Deneysel Fizikten Giyilebilir Elektroniğe Fikir Aktarımı

Bir kaç örnek

Şu **pseudo-algoritma**yı anlatacağım:

- Deneysel fizikten **bir fikir** alınır: **resistive charge division / position-sensitive detection**
- Seksi bir alan olan **giyilebilir elektroniğe** uygulanır
- Malzeme, organik ve polimer kimyası, tekstil, biyoloji, enzimoloji alanlarından **multi-disipliner** arkadaşlar edinilir
- **Sensör yapıları**nın sentezi ve elektro-mekanik-spectroskopik karakterizasyonu gerçekleştirilir
- Read-out **elektronikleri** tasarlanır, yapılır, prototipler üretilir
- Son **kullanıcı ürünleri** düşünülür ve tasarlanır, imal edilir
- İstekli **kullanıcılar** (early adopters) bulunur ve kullandırılır
- Kullanıcı **tecrübeleri toplanır** ve iterasyon
- **Patent'**leyerek korunur
- **Yayın**lar ile duyurulur
- Konferanslarda sunulur (**Şu anda buradasınız!**)

Detectors and the Design of Full-Custom Front-End & Data Transmission ASICs*

Table of Contents

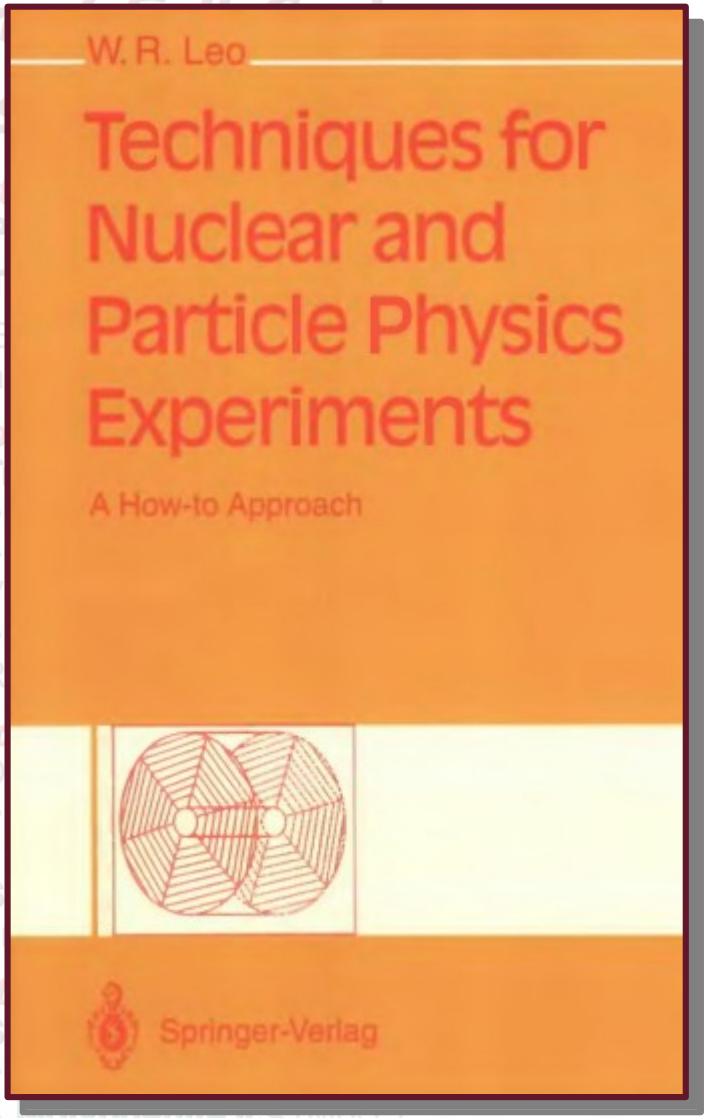
- **The Big (but Brief) Picture**
  - Briefly **front-end** – FE ASICs
  - Briefly **read-out** – RO systems
  - Briefly **serializer** - SER
  - Briefly **phase-lock loop** - PLL
- **Detectors and Ideas Behind**
  - Particle ***tracker*** detectors
  - Photodetectors ***vs*** photon counters
  - ***Position-sensitive*** detectors
    - Resistive charge division
    - Discrete array of elements
  - ***Time-resolved*** detection
  - ***DAQ*** system overview
- **Feed-Back Concept**
  - A **qualitative** introduction
  - **Natural frequency** concept - ω_n
  - Real-world examples:
    - **Binary** read-out
    - **Time-over threshold**
  - Adjusting/optimizing loop behavior
    - Damping ratio - ξ
- **Detector Front-End ASICs**
  - **Pre-Amplifier**: basic idea – V_{out} / V_{in}
  - **Transconductance** of a transistor - g_m
  - Evolving a **single-stage amplifier** into a real-world application
- **Processing Technology**
  - **Transistor** switch – A masterpiece
    - **Lithography**
    - Formation of an **nMOS** transistor
  - VLSI design flow
    - Parasitic **extraction**
  - Real-world ASIC examples
- **Radiation Tolerance Issues**
  - Definitions:
    - **Single event upset**, **analog single event transient**, **latch-up**
  - **Simulating** radiation effects on analog circuits
- **Potential CMOS Replacements(?)**
  - **Single-layer thick** transistors
    - **Graphen'ics** (benzen lattice)
    - **Molybdenite'ics** (MoS_2)

*Application Specific Integrated Circuit

Detectors and the Design of Full Front-End & Data Transmiss

Table of Contents

- ***The Big (but Brief) Picture***
  - Briefly **front-end** – FE ASICs
  - Briefly **read-out** – RO systems
  - Briefly **serializer** - SER
  - Briefly **phase-lock loop** - PLL
- ***Detectors and Ideas Behind***
  - Particle ***tracker*** detectors
  - Photodetectors ***vs*** photon counters
  - ***Position-sensitive*** detectors
    - Resistive charge division
  - Discrete array of elements
  - ***Time-resolved*** detection
  - ***DAQ*** system overview
- ***Feed-Back Concept***
  - A **qualitative** introduction
  - **Natural frequency** concept - ω_n
  - Real-world examples:
    - **Binary** read-out
    - **Time-over threshold**
  - Adjusting/optimizing loop behavior
    - Damping ratio - ξ



* Application Specific Integrated Circuit

Position Sensitive Architecture

First interaction with the photons (and/or particles)

- Detect particles with the sensitivity of **where** they land; two main **paradigms**:
  - **Resistive charge division** on a single detection element:

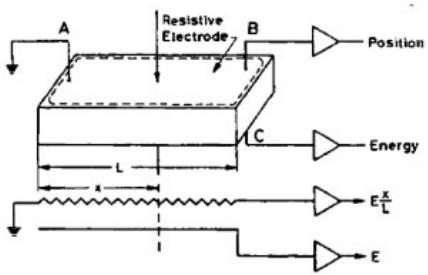
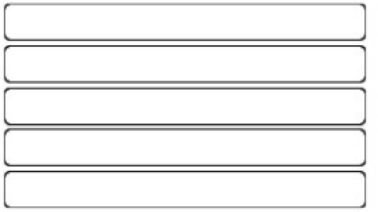


