project's expected results may also contribute towards the treatment of other musculoskeletal disorders such as...

State-of-the-art (Son Teknoloji)

- Biimsel makale değil,
- Genel okuyucuya hitap etmeli
- Anlaşılır olmalı

Alandaki son teknolojiler

Different types of devices for manipulating muscle tissue have been developed for clinical applications and **pneumatic compression devices are already in the market and widely used**[13]. These inflatable devices are ...

The NormaTec PULSE (NormaTec, MA, USA) for sports recovery and the Flexitouch system (Tactile Medical, MN, USA) are given examples of this type of devices.

Problemler

However, these systems have **limited ...** and **lack of ...** and previous studies have shown that the loading conditions of soft tissue have a crucial effect on the mechano- therapeutic treatment[14].

Çözümleriniz

Thus, I propose the use of **textile-based ...** (based on my previous work[15]) within the **TMTD**.

Proje metodolojisi

- Hedefiniz açık ve net olmalı
- Ölçüm cihazları, deney kurulumu, malzemeler ve deneyler detaylı bir şekilde açıklanmalı
- Kaliteli figürler ve resimlerle destekleyin

Planlanan projenin orjinalliği

- İddialı kelimeler kullanın.

I will use a multidisciplinary approach **to combine state-of-the-art materials and methods in a novel fashion.** This will allow me to create **a ground-breaking research** in mechanotherapy area by employing .....with functional textiles **for the first time.**

Cinsiyet boyutu

- Cinsiyet eşitliğine verdiğiniz önemi ekibinizle ispatlayın.

However, I have made sure that the research team I have built around the project takes into account **gender balance.**
Currently, there are 87,863 man scientist and 70,235 woman scientist in academia in Turkey[29]. This project will contribute to **gender equality in** academia **by involving woman scientists and woman grad/undergrad students more.**

İki taraflı bilgi transferi

- **Projenin size katacakları**
- **Avrupaya kazandıracakları**
- **Danışmana kazandıracağı tecrübe ve bilgi**

Research management is one of the key skills that **I will gain** during the fellowship
I will learn from theoretical and practical aspects of **control system development** as well as several linear and ...
This project will enable me to transfer and exploit my existing knowledge and **experience from USA to Europe**...
My supervisors will also gain knowledge about sensing and actuating textiles

EU proje Yöneticisi

Ödülleri

Öğrenci danışmanlıkları

Danışmanın Deneyimi

Üye olduğu kuruluşlar

Alıntı sayısı

He is a member of IEEE RAS and IEEE CSS. He supervised many **graduate/undergraduate students** and interns. He has contributed two books published by Wiley and Springer, 20 peer reviewed international Journal Publications and many conference papers (**with 4300 citations**). He has also contributed to several externally funded national and international research projects including one **EU framework programme funded project as principle investigator.** He is a **recipient of the 2005 Andrew P. Sage best transaction paper award awarded by the IEEE SMC**.

Multidisipliner yetenek ve bilgi

Araştırmacının akademik olgunluğa erişme potansiyeli

Ödüller (fırsatları değerlendirebilme)

I was given an opportunity to apply my existing knowledge in soft sensing area into the soft robotics thereby enabling me to explore this highly innovative area**. My article (during the postdoctoral studies in Harvard) in soft sensing for soft robotics area was chosen as one of the best article of 2017 in the *Advanced Materials Technologies* journal**. Also, **one of my co-authored articles was awarded with Zwick Science Award 2016**.

Mobilite

During my postdoctoral studies at Harvard University, I have developed effective leadership skills. I have been involved in **the mentoring of both undergraduate and graduate research students**. **One of my students got admitted to PhD studies in Harvard University and was awarded with NSF funding.**

Liderlik

IMPACT (ETKİ)

Kariyerinize etkisi

*Starting from the **advancing of my electronic and soft robotic textile skills**, ... **I will learn development and applications of control strategies** for the device under the supervision of Prof. Gazi as well as of broader application of such technology in the area of robotics.*

Yaygınlaştırma aktiviteleri

An invention disclosure will be prepared and submitted by MITTO regarding to the manufacturing process of...

