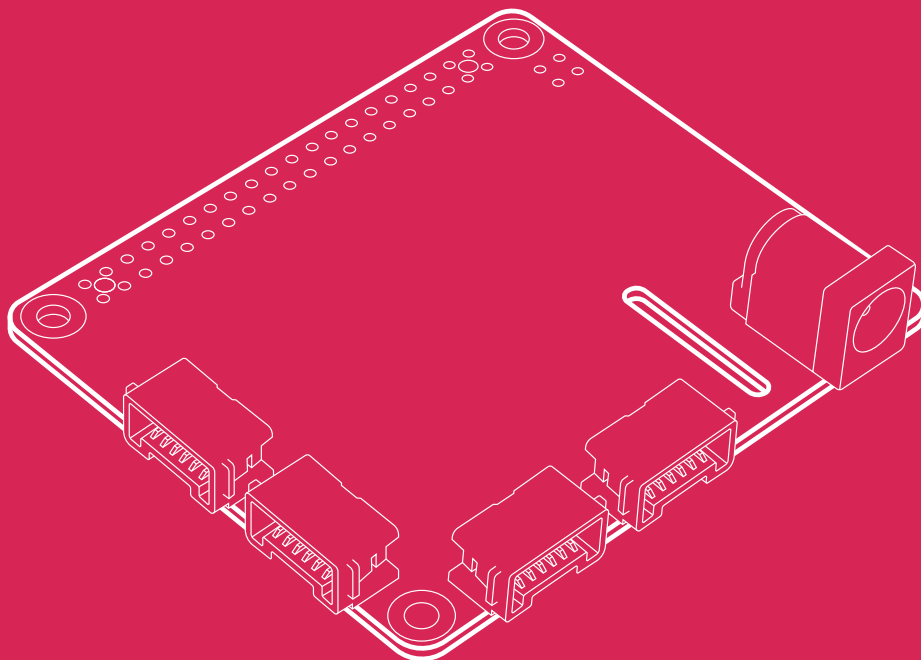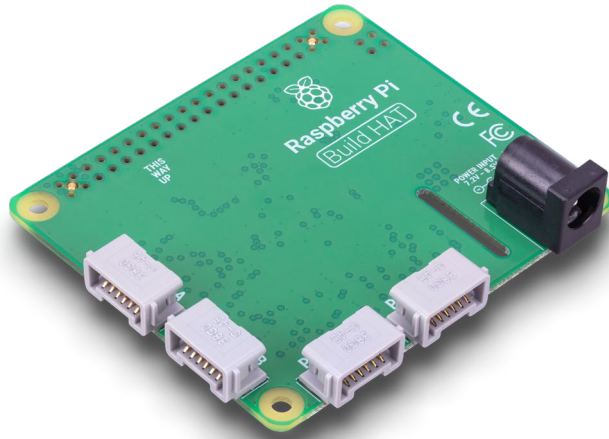# Raspberry Pi Build HAT

Published October 2021

Overview

The Raspberry Pi Build HAT is an add-on board designed in collaboration with LEGO® Education to make it easy to control LEGO® Technic™ motors and sensors with Raspberry Pi computers.

It provides four connectors for LEGO Technic motors and sensors from the LEGO® Education SPIKE™ Portfolio. The available sensors include a distance sensor, a colour sensor, and a force sensor. The angular motors come in a range of sizes and include integrated encoders that can be queried to find their position.