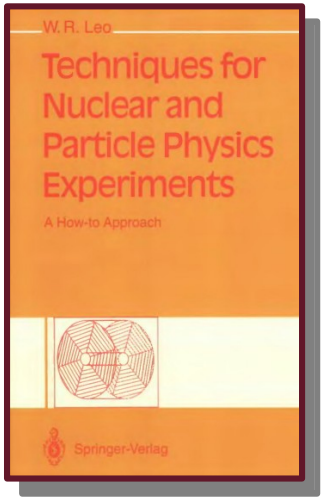
Fig. 10.14. Layout of a one-dimensional continuous position-sensitive detector using resistive charge division. A simplified equivalent circuit is shown below

* From Leo, p. 227

$$Position = \frac{B}{C}$$



A hybrid: Discrete array of resistive charge division



  - **Discrete array** of individual detection elements:

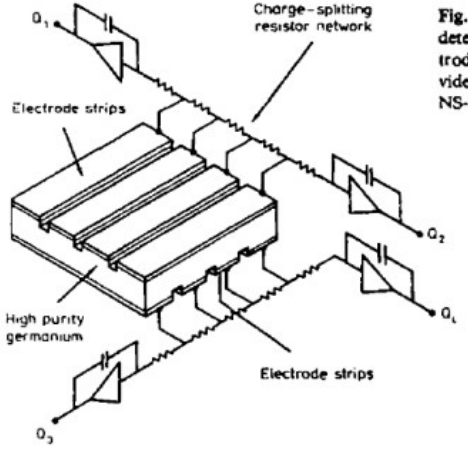
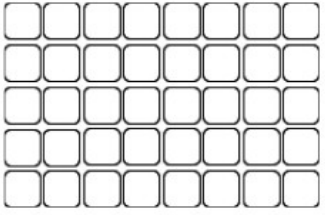


Fig. 10.15. Layout of a two-dimensional *matrix* detector. To reduce the readout electronics, the electrodes may be connected to an external resistive divider [from *Gerber* et al.: IEEE Trans. Nucl. Sci. NS-24, No. 1, 182 (1977)]

* From Leo, p. 229



Pixel detector

MEDIPIX

Bir Uygulama (1/3)

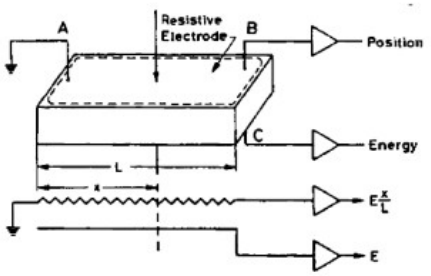
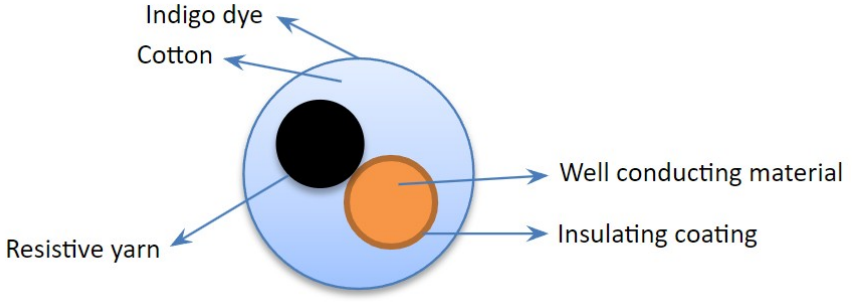
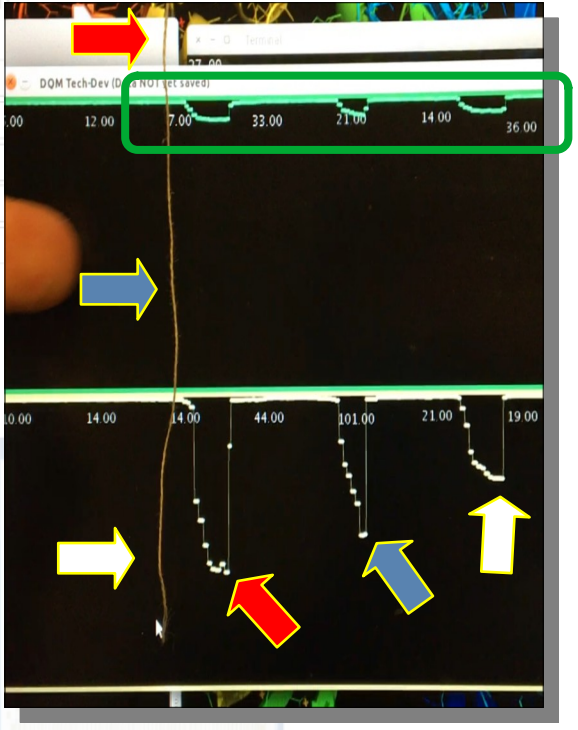


Fig. 10.14. Layout of a one-dimensional continuous position-sensitive detector using resistive charge division. A simplified equivalent circuit is shown below

* From Leo, p. 227

$$Position = \frac{B}{C}$$





Bu kimsenin aklına gelmemiş mi?

