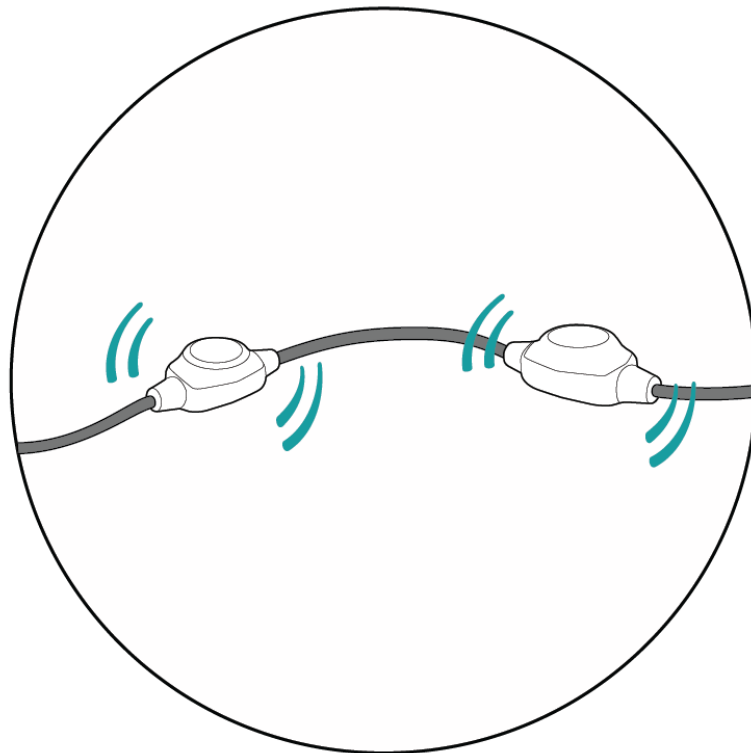# HAPTIC DEVELOPMENT BOARD MANUAL

For Haptic Development Board (CM2302)
Part 1 of 3

This manual describes the general use of the Haptic Development Board.
It is part of a package of three manuals:

Part 1 – Haptic Development Board Manual General – this manual
Part 2 – Haptic Development Board Manual Software - describes the software to be used with the Haptic Development Board
Part 3 – Haptic Development Board Manual ScienceSuit - describes the specific use of the Haptic Development Board

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TABLE OF CONTENTS

INSTALLATION AND INSTRUCTIONS FOR USE

This manual describes the general use of the Haptic Development Board and how to control it. A separate manual is provided with specific information on your set of hardware, as well as instructions for use.

For software developers this manual describes the software interfaces provided to control the haptic hardware, for the different platforms.

MANUAL

All users should read this manual completely. More experienced users can go directly to the sections of the information they need.

Improvements and changes to this manual necessitated by typographical errors, inaccuracies of current information, or improvements to programs/equipment may be made by Elitac Wearables at any time and without notice. Elitac Wearables gives no guarantees regarding to typographical errors in this document.

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ATTENTION

- Read this manual before using the Haptic Development Board.

- The Haptic Development Board consists of original parts and accessories, which may only be used in the combinations as described in this manual.

SYMBOLS

⚠ Warning! Read instructions for use

REF Batch number

🏭 Manufacturer

📖 Read instructions for use

1   IMPORTANT INFORMATION

1.1 WARRANTY

Elitac hardware is purchased for evaluation purposes. There are no warranties inhibited in the sale. Technical support is available at cost price. SLA and/or custom work can be agreed separately, upon request.

