

LEGO Smart Train – Printable Wiring Schematic

Logical wiring schematic for the LEGO Smart Train project. This diagram is intended as a printable electrical reference.

Power Path

Transformer 45517	DC Jack → Schottky → PF Battery +
PF Battery –	Common Ground
PF Battery +	TB6612 VM
PF Battery +	Buck Converter VIN+
Buck 5V Output	ESP32 / Audio / Display

ESP32 Controller

5V	From Buck Converter
GND	Common Ground
D4 / D5	I2C: Sensors + MCP23008
D8 / D9 / D10	SPI: SD + TFT
D6 / D7 / D2	I2S Audio

Motor Control (TB6612 Channel A)

VM	PF Battery +
VCC	3.3V
PWMA (D3)	Motor Speed PWM
AIN1 / AIN2	From MCP23008
A01 / A02	PF Train Motor

PF Lights (MOSFET)

PF Battery +	PF Lights +
PF Lights –	MOSFET Drain
MOSFET Source	GND
MOSFET Gate (A0)	PWM Brightness

Dock Detect

Dock +	Divider → LM393
LM393 OUT	MCP23008 GP7
LM393 VCC	5V