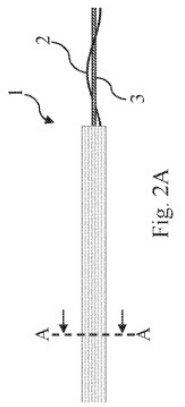


Fig. 2A

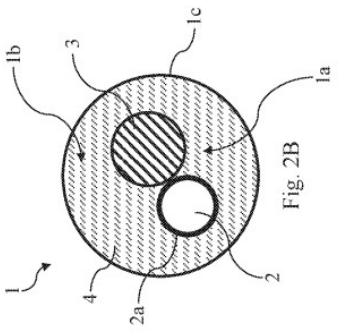


Fig. 2B

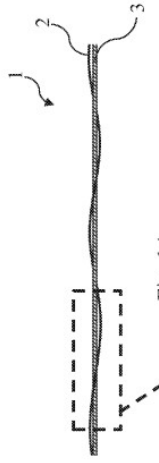


Fig. 1A

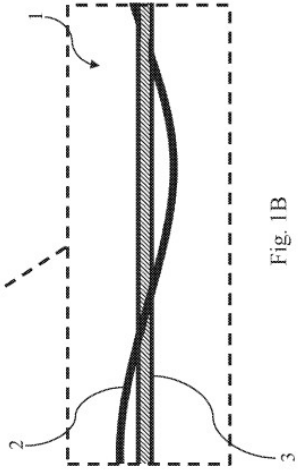


Fig. 1B

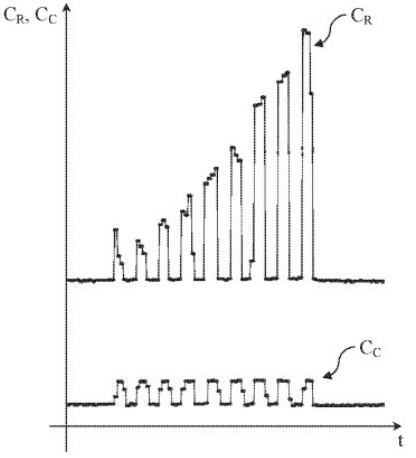


Fig. 4

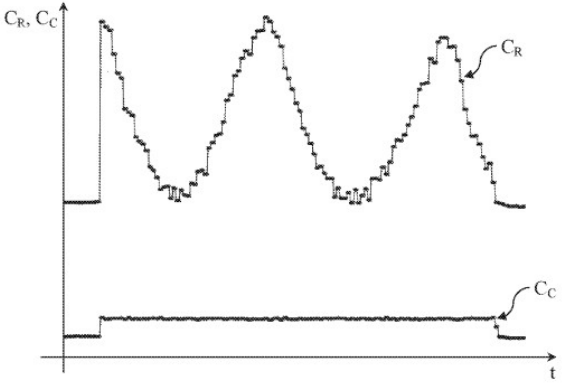
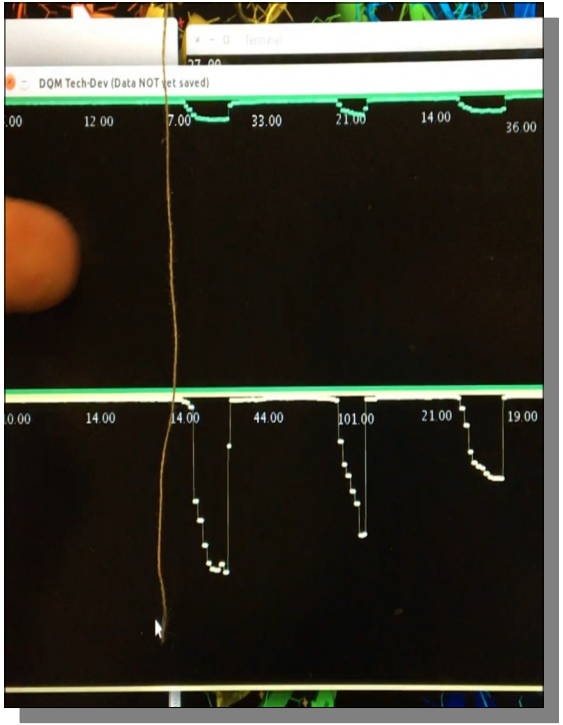
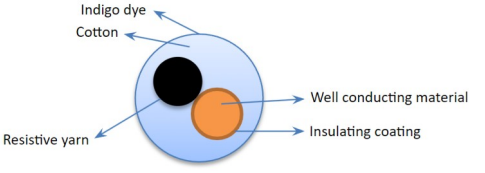


Fig. 5





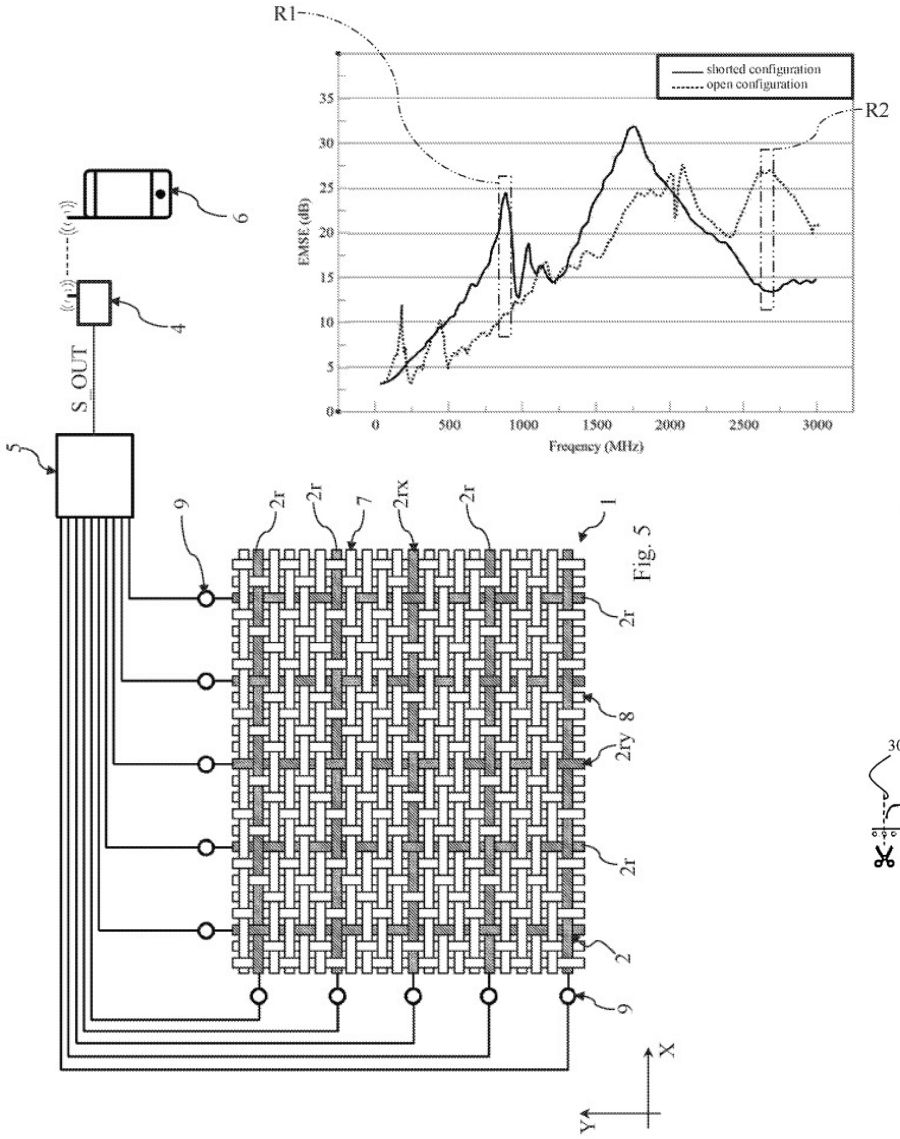
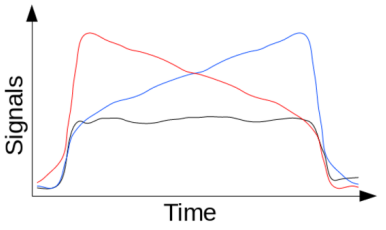
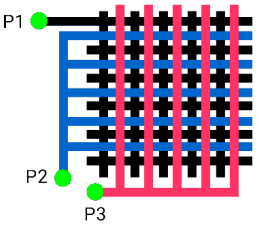
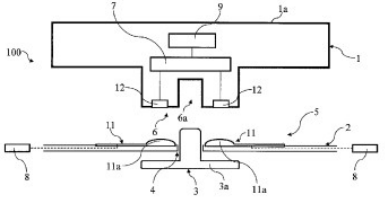