1.2 SAFETY INSTRUCTIONS

GENERAL NOTES
- THIS MANUAL FORMS AN INTEGRAL PART OF THE HAPTIC DEVELOPMENT BOARD. IT MUST BE KEPT CLOSE TO THE DEVICE AND IN READINESS WHENEVER REQUIRED. PRECISE OBSERVANCE OF THESE INSTRUCTIONS IS TO ENSURE THE SAFE AN EFFICIENT USE OF THE DEVICE AND ITS COMPONENTS;
- USE ONLY ORIGINAL ACCESSORIES (USB-CABLE, TEXTILES) WHICH HAVE BEEN PROVIDED BY THE MANUFACTURER. FAILURE TO DO SO MAY CAUSE DAMAGE, INJURIES OR LOSS OF PERFORMANCE AND WILL VOID THE WARRANTY;
- WEAR THE TACTORS CLOSELY TO THE SKIN FOR OPTIMAL EXPERIENCE AND VIBRATION TRANSMISSION;
- THERE SHOULD NOT BE MORE THAN 1 LAYER OF THIN CLOTHING (E.G. A T-SHIRT) BETWEEN THE SKIN AND THE TACTOR, IN ORDER TO GET A LOCALISED FEELING;
- ALWAYS ATTACH THE TACTOR STRING TO AN ELASTIC FABRIC SO THAT THE ELECTRONICS ARE PRESSED TO THE SKIN;
- WHEN YOU WANT TO CREATE A SPATIAL CONFIGURATION OF TACTORS, MAKE SURE THAT THE TACTORS ARE NOT POSITIONED DIRECTLY OVER LARGE BONES NEAR THE SURFACE OF THE SKIN, BECAUSE THIS WILL MAKE THE SENSATION LESS LOCALISED AND POSSIBLY GENERATE NOISE. FOR THE SAME REASONS DO NOT COVER THE DISPLAY DIRECTLY WITH STIFF MATERIALS;
- BEFORE EACH USE, CHECK IF ALL TACTORS ARE WORKING WHEN STARTING THE DEVICE;
- BEFORE EACH USE, CHECK THE BATTERY STATE IN THE APPLICATIONS TO CHECK IF IT'S FULL ENOUGH FOR USE;
- ONLY USE THIS DEVICE IN RESIDENTIAL, LIGHT INDUSTRIAL OR COMMERICAL ENVIRONMENTS.

CAUTIONS
CAUTIONS INDICATE INFORMATION WHICH, IF NOT OBSERVED, COULD RESULT IN DAMAGE TO THE EQUIPMENT;
- DO NOT EXPOSE THE HAPTIC DEVELOPMENT BOARD (NOR DEVICE, TEXTILES, TACTORS OR USB-CABLE) TO EXTREME TEMPERATURES OR OPEN FIRE. USE THE DEVICE IN AMBIENT TEMPERATURES BETWEEN +10° CELSIUS AND +60° CELSIUS (50 ° FAHRENHEIT TO 140 ° FAHRENHEIT);
- DO NOT EXPOSE THE HAPTIC DEVELOPMENT BOARD TO EXCESSIVE FORCES, FOR EXAMPLE CAUSED BY FALL, SHOCK OR IMPACT;
- DO NOT OVER STRETCH THE CABLES OF THE HAPTIC DEVELOPMENT BOARD, AS IT MAY CAUSE DAMAGE TO THE CABLE OR TACTORS;
- DO NOT SUBMERGE THE CONTROL MODULE, TACTOR OR USB-CABLE IN LIQUID OF ANY KIND. CHAPTER 5 GIVES INSTRUCTIONS ON HOW TO CLEAN THE DEVICE AND ACCESSORIES SAFELY;
- DO NOT SPRAY CLEANING FLUIDS DIRECTLY ONTO THE DEVICE;
- BEFORE CONNECTING THE HAPTIC DEVELOPMENT BOARD TO THE ELECTRICAL OUTLET: CHECK IF THE CONTROL MODULE, TACTORS OR USB-CABLE HAS NO VISIBLE DAMAGE. IF SO; QUIT USING THE PRODUCT AND IMMEDIATELY CONTACT ELITAC WEARABLES FOR REPLACEMENT OR REPAIR;
- ALWAYS TRANSPORT AND STORE THE HAPTIC DEVELOPMENT BOARD, TACTOR STRING, TEXTILES, USB-CABLE AND MANUAL IN THE ORIGINAL PACKAGING TO ENSURE THAT NO DAMAGE TO THE COMPONENTS MAY ARISE DURING TRANSPORTATION AND STORAGE;
- PROTECT THE TEXTILE PARTS AGAINST SHARP OBJECTS OR SHARP NAILS;
- USE A ELECTICAL SAFE USB POWER ADAPTER AND USB CABLE THAT COMPLY TO LOCAL SAFETY REGULATIONS LIKE CE AND FCC.