The Build HAT fits all Raspberry Pi computers with a 40-pin GPIO header, including — with the addition of a ribbon cable or other extension device — Raspberry Pi 400. Connected LEGO Technic devices can easily be controlled in Python, alongside standard Raspberry Pi accessories such as a camera module.
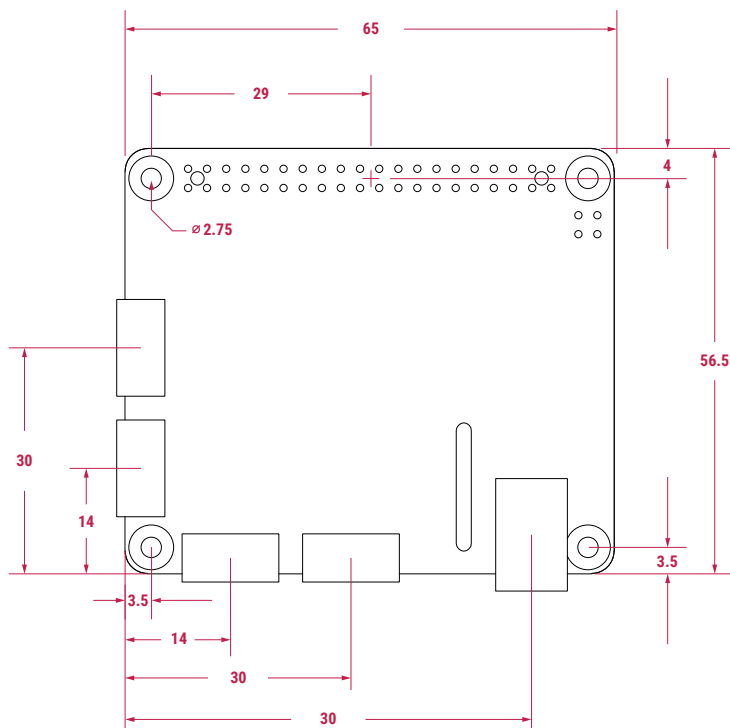
The Raspberry Pi Build HAT power supply, available separately, is designed to power both the Build HAT and Raspberry Pi computer along with all connected LEGO Technic devices.

The LEGO® Education SPIKE™ Prime set 45678 and SPIKE™ Prime Expansion set 45681, available separately from LEGO Education resellers, include a collection of useful elements supported by the Build HAT.

Specification

- Controls up to four LEGO Technic motors and sensors included in the SPIKE Portfolio, along with those from the LEGO® MINDSTORMS® Robot Inventor kit and most other LEGO devices that use an LPF2 connector

- Fits onto any Raspberry Pi computer with a 40-pin GPIO header

- Easy-to-use Python library to control your LEGO Technic devices

- Onboard Raspberry Pi RP2040 microcontroller manages low-level control of LEGO Technic devices

- DC power connector: 2.1mm barrel jack, centre positive

- Requires an external 8V ±10% DC power source – like the Raspberry Pi Build HAT Power Supply, or a 7.5V battery pack – to power the Build HAT, Raspberry Pi computer (except Raspberry Pi 400), and connected LEGO Technic devices

Physical specification


Note: all dimensions in mm

WARNINGS

- This product shall only be connected to a Raspberry Pi via the GPIO header.

- Any external power supply used with the Raspberry Pi Build HAT shall comply with relevant regulations and standards applicable in the country of intended use.

- This product should be operated in a well-ventilated environment, and if used inside a case, the case should not be covered.

- Whilst in use, this product should be placed on a stable, flat, non-conductive surface, and should not be contacted by conductive items.

- The connection of incompatible devices to the Raspberry Pi Build HAT may affect compliance, result in damage to the unit, and invalidate the warranty.

- The connection of incompatible devices to the GPIO connection of a Raspberry Pi computer may affect compliance and result in damage to the unit and invalidate the warranty.

- All peripherals used with this product should comply with relevant standards for the country of use and be marked accordingly to ensure that safety and performance requirements are met.

- The cables and connectors of all peripherals used with this product must have adequate insulation so that relevant safety requirements are met.

- Operation of this device requires adult supervision.

SAFETY INSTRUCTIONS

To avoid malfunction or damage to this product, please observe the following:

- Do not expose to water or moisture, or place on a conductive surface whilst in operation.

- Do not expose to heat from any source; Raspberry Pi computers and the Raspberry Pi Build HAT are designed for reliable operation at normal ambient temperatures.

- Take care whilst handling to avoid mechanical or electrical damage to the printed circuit board and connectors.