Fig. 5







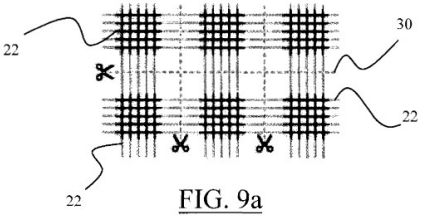


FIG. 9a

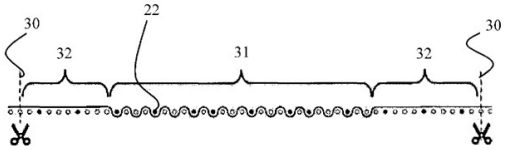
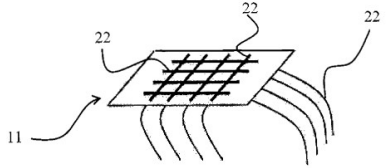
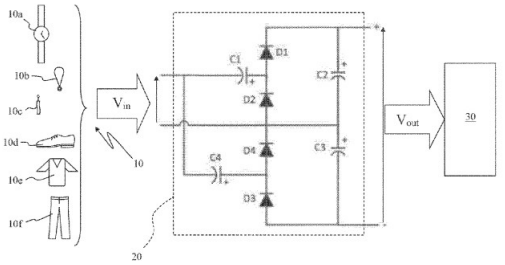


FIG. 9b





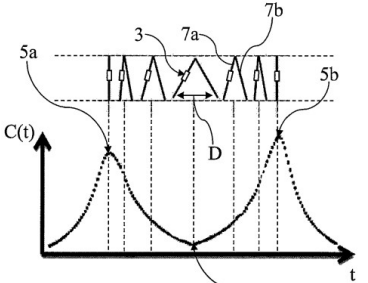
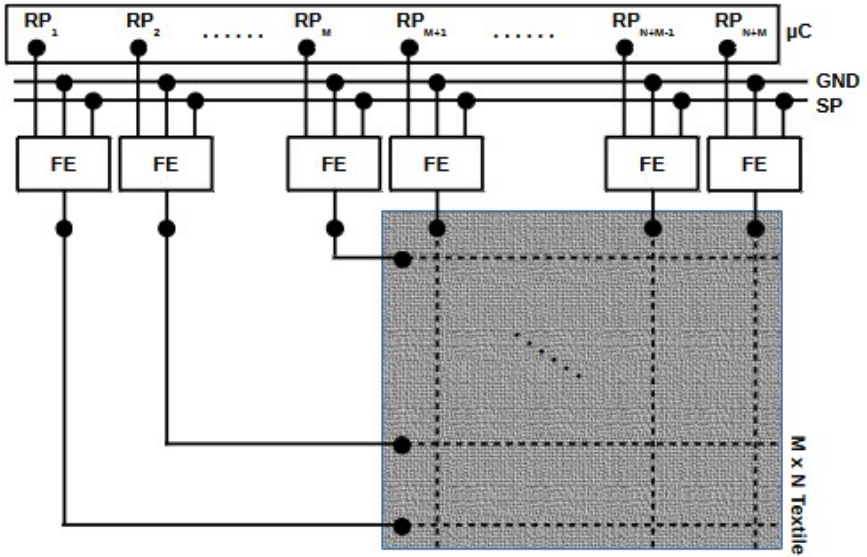
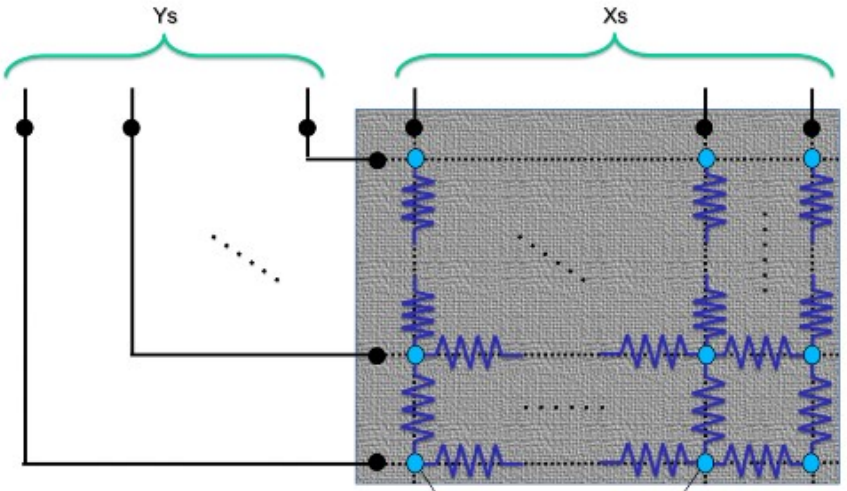


Fig. 2A

Bir Başka Uygulama (2/3)

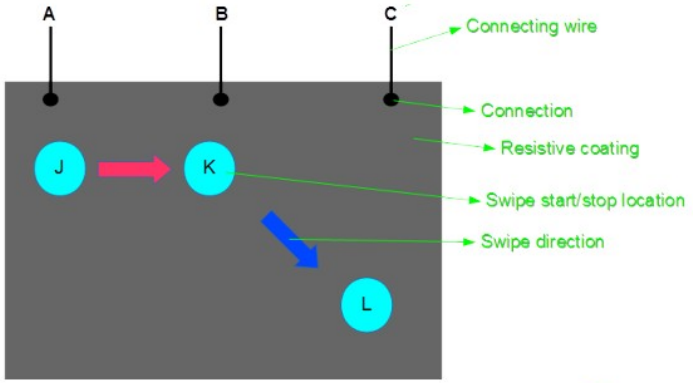


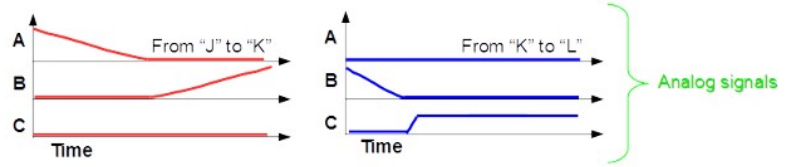
SoA: Conducting yarns forming an isolated grid

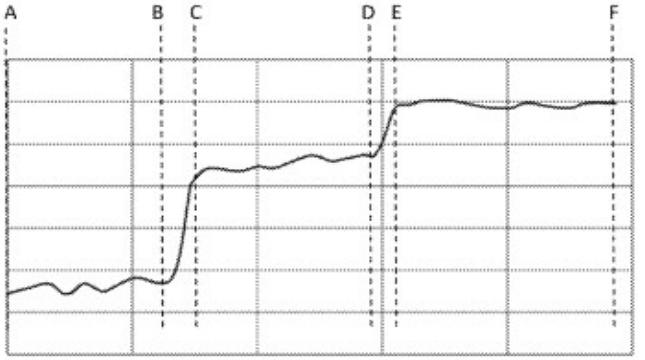


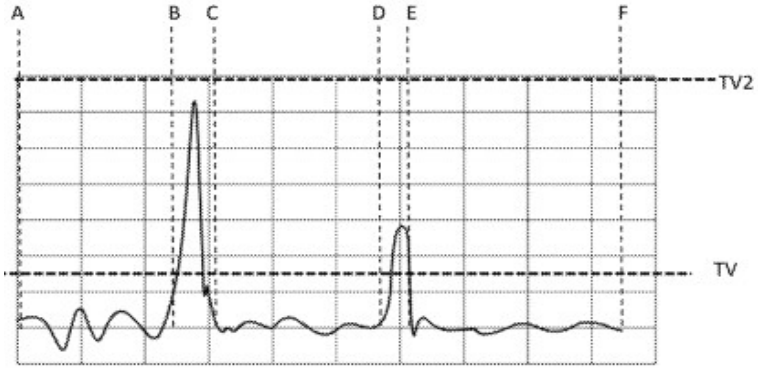
Disclosed: Network of unit resistors

Parasitic capacitance or ohmic contact point which couples a vertical sensing element to a horizontal sensing element









(12) **United States Patent**
Cobanoglu et al.

