



# Workshops

## Getting started with E-Textiles

Tailored for industry professionals, embroidery business owners, textile enthusiasts, and innovators.

Experience guided learning for an easy start, engage in hands-on practice, broaden your portfolio, customize to your business needs.

Reliability

Automation

Scalability





## Workshop 1

# Getting Started with Heated E-Textiles

### Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 8 hours

### Content

#### Electronics

- Fundamental Electrical Quantities and Their Interrelations
- Safety First: Understanding the Dangers of Electricity
- Electronic Building Blocks Part 1: Batteries and Heaters
- Roll Up Your Sleeves:
  - Measuring with a Multimeter
  - Designing Your Own Heater Circuit

#### Embroidery

- Digitizing & Embroidery of Heating Elements
- TFP/TWP - Tailored Fibre/Wire Placement



## Workshop 2

# Integration of LEDs and Control Elements into Textiles

### Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 8 hours

### Content

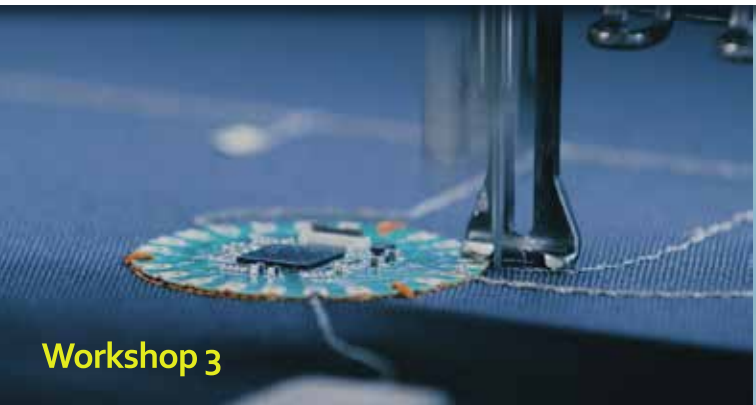
#### Electronics

- Electronic Building Blocks Part 2: Introduction to Semiconductors
- Electronic Building Blocks Part 3: Overview Sensors and Actuators
- Roll Up Your Sleeves:
  - Designing Your Own LED Circuit
  - Hands-on with Pressure Sensors

#### Embroidery

- Digitizing & Embroidery of
  - Traces with Conductive Yarn
  - LEDs
  - Control Elements

s. Each on-site workshop includes a take-home sample. For more in



## Workshop 3

# Introduction to Microcontrollers and PCB Integration into Textiles

### Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 8 hours

### Content

#### Electronics

- Getting Started with Microcontrollers
- Introduction to Microcontroller Programming
- Roll Up Your Sleeves:
  - Hands-on Development with Arduino/Micro:Bit

#### Embroidery

- Digitizing & Embroidery
  - Geometrical Rules for Embroiderable PCBs
  - PCB Integration: Placement & Connection

## Workshop 4



# Building Advanced $\mu$ C-Based Projects for E-Textiles

## Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 8 hours

## Content

### Electronics

- Microcontroller Debugging
- Designing and Building Advanced Applications
- Roll Up Your Sleeves:
  - Programming a Sensor-Controlled Output System with Arduino/Micro:bit

### Embroidery

- Digitizing & Embroidery of a Sensor-Controlled Output System, Combining:
  - PCB
  - Capacitive Sensors
  - LED Output



## Workshop 5

# Integration of RFID Antennas into Textiles

### Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 8 hours

### Content

#### **Theoretical Foundations**

- RFID - Definition, Operating Principle, Components
- RFID Tags für Industrial Laundry Applications - Requirements, Design, Validation

#### **Production of RFID Tags by Embroidery**

- Comparison of Embroidery Technologies
- Automation Solutions
- Antenna Stacking and Orientation Considerations



## Workshop 6

# Joining Techniques in Smart & E-Textiles

### Overview

**Format:** On-site (Krefeld, Germany)

**Duration:** 4-8 hours

### Content

#### **Overview Joining Technologies in Smart & E-Textiles**

- Requirements and Challenges
- Types of Connections
  - Fixed
  - Detachable
  - Wireless

#### **Embroidery and Practice**

- Creating Embroidered Connections
- Hands-on: Soldering, Crimping, Clamping, Snap Fasteners



Online Workshop

# E-Textiles 101: Introduction to Electrical Engineering

## Overview

**Format:** Online sessions

**Duration:** 8 hours in total; split sessions upon agreement

## Content

### Introduction to Electrical Engineering

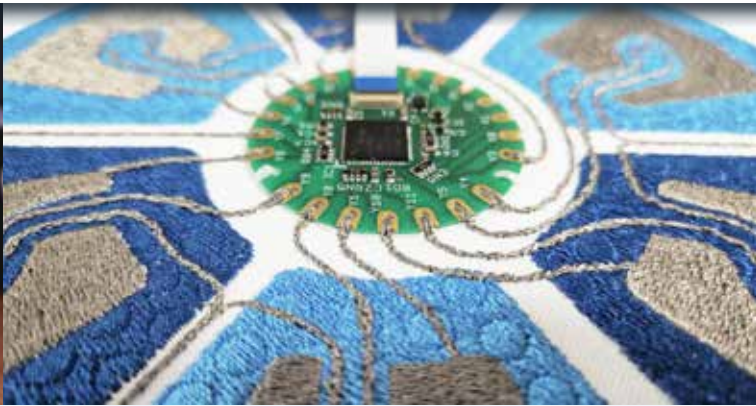
- Fundamental Electrical Quantities and Their Interrelations
- Electrical Components: Heaters, Batteries, LEDs, Sensors
- Hands-on: Basic Electrical Calculations

### Introduction to Microcontrollers and Programming

- Getting Started with Microcontrollers
- Introduction to Programming for Arduino/Micro:bit
- Hands-on: Software Development with Arduino/Micro:bit



Innovating your future.



## Our Service

### From idea to mass production

#### Product Development and Prototyping

We transform your product concepts into reality. Obtain a proof of concept and functional prototypes to accelerate your product's journey from idea to market.

#### Small Batch Manufacturing On-Site

Our on-site small batch manufacturing services allow you to start production before the machinery is available at your facility.

#### Transfer into Mass Production

Whether in-house or outsourced, we assist you in selecting the right equipment or producer from our wide partner network.

#### Workshops & Trainings Customized to Your Needs

We help you master electrical engineering, e-textiles development, and technical embroidery machine operation.

Innovating your future.



## Revolutionizing the Industrial Smart & E-Textiles Production

**Let's work together**

Contact us and explore your new potentials.

### **3E Smart Solutions**

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### **Affiliate Contacts**

#### **ZSK Stickmaschinen GmbH**

Web: [www.zsk.de](http://www.zsk.de)



#### **Unwind3D - Tailored Composite Solutions**

Web: [www.unwind3d.com](http://www.unwind3d.com)