- Whilst it is powered, avoid handling the printed circuit board, or only handle it by the corners to minimise the risk of electrostatic discharge damage.
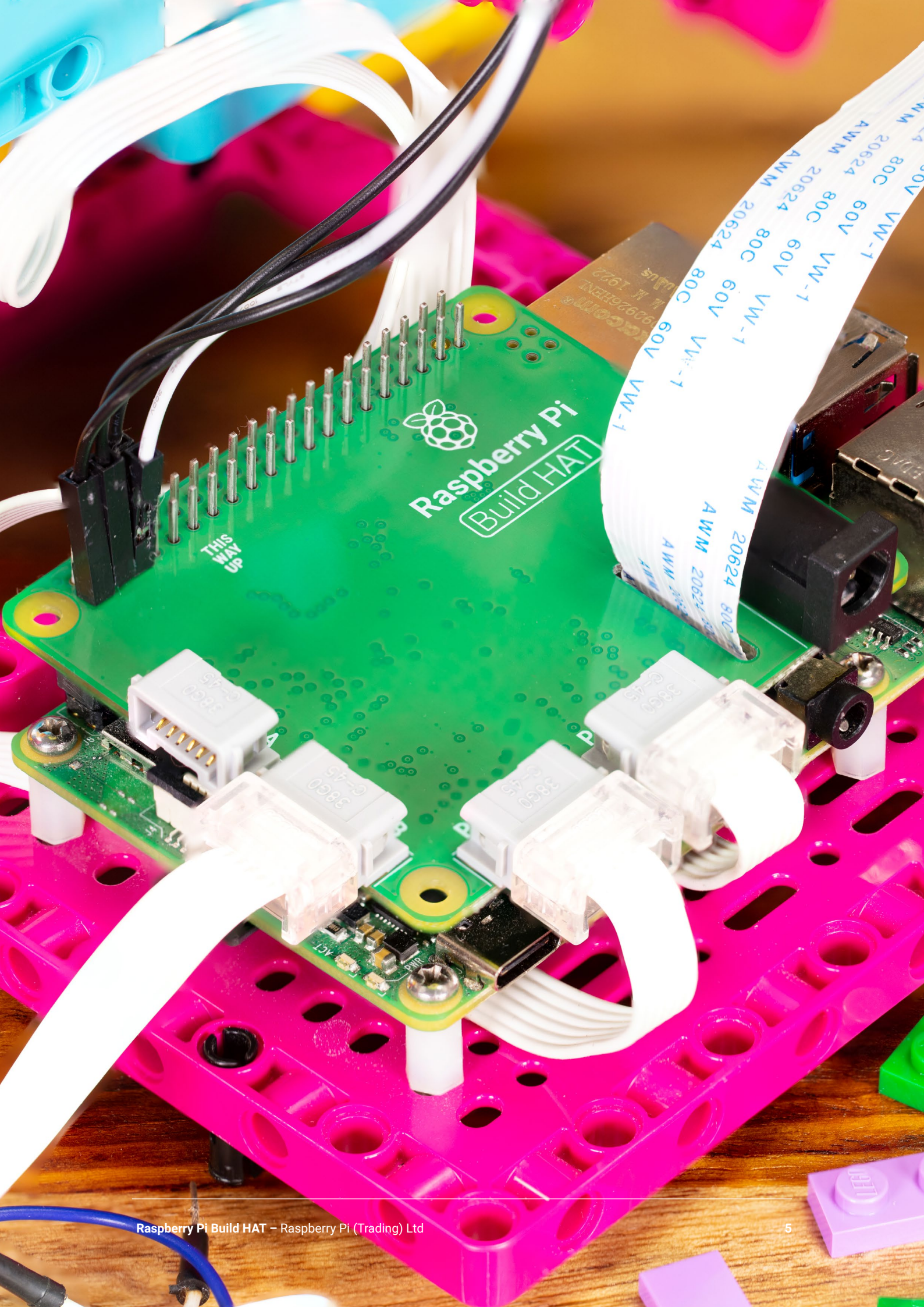
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