(10) **Patent No.: US 11,460,959 B2**
(45) **Date of Patent: Oct. 4, 2022**

(54) **LARGE AREA TOUCH FABRIC**

(71) Applicant: **Sanko Tekstil Isletmeleri San. Ve Tic. A.S.**, Inegol-Bursa (TR)

(72) Inventors: **Ozgur Cobanoglu**, Inegol-Bursa (TR); **Deniz Iyidogan**, Inegol-Bursa (TR); **Leyla Zengi**, Inegol-Bursa (TR); **Adil Berk Karakaya**, Inegol-Bursa (TR)

(58) **Field of Classification Search**
CPC D06N 3/0006; D06N 3/0088
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2008/0314626 A1* 12/2008 Moore G06F 3/0445 174/255
2009/0160800 A1* 6/2009 Liu G06F 21/83

(12) **United States Patent**
Cobanoglu et al.

(10) **Patent No.: US 10,613,047 B2**
(45) **Date of Patent: Apr. 7, 2020**

(54) **FABRIC WITH DEGRADABLE SENSOR**

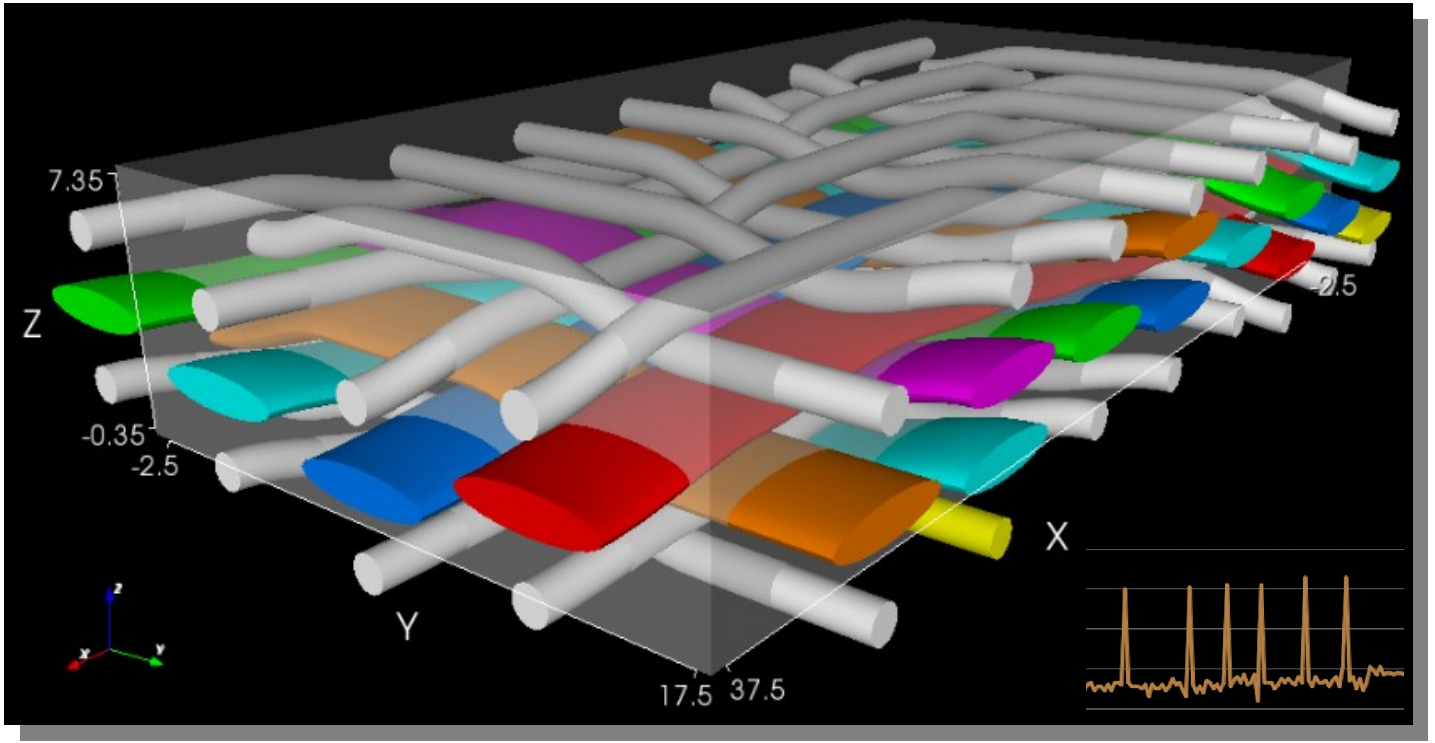
(71) Applicant: **Sanko Tekstil Isletmeleri San. Ve Tic. A.S.**, Inegol-Bursa (TR)

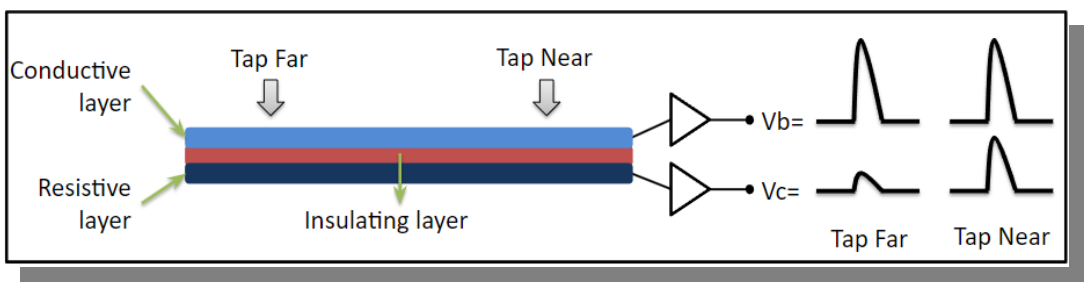
(72) Inventors: **Ozgur Cobanoglu**, Inegol-Bursa (TR); **Jitka Eryilmaz**, Inegol-Bursa (TR); **Ozgur Akdemir**, Inegol-Bursa (TR); **Deniz Iyidogan**, Inegol-Bursa (TR); **Onur Yukselen**, Inegol-Bursa (TR)

(2013.01); *A41D 2500/20* (2013.01); *D10B 2401/18* (2013.01); *G06K 19/0717* (2013.01)

(58) **Field of Classification Search**
CPC G01N 27/02; G01N 33/367; G01N 3/56; G01N 33/36; G01N 33/365; A41D 1/06; A41D 1/002; A41D 2500/20; A41D 2500/10; D03D 1/0088; D10B 2401/18; G06K 19/0717
USPC 324/654
See application file for complete search history.