My target is to **publish 2-3 papers** during the fellowship in **open- access, high impact factor, peer-reviewed journals** such as i) Advanced materials, scientific reports (On the actuator development part of the project), ii) Soft Robotics "SoRo" (Application side of the study)

Participation in international conferences, 1) RoboSoft 2019- IEEE RAS International Conference on Soft Robotics
2) ICRA 2020- IEEE International Conference on Robotics and Automation
3) Physiotherapy & Physical Rehabilitation Conf. (location to be determined), 2020

- Seminerler → Hedef kitle
- Kurslar → içerik

Başka hedef kitlelerle iletişim planları

Visit to High schools for girls
Marie Skłodowska-Curie Fellow (MSCF) website
Blog

IMPLEMENTATİON (UYGULAMA)

Gantt chart

Months		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WP1					$D_{1.1}$																				
WP2								$D_{2.1}$																	
WP3													$D_{3.2}$												
WP4																		$D_{4.2}$							
WP5																					$D_{5.2}$				
WP6																								$D_{6.1}$	
WP7		$D_{7.1}$			$D_{7.2}$					$D_{7.3}$							$D_{7.4}$								$D_{7.5}$
TPD				L_1						$D_{3.1}$	L_2				$D_{4.1}$			L_3		$D_{5.1}$					L_4 R
Dissemination and Exploitation		Website																							
								U_1				V_1						U_2						U_3	V_2
PM	C.D.P.																								
	W.M.																								
	Q.P.E.																								
	Publication																	JA							JA
	Milestones				M_1	M_2							M_3				M_4				M_5			M_6	
Secondments																	CSV								

TPD: *Training and Professional Development* ***PM:*** *Progress monitoring* ***CDP****: Career development plan,* ***WM:*** *Weekly meetings,* ***QPE:*** *Quarterly progress evaluation,* ***CSV:*** *Company Short visit* ***L:*** *Lectures on soft robotics at Marmara,* ***V:*** *High School Visit,* ***U:*** *updates disseminated through the TSPMR and Crowdhelix,* ***R:*** *Marmara Robot Olympics,* ***JA****: Journal Article*

Proje yönetimi

A weekly meeting between Prof. Gazi (supervisor) and myself will be the foundation for the planning...

A meeting every 3 months with an Advisory Committee comprised of...

Risk Yönetimi

Risk, Difficulty of creating a robust control strategy in an all soft system. (low-medium)

Contigency plan, A more complicated control strategy might be needed. Prof. Laschi and Prof. Gazi are highly...

TÜBİTAK HAKEM YORUMLARI

EXCELLENCE:
Strengths:
- **Methodology is appropriate** fo
- **Transfer of knowledge adequately demonstrated.**
- Hosting arrangements are in place.
- **The researcher has a good academic background**.
- The proposal is **very hot topic** and proposes **a novel wearable actuator** for healthcare applications.
- The host institution and the second center **in Italy is a perfect fit and both are lead by experts** in the field.
- The project is very **multidisciplinary** covering materials, textile, electronics, healthcare / physio therapy.

Weaknesses:
- **Research goals insufficiently identified**
- **The state-of-the-art** is broadly described
- **Innovative aspects** of the proposal **are not clearly discussed**.
- Knowledge to be transferred from the host to the researcher is not sufficiently identified.
- **The supervisor's experience at the host organization covers only a small fraction of the proposal**
- One can easily argue that the proposed actuation scheme is **potentially more difficult to apply compared to its counterparts**. This is my **major issue** with the proposal. Other than that it is a strong and very well written idea.
- **Some potetial materials should be listed.**
- **A schematic cross section**
- **Closed-loop** is a very general term and it is **not clear** what the system is sensing? As a future extension, ideally we want such a system to sense muscle actuation and muscle healing and provide it back to the controller system.

IMPACT:

Strengths:

- The project **builds on the previous experience** of the researcher and is a feasible **extension of her work recently published.**
- **The dissemination of results were well laid out**.
- The targeted audiences and dissemination channels were very satisfactory.

Weaknesses:
- **future career prospects is not convincingly demonstrated.**
- **Dissemination plans for the project outputs are too generic**
- **Turkey has a strong position in textile industry**. With the advancements in the field, Turkey should adapt the next generation smart textiles. I do not see much steps being taken in this direction. This project has such a potential considering that the host institution is very close to some textile centers in Turkey, Duzce and Bursa. This is not mentioned at all in the proposal.
- pg7 first bullet point mentions that the project combines state-of-the art methods. I do not agree with this statement. Joule heating, phase change materials, control system design, capacitive sensing required for this project are all very well-known. The level of depth required for **this project is not state-of-the art in any of these fields.** No risks were foreseen by the researcher, to support this view. The impact of this project is the fact that all these techniques are being combined for **a technology that can touch quality of life**. So, **a rewording is required in this section.**

IMPLEMENTATION:

Strengths:

- There is a **credible work plan with realistic milestones and deliverables.**
- There are plans for the financial, scientific, and quality management of the project.
- The host organization provides most of the infrastructure for the electrical design and manufacturing steps, but the project relies on the secondment organization for the testing infrastructure.
- The implementation of the project was very well planned and reflected in the proposal. **VERY WELL DONE.** The plan is very solid and coherent, the timeline is reasonable. The deliverables and milestones are consistent. The host's infrastructure and experience is very satisfactory.