WARNINGS
WARNINGS INDICATE INFORMATION WHICH, IF NOT OBSERVED, COULD RESULT IN INJURY OF THE USER, AND POSSIBLY DAMAGE THE DEVICE OR ITS ACCESSORIES.
! THE HAPTIC DEVELOPMENT BOARD IS ONLY INTENDED FOR USE AS IS STATED IN THE MANUAL. ANY OTHER USE, OR USE BEYOND THAT SPECIFIED IN THIS MANUAL IS DEEMED AS INCORRECT USE. THE MANUFACTURER ACCEPTS NO LIABILITY FOR DAMAGE RESULTING FROM INCORRECT USAGE. ALL RISKS ASSOCIATED WITH THE USE OF THE DEVICE ARE BORNE SOLELY BY THE USER;
! USE ONLY ORIGINAL ACCESSORIES (USB-CABLE, TEXTILES) WHICH HAVE BEEN PROVIDED BY THE MANUFACTURER. FAILURE TO DO SO MAY CAUSE DAMAGE, INJURIES OR LOSS OF PERFORMANCE AND WILL VOID THE WARRANTY;

! TO REDUCE THE RISK OF ELECTRIC SHOCK, THE EQUIPMENT SHOULD ONLY BE CONNECTED TO A GROUNDED POWER SUPPLY;

! TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT ATTEMPT TO OPEN THE CONTROL MODULE, TACTOR STRING OR USB-CABLE;

! TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT ATTEMPT TO CHARGE THE DEVICE ON 220 AC, WHILE IT IS PLACED IN A TEXTILE AROUND THE BODY;

! DO NOT APPLY MORE THAN 5V ON THE HAPTIC DEVELOPMENT BOARD USB PORT;

! DO NOT ATTACH AN AC ADAPTER THAT PROVIDES MORE THAN 5V DC, BECAUSE THIS WILL DAMAGE THE CONTROL MODULE;

! DO NOT CONNECT THE USB CALBE OF THE CONTROL MODULE IF IT IS DAMAGED OR IF IT SHOWS LARGE OPENINGS;

! DO NOT EXPOSE THE HAPTIC DEVELOPMENT BOARD AND ACCESSORIES TO TEMPERATURES OVER +60° CELSIUS (140 ° FAHRENHEIT). THIS COULD LEAD TO DANGEROUS SITUATIONS OR TO EARLY WORN-OUT OF THE HAPTIC DEVELOPMENT BOARD OR ITS ACCESSORIES;

! DO NOT REMOVE ANY STICKERS OR LABELS FROM THE CONTROL MODULE, TACTOR, TEXTILES, OR USB-CABLE. THE WARRANTY IS VOID WHEN LABELS OR STICKERS HAVE BEEN REMOVED BY THE USER;

! DO NOT EAT, SWALLOW, DROP, HIT, ABUSE, OPEN, INCINERATE, BURN OR SHORT CIRCUIT THE HAPTIC DEVELOPMENT BOARD OR ITS COMPONENTS;

! IMMEDIATELY STOP USING THE HAPTIC DEVELOPMENT BOARD AND/OR SUPPLIED ACCESSORIES IF THE HOUSING IS DAMAGED AND/OR WHEN ACCUMULATION OF MOIST CAN BE EXPECTED IN THE DEVICE OR ITS ACCESSORIES;

! AVOID THAT THE USB-PORT OF THE HAPTIC DEVELOPMENT BOARD BECOMES WET OR DAMP;

! PROTECT THE HAPTIC DEVELOPMENT BOARD AND SUPPLIED ACCESSORIES FROM MOISTURE, DIRT AND DUST;

! BEFORE CLEANING: DISCONNECT THE HAPTIC DEVELOPMENT BOARD FROM THE POWER SOURCE (CONNECTED ADAPTER OR COMPUTER);

! DO NOT CLEAN THE DEVICE USING CHEMICALS OR OTHER SUBSTANCES THAT MAY CAUSE DAMAGE TO THE PRODUCT SUCH AS ACETONE, PHENOL OR DISINFECTANTS;

! DO NOT IMMERSE THE HAPTIC DEVELOPMENT BOARD IN WATER, OR THE HARDWARE WILL BE DAMAGED;

! ALWAYS REMOVE ALL ELECTRONICS BEFORE WASHING THE TEXTILE PARTS;

! ENSURE THAT THE TEXTILE PARTS ARE COMPLETELY DRIED BEFORE PLACING ELECTRONICS BACK;