Bir Başka Uygulama 3/3





Piezoelektrik Sensör

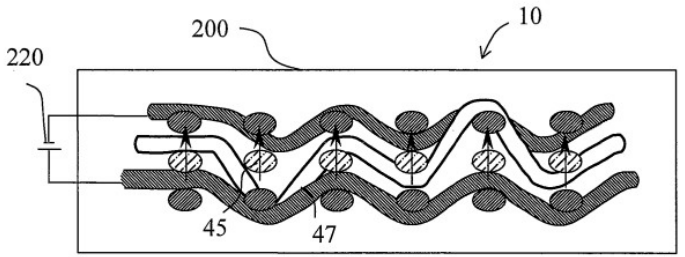


FIG.3

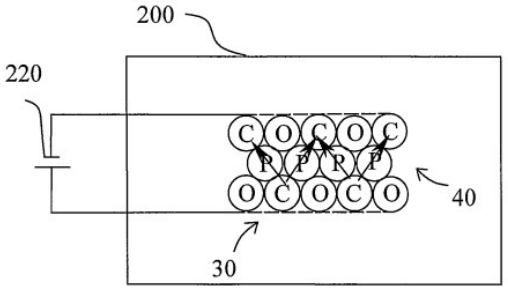
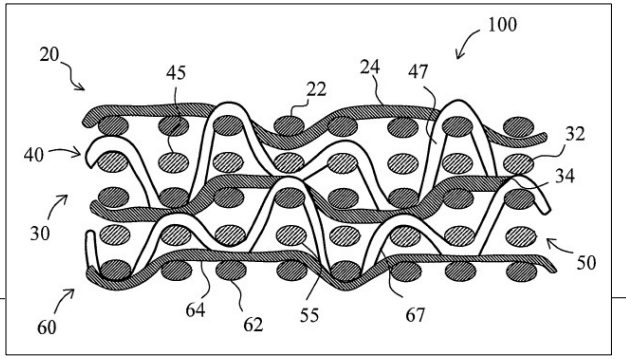


FIG.4



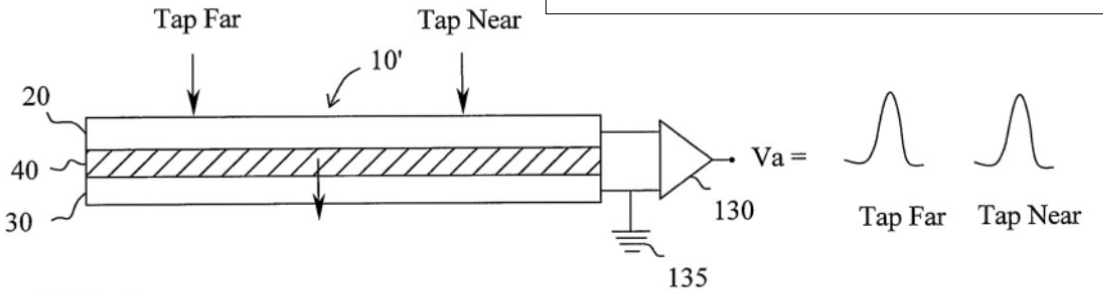


FIG.5

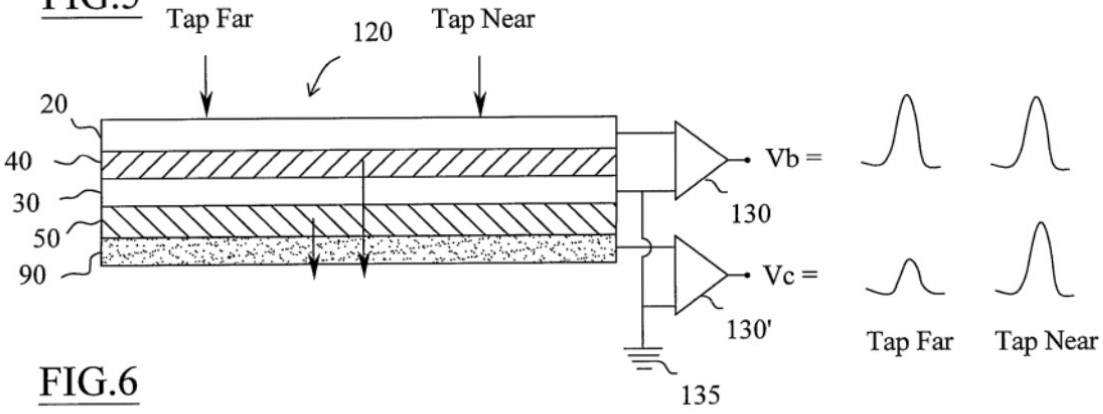
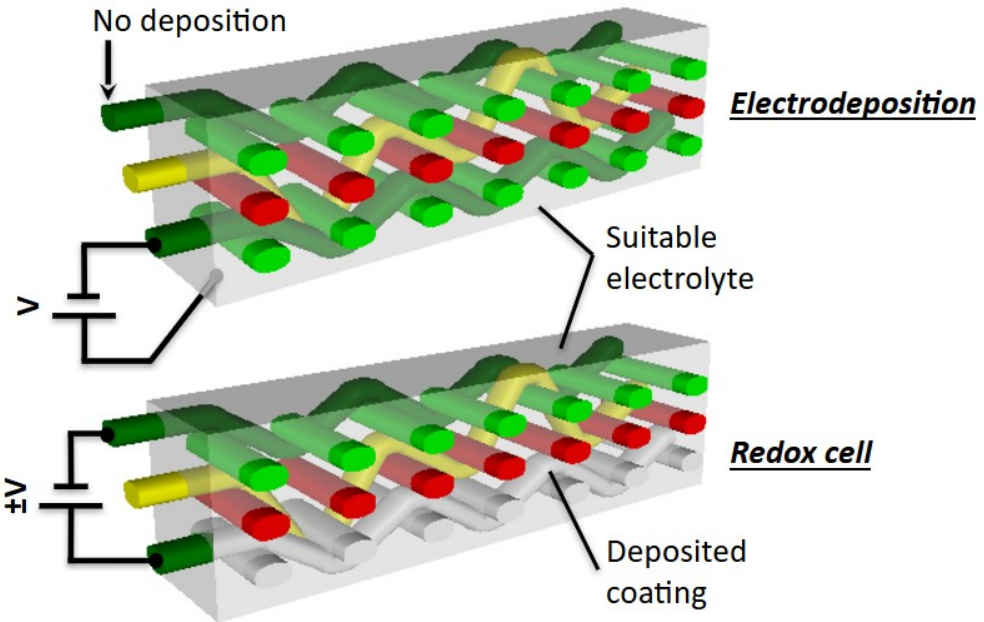
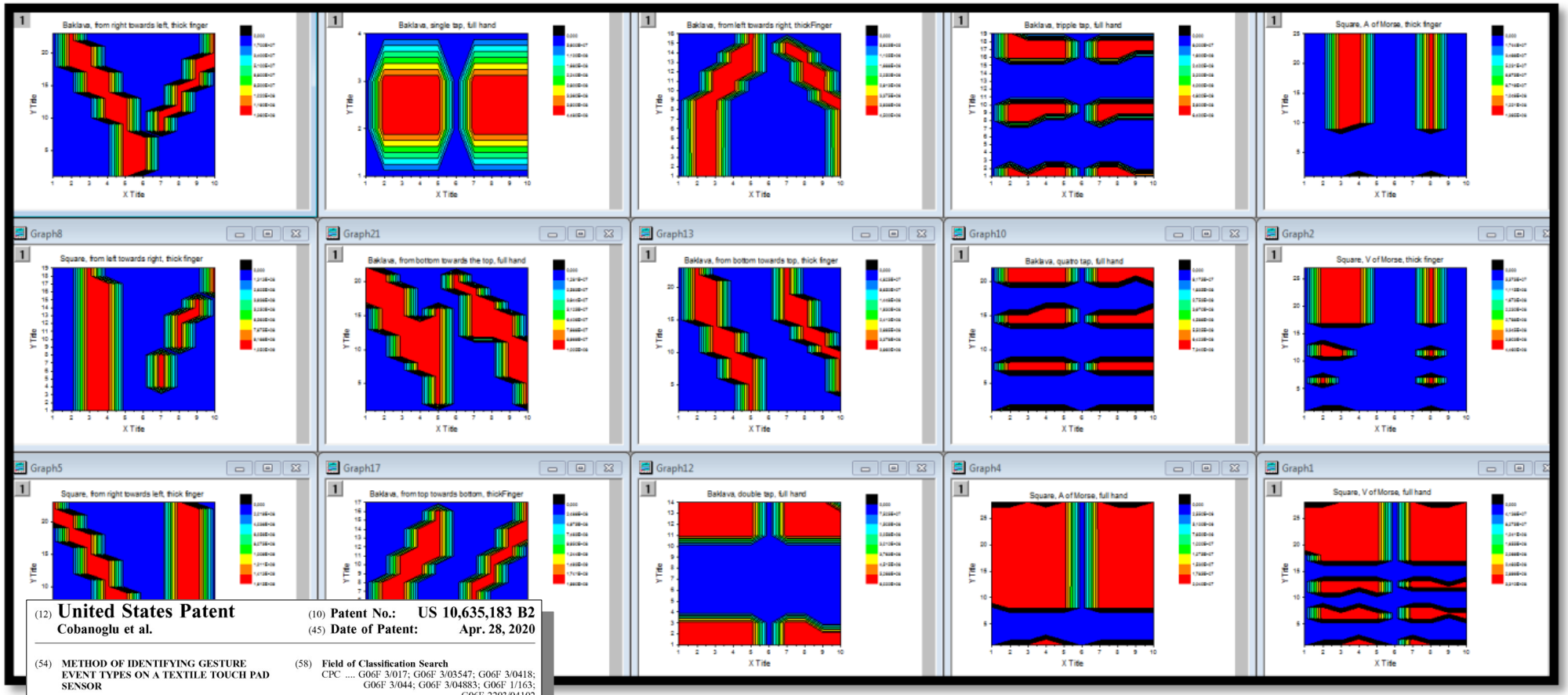