Weaknesses:

- Allocation of tasks and resources is not **sufficiently discussed**.
- **Risk management plan is weak**, without any actual risks taken into account.
- **EXCELLENT TABLE** by the way !!!

OVERALL COMMENTS

Strengths:

- This is a **timely project** that could result in the design of a **useful product** **at the end.**
- The researcher has a **strong academic background.**
- Overall, I liked the proposal and I think it has a strong potential to **support the candidate's research career**. **The team is very strong** and will give the candidate a boost at the host institutions. **The expertise of the candidate is very well matching with the scope of the project and long-term goals**. I laid out a few objections in some claims of the proposal in the previous sections, but they can be all addressed.

Weaknesses:

- The **theoretical contribution** of the proposal **is not sufficiently discussed**, which includes the discussion on the relation to the state-of-the-art.
- The supervisor at the host organization is very good at his area, but **the connection of the proposal is small**. For the majority of the project that has strong textile engineering bases, the supervisor does not have a demonstrated experience. The proposal relies on the supervision of the secondment host, but the secondment is only 3 months long, and no relevant supervision is established by the host for the rest of the time.
- **Risk management is very weak** and needs to be strengthened by a proper risk mitigation plan.

AB HAKEM YORUMLARI

Excellence: Score: 4.50 (Threshold: 0/5.00 , Weight: 50.00%)

Strengths

- The proposal is credible in its important focus of mechanotherapy aimed for physical rehabilitation and health promotion. The technology driven approach is appropriately supported by its methodology combining state-of-the-art materials and methods in a novel fashion. ***The multidisciplinary character*** *of the proposal is particularly visible in textile technology, electronics, materials science, control and biomedical engineering.* **Gender aspects are well addressed**.

- *The transfer of knowledge from the host to the researcher is well evidenced in terms of exposure to the various disciplines in the research, short stay at industry, project management, IP rights, mentoring of students, lectures and project interactions. The transfer of knowledge from the researcher to the host is clearly described.*

- **The track record of the main supervisor is well matched to the proposal**. *Opportunities for international networking and collaboration are well provided. There are possibilities of long term integration of the researcher in the host institution meeting, code of conduct for the recruitment of researchers, technology transfer office, and living facilities.*

- The Researcher demonstrates a good track record in multidisciplinary research related to the objectives of this proposal. ***The fellowship is likely to enhance the researcher's potential to reach maturity and independence as a researcher.***

Weaknesses

- The research methodology lacks sufficient detail in places, as for instance in the selection of the textile material structure, and compatibilities between coefficients of thermal expansion between the dissimilar materials for avoiding occurrence of damage during the cyclic loading conditions.

- The track record, experience and complementarity of other supervisors involved in the project are insufficiently detailed.

Impact: Score: **5.00** (Threshold: 0/5.00 , Weight: 30.00%)

Strengths:

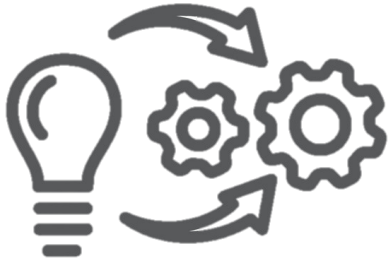
- The proposal evidences a high potential ***for enhancing the future career prospects*** *of the researcher in this strong* ***multidisciplinary*** *field. The project has the right mechanisms to* ***support the researcher's career development****.*

*- Measures to exploit or disseminate the project results are adequately described****, realistic****, complementary, with quantified targets and relevant impacts.*

- Outreach measures are very well addressed and diverse. ***The targeted audiences are clear****, as is the purpose of the communication.*

Weakness:

No weakness identified.



Implementation: Score: **4.60** (Threshold: 0/5.00 , Weight: 20.00%)

Strengths

*- **The work plan is well structured**. The technical activities will run sequentially, with **clear interrelations between tasks**. Deliverables and milestones are clear. Secondments are well planned. Resources are adequately allocated.*

*- **Potential technical risks have been clearly laid out** and alternative experimental procedures are suggested as contingency plans.*

- The host institution is well equipped and will provide the necessary infrastructure, logistics, facilities and perfect environment for conducting research in this area of science. The proposal demonstrates useful and substantial contribution of the beneficiary and supervisors to the research activities of the project.

Weaknesses

*- The **management strategy** and specific procedures are **described in a very general** manner. The proposal lacks sufficient details related to progress evaluation and decision making procedures.*

*- Possible **management related risks** **have** **not** **been** **sufficiently considered**.*

Dinlediğiniz için teşekkürler !!!