! DO NOT WASH THE TEXTILE IF ELECTRONICS CANNOT BE REMOVED;

! CHOKING HAZARD! KEEP THE DEVICE AND ITS ACCESSORIES AWAY FROM CHILDREN;

! USERS MAY BE ALLERGIC TO THE MATERIALS USED IN THE PRODUCT OR ITS ACCESSORIES. IF AN ALLERGIC REACTION OCCURS: IMMEDIATELY STOP THE USE AND CONSULT A SPECIALIST;

! DO NOT USE IN APPLICATIONS WERE LOSS OF FEEDBACK LEADS TO UNSAFE SITUATIONS;

! DO NOT USE THIS DEVICE NEAR LIFE CRITICAL DEVICES LIKE PACEMAKERS.

!

1.3 WHAT IS THE HAPTIC DEVELOPMENT BOARD

The Haptic Development Board uses the skin to display information using localised vibration. It consists of one or more small vibration elements, called tactors, that are mounted in textile and pressed to the skin. By activating the tactors in spatiotemporal patterns, called tactile patterns, information can be displayed. The Haptic Development Board hardware consists of a control module with up to 32 tactors. They can be arranged in many shapes or spatial constellations inside textiles, called tactor constellations.

Tactors can be controlled individual using the corresponding tactor number. Or a set of tactors can form together a Haptic Development Board that can be used to display information on a specific location on the skin. The location on the skin can be described by our proprietary body coordinate system.

The Haptic Development Board can be controlled through a wired USB or wireless Bluetooth connection with software running on a host device (PC, smartphone, tablet) that runs on either one of the following operating systems: Windows; Mac OS X; Linux; or Android. The software consists of two components: *Elitac HIDCom* (on non-Android platforms) or *ElitacMain* (on Android platforms) that controls the hardware directly and listens to a UDP port (all platforms); and your or third-party software (e.g. *Elitac_UDPClient_Example.jar* or *SampleApp.apk*) that sends commands to this UDP port. All

this combined makes the Haptic Development Board an easily customizable display that can be adapted for a wide range of applications.
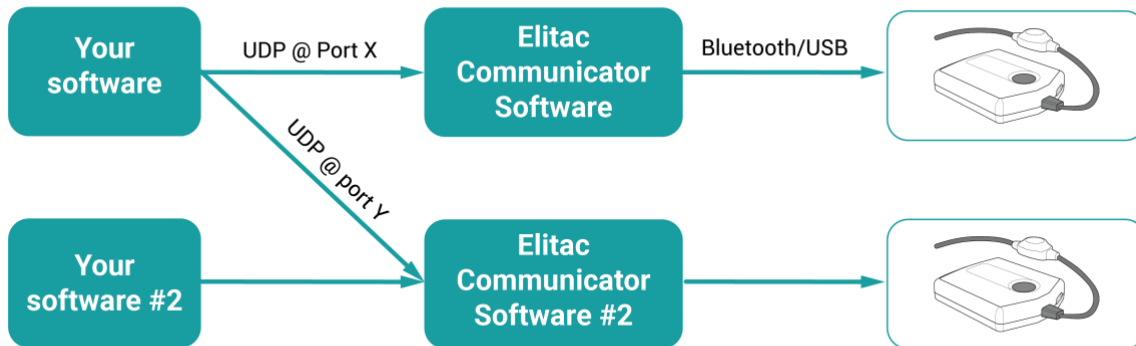

Figure 1 Schematic depicting the control of the Haptic Development Board: Your software or third-party software sends commands to the Elitac HIDCom software through UDP, which is listening to an adjustable port number. The Elitac HIDCom sends these commands to the control module through either a Bluetooth® or USB connection. Your software can talk simultaneously to more than one copy of Elitac HIDCom through different UDP ports. When these copies run on a single host device Bluetooth ® 4.0 or USB connections are required.

2   GETTING STARTED: FIRST TIME USE

Before using the Haptic Development Board for the first time: Follow the steps in the section 'Installation' in this chapter.

2.1   INSTALLATION

Unpack all components and check whether the product is complete (see packing slip, or specific product manual for packaging contents.)

2.1.1   Optional: Software installation to control the Haptic Development Board from your computer

Follow instructions in the Software Manual.