FIG.6


FİZİK LAB.
KİMYA LAB.
GENEL LAB.
ÖĞRETİM ELEMANLARI
OFİS ALANI


No deposition
Electrodeposition
Suitable
electrolyte
V
±V
Redox cell
Deposited
coating

Farklı El Hareketlerinin Hatalarına Rağmen Ayrılmaları



(12) **United States Patent**
Cobanoglu et al.

(10) **Patent No.: US 10,635,183 B2**
(45) **Date of Patent: Apr. 28, 2020**

(54) **METHOD OF IDENTIFYING GESTURE EVENT TYPES ON A TEXTILE TOUCH PAD SENSOR**

(71) Applicant: **Sanko Tekstil Isletmeleri San. Ve Tic. A.S.**, Inegol-Bursa (TR)

(72) Inventors: **Ozgur Cobanoglu**, Inegol-Bursa (TR); **Fehim Caglar**, Inegol-Bursa (TR); **Semih Kazanc**, Inegol-Bursa (TR); **Jitka Eryilmaz**, Inegol-Bursa (TR); **Serkan Mert**, Inegol-Bursa (TR); **Ertug Erkus**, Inegol-Bursa (TR); **Lian Kohener**, Inegol-Bursa (TR)

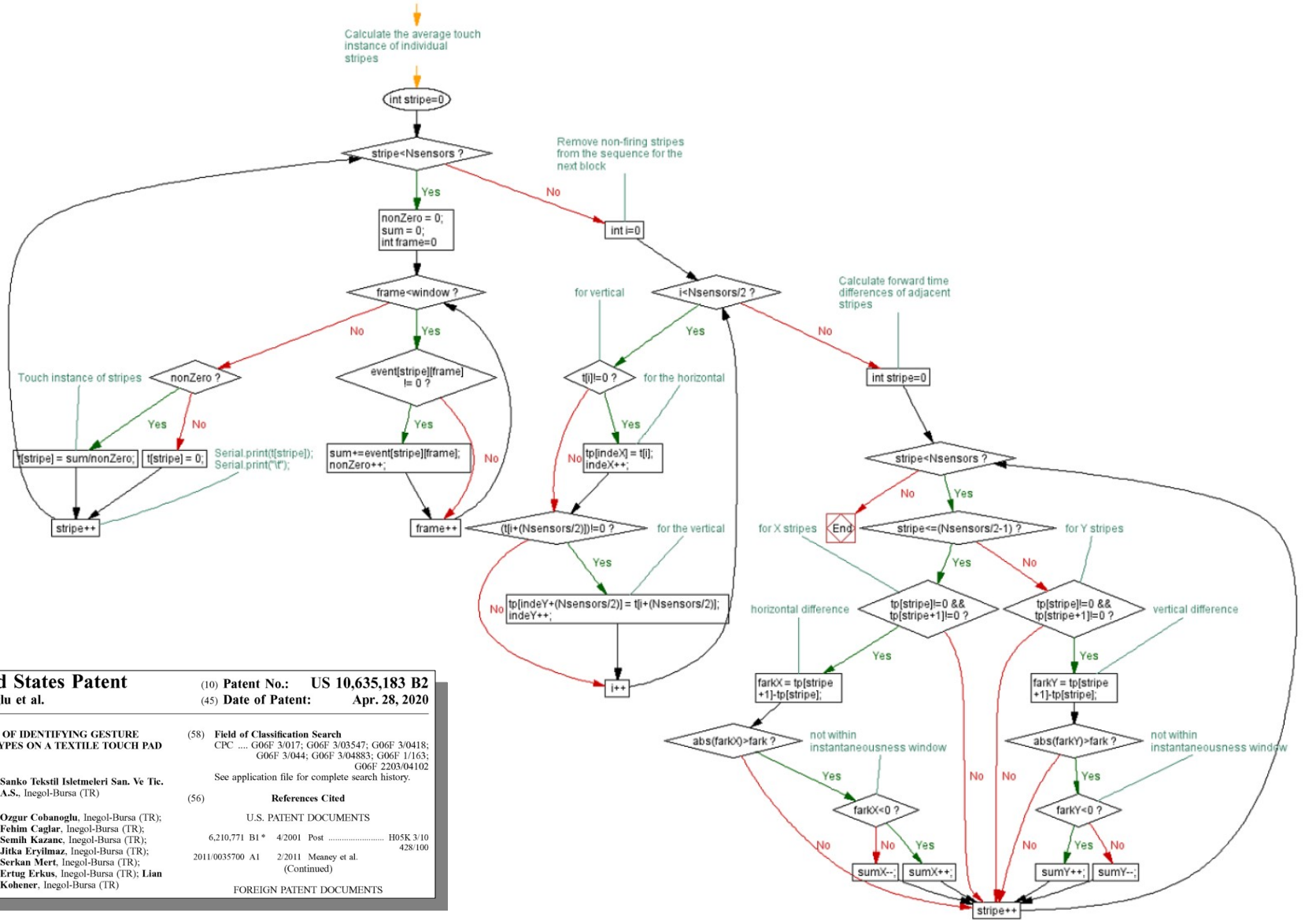
(58) **Field of Classification Search**
CPC G06F 3/017; G06F 3/03547; G06F 3/0418; G06F 3/044; G06F 3/04883; G06F 1/163; G06F 2203/04102
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,210,771 B1 * 4/2001 Post H05K 3/10 428/100
2011/0035700 A1 2/2011 Meaney et al.
(Continued)

