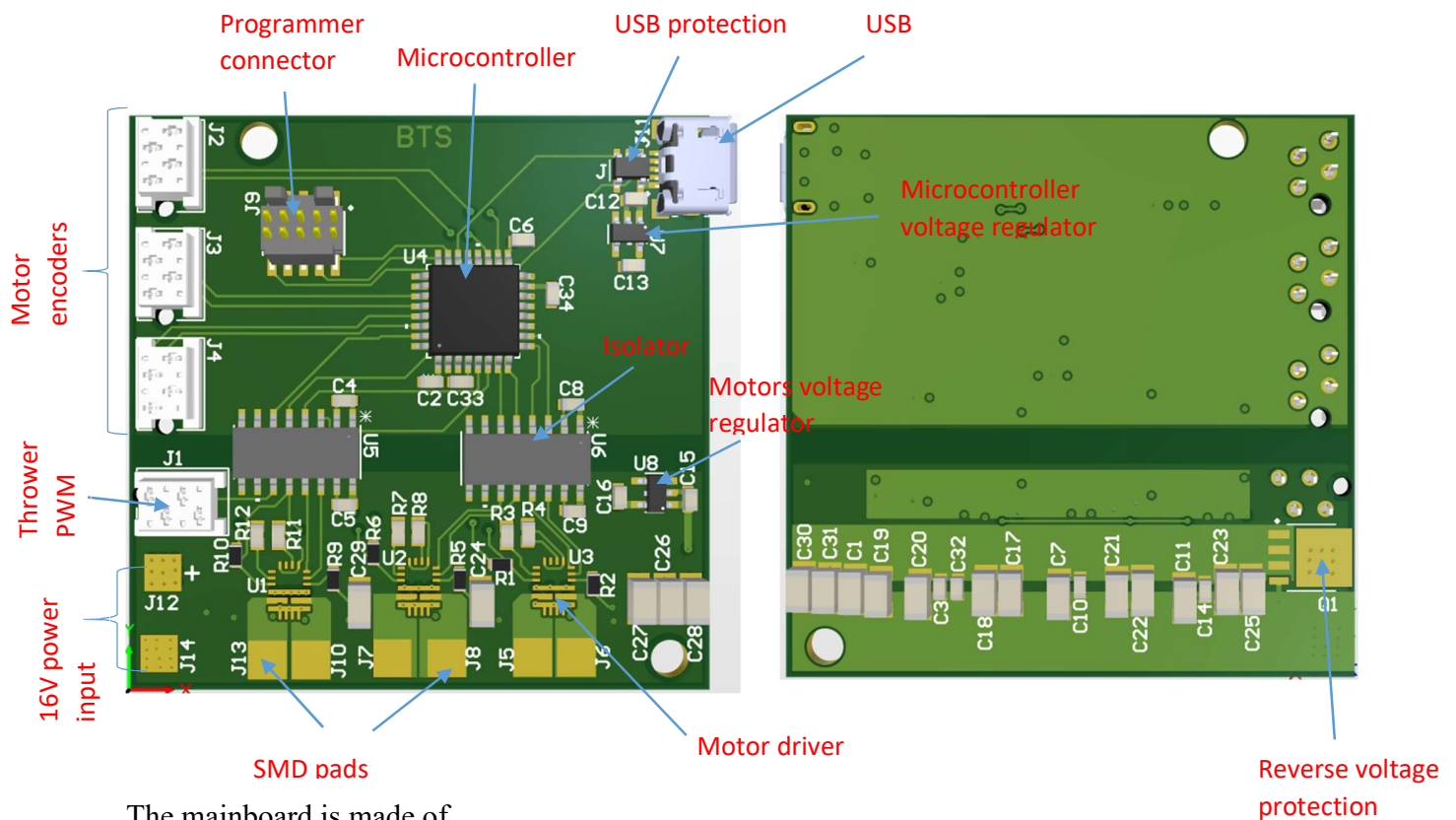


# MAINBOARD DOCUMENTATION

## Functionality described:



The mainboard is made of

- **STM32G441KB microcontroller**
- **Programmer connector**  
for connecting STLink programmer to the microcontroller.
- **USB connector**  
for powering the microcontroller and for communicating with robot's computer.
- **Three motor drivers**  
connected to two isolators to avoid short circuits on the motor's side damaging the computer.
- **Three encoder connectors input and one PWM output** for controlling the thrower

The mainboard is supplied with 16v on the motor drivers side with a reverse voltage protection for avoiding reverse voltage damaging the components. The motor drivers have 3 x 3 mm pads for each motor driver power outputs.

### **Connector pinouts:**

- Power input
  - J12 → Power input positive potential
  - J14 → Power input negative potential
  
- Motor drivers' outputs
  - J10/J13 → Motor driver output for the first motor
  - J7/J8 → Motor driver output for the second motor
  - J5/6 → Motor driver output for the third motor
  
- J1 thrower connector
  - 1- GND
  - 2- PWM
  - 3- Not used
  - 4- Not used
  
- J2, J3, J4 encoders
  - 1- GND
  - 2- +3,3
  - 3- TIM\_CH1
  - 4- TIM\_CH2

### **Schematics Pdf file:**

<https://github.com/ut-robotics/picr21-team-bts/blob/main/Electronics/PCB%20Schematics.pdf>

**Link to firmware:**

[https://github.com/ut-robotics/picr21-team-bts/tree/main/Electronics/BTS\\_firmware](https://github.com/ut-robotics/picr21-team-bts/tree/main/Electronics/BTS_firmware)

**Components BOM:**

COMPONENTS			
Name	Comment	Designator	Quantity
DRV8243	Motor Driver	U1, U2, U3	3
Amphenol 10118193-0001LF	USB connector	J11	1
CM1223-02SO TVS diode array	USB protection	J	1
STM32G441KB	Microcontroller	U4	1
MAX14930DASE+	Isolator (SOIC16 package)	U5, U6	2
Micro-MaTch 215079-4	Encoder, PWM connectors	J1, J2, J3, J4	4
Samtec FTSH-105-01-L-DV-K	Programmer connector	J9	1
BUK6Y10-30P	Reverse voltage protection	Q1	1
NCP164CSN330T1G	Voltage regulator for microcontroller	U7	1
NCV8730ASN500T1G	Voltage regulator at the motor driver's side	U8	1
100K 0603	Resistor	R4, R8, R9	3
10k 0603	Resistor	R1, R2, R5, R6, R9, R10	6
3.3k 0603	Resistor	R3, R7, R12	3
1uF 0603	Capacitor	C12, C13, C15, C16, C19, C20 C24, C26, C27, C28, C29	11

100nF 0603	Capacitor	C2, C3, C4, C5, C6, C8, C9, C10, C14, C33, C34,	11
10uF 0603	Capacitor	C7, C11, C17, C18, C21, C22, C23, C25, C28, C26, C27, C32	12

### Gerber files:

<https://github.com/ut-robotics/picr21-team-bts/tree/main/Electronics/picr21-team-BTS-mainboard/Project%20Outputs%20for%20picr21-team-BTS-mainboard>