3 USING THE HAPTIC DEVELOPMENT BOARD

Consult the user manual of your specific hardware set for a full explanation of all elements of the use of the Haptic Development Board.

CONNECT THE HAPTIC DEVELOPMENT BOARD TO A COMPUTER

Consult the Software Manual for information on:
- How to install Elitac *HIDCOM* or *ElitacMain* (communication software) on different platforms;
- How to connect the Haptic Development Board using *HIDCOM* or *ElitacMain*;
- How to control the Haptic Development Board from your own application;
- How to create Tactile Patterns.

4 MAINTANANCE: CLEANING THE HAPTIC DEVELOPMENT BOARD

Consult the user manual of your specific hardware set for instructions on how to maintain and clean the Haptic Development Board.

5 STORAGE AND TRANSPORT
- Store the Haptic Development Board and all accompanying accessories such as textiles, patches, Bluetooth Dongle, and USB-cable together with the manual in the original packaging;
- Always transport the Haptic Development Board, textiles, patches, Bluetooth Dongle, USB-cable and manual in the original packaging, to ensure that no damage to the components can occur during transport;
- Always store the Haptic Development Board and its accessories between temperatures of +10° C to +40° C (50°F – 104°F);
- Fully recharge the Haptic Development Board every 6 months to ensure the durability of the battery.

6 TROUBLESHOOTING

If any problems occur with the software, view the troubleshooting list in the software manual. If your problem cannot be solved using this list contact Elitac Wearables for support support@elitacwearables.com.

7 TECHNICAL SUPPORT

If any problems occur during use, use the troubleshooting list in the software manual to find a solution for the problem. Technical support is available at cost price. SLA and/or custom work can be agreed separately, upon request. For technical support contact Elitac Wearables, support@elitacwearables.com

8 CUSTOMER SERVICE AND REPAIRS

For customer service and repairs contact: support@elitacwearables.com

9   DISPOSAL

9.1   CONTROL MODULE AND TACTOR STRING

When you decide to dispose the Haptic Development Board, you are advised to return the device to the manufacturer. Here, the device and accessories will be disassembled and hazardous materials will be removed.

Control Module with integrated battery:

The device contains a battery, review technical specifications in your specific hardware manual for the exact type. You are advised to return the device to the manufacturer. The device will be disassembled, hazardous materials will be removed and battery will be disposed according to the regional legislation for disposal.

9.2   TEXTILE PARTS (STRAP SET, SHIRTS)

The textile parts may be disposed in the waste system for textiles. If this is not available in your region, you can dispose the textiles in the normal waste system.

Textile parts with electronics directly integrated onto the fabrics should be considered as "Control Module and Tactor string" and should be disposed as described in chapter 9.19.1.

9.3   USB-CABLE, USB-STICK, BLUETOOTH DONGLE

The USB-cable, USB stick and Bluetooth Dongle need to be returned to the manufacturer. If necessary, the parts will be disassembled and removed according to the regional legislation for disposal.

10 TECHNICAL SPECIFICATIONS

Consult the user manual of your specific hardware set for Technical Specifications.

11 GLOSSARY

Cautions
Cautions indicate information which, if not observed, could result in damage to the equipment.

Control module
The main control unit of the Haptic Development Board. This module contains the processor as well as the battery.

C-Type USB-plug
A C-Type USB-plug that connects the USB-cable to the Control Module

Elitac HIDCom
Software that can be used to play (custom) predefined tactile patterns.

Firmware
Software installed on the Haptic Development Board

Indicator light (if available)
Light on the control module that shows the status of the device using several colours.

LED; see indicator light

Manual
Extensive explanation on the (first time) use of the Haptic Development Board as well as more advanced functionalities.

ON/OFF-button (if available)
Button on top of the control module to switch the Haptic Development Board ON and Off.

Haptic Development Board
A system that uses the skin to display information using localized vibrations comprising of a control module, tactile string and textiles.

Tactor
A small component that transmits vibrations.

Tactor constellation
A spatial set of related tactors.

USB-Cable
Data cable used to charge the Haptic Development Board, as well as to read/write the firmware using the Elitac HIDCom Software.

Warnings
Warnings indicate information which, if not observed, could result in injury of the user, and possibly damage to the device or its accessories.