FOREIGN PATENT DOCUMENTS



(12) **United States Patent**
Cobanoglu et al.

(10) **Patent No.: US 10,635,183 B2**
(45) **Date of Patent: Apr. 28, 2020**

(54) **METHOD OF IDENTIFYING GESTURE EVENT TYPES ON A TEXTILE TOUCH PAD SENSOR**

(71) Applicant: **Sanko Tekstil Isletmeleri San. Ve Tic. A.S.**, Inegol-Bursa (TR)

(72) Inventors: **Ozgur Cobanoglu**, Inegol-Bursa (TR); **Fehim Caglar**, Inegol-Bursa (TR); **Semih Kazanc**, Inegol-Bursa (TR); **Jitka Eryilmaz**, Inegol-Bursa (TR); **Serkan Mert**, Inegol-Bursa (TR); **Ertug Erkus**, Inegol-Bursa (TR); **Lian Kohener**, Inegol-Bursa (TR)

(58) **Field of Classification Search**
CPC G06F 3/017; G06F 3/03547; G06F 3/0418; G06F 3/044; G06F 3/04883; G06F 1/163; G06F 2203/04102
See application file for complete search history.

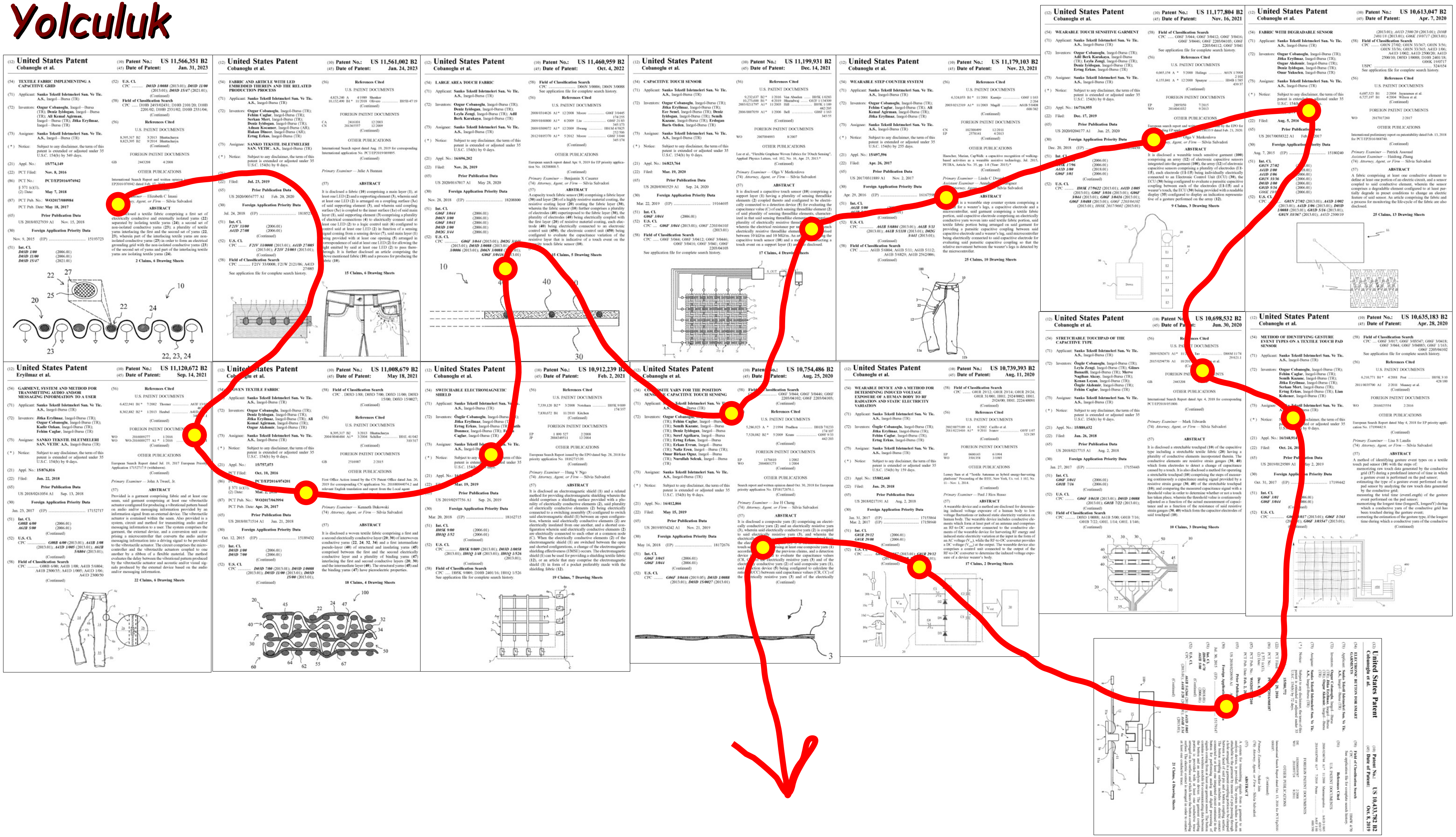
(56) **References Cited**

U.S. PATENT DOCUMENTS

6,210,771 B1 * 4/2001 Post H05K 3/10 428/100
2011/0035700 A1 2/2011 Meaney et al.
(Continued)

FOREIGN PATENT DOCUMENTS

Yolculuk



Parçacık Hızlandırıcıları ve Algıçları Yerel Altyapı ve Ar-Ge Çalıştayı, 2-3 Aralık 2023, İstinye Üniversitesi, İstanbul

Deneysel Fizikten Giyilebilir Teknolojiye: Bir İnovasyon Hikayesi - Özgür Çobanoğlu, Ph.D.