## Introduction

APPS (Acceleration pedal position sensor) is a PCB created as part of the electrical car assembled by PUT Motorsport - a Formula Student team from Poznań University of Technology.

## Features

Main features included on the board are:

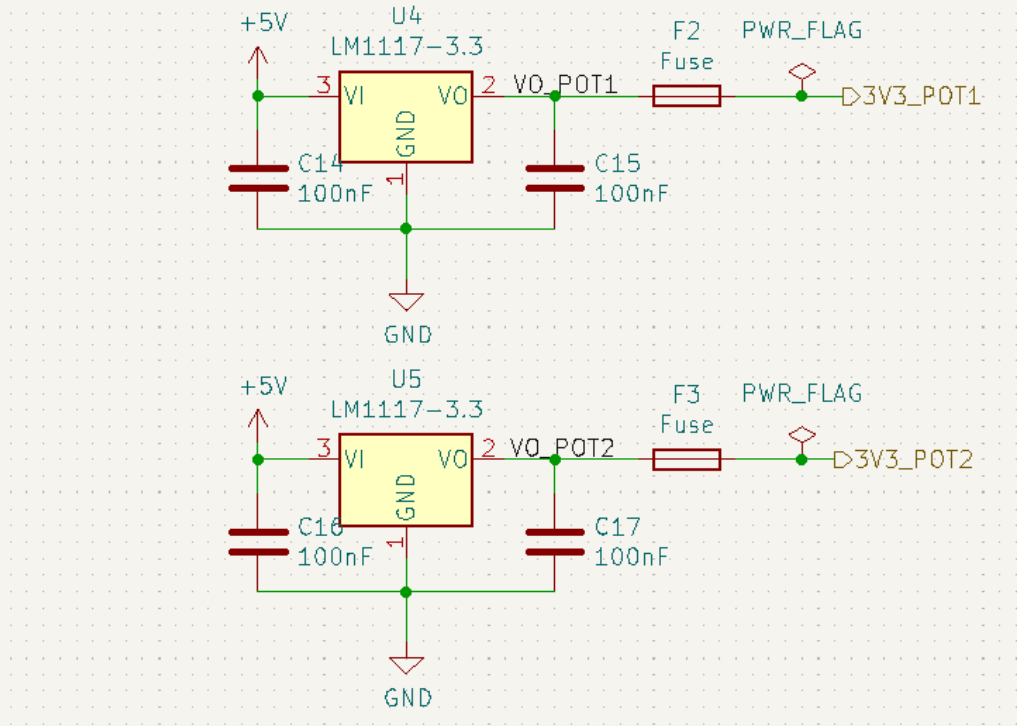
- pedal position readout
- sensor power delivery
- CAN interface
- front-box pinout interface
- safety relay

## Motivation

APPS is a part required by the competition rules. Its main purpose is to analyze signals coming from two potentiometers mounted along the acceleration pedal and to decide whether the measurements are plausible or not. An implausibility of the signals is defined as deviation of more than ten percentage points pedal travel between any of the used sensors. By design the APPS signals must have different, non-intersecting transfer functions. Thus we chose to use two potentiometers with linear transfer functions offset by a voltage divider.

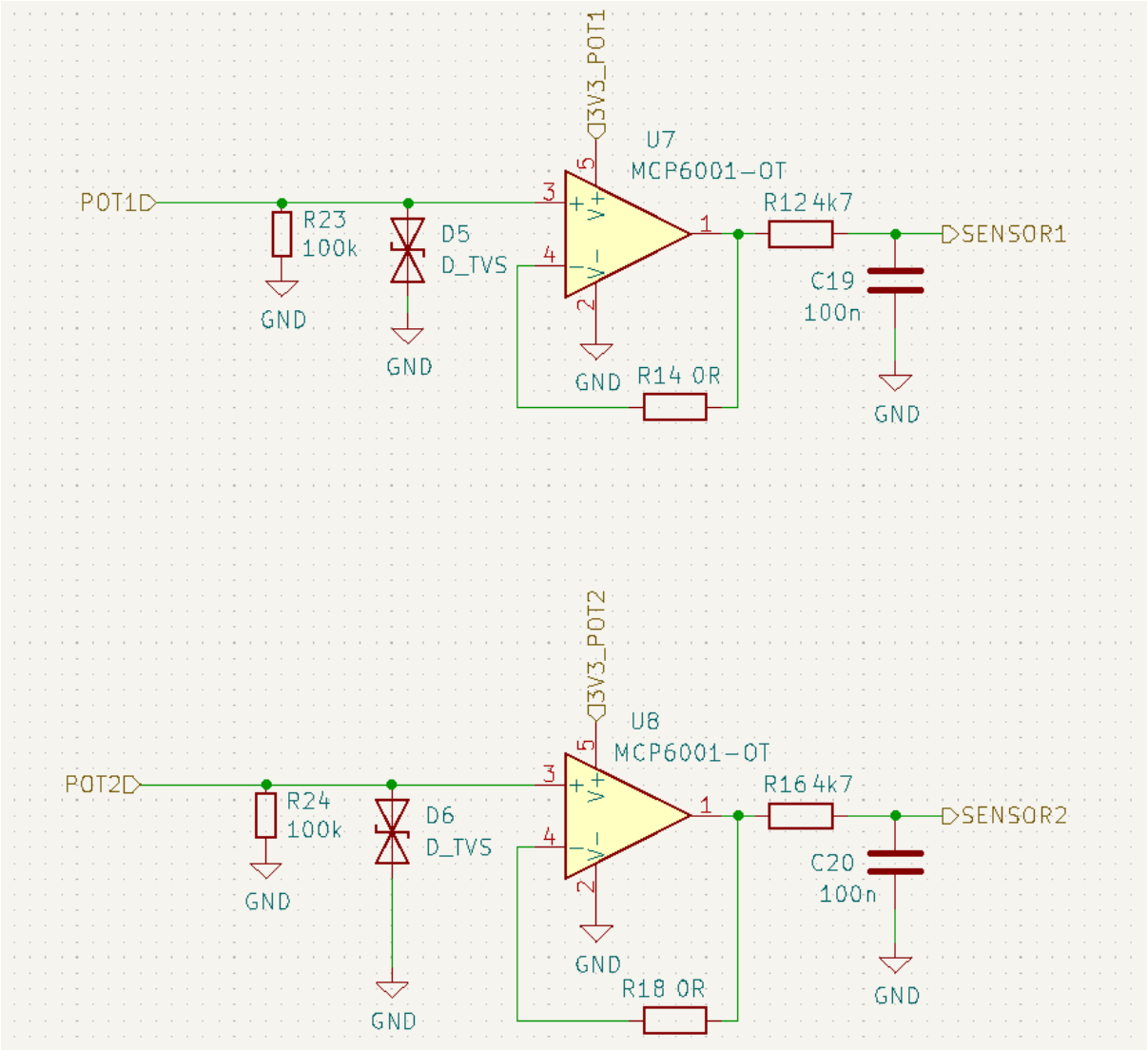
## Sensor power delivery

Each of APPSs has to have a separate power source.



## Sensor signal measurement

Each signal from the potentiometers is passed through a low pass filter designed to cutoff frequencies above 338 Hz. After the signal has been filtered it is led to an ADC of STM32.




## CAN interface

Our car uses CAN bus for device communication. APPS sends current pedal position over the bus as well as diagnostic information regarding any errors that occurred during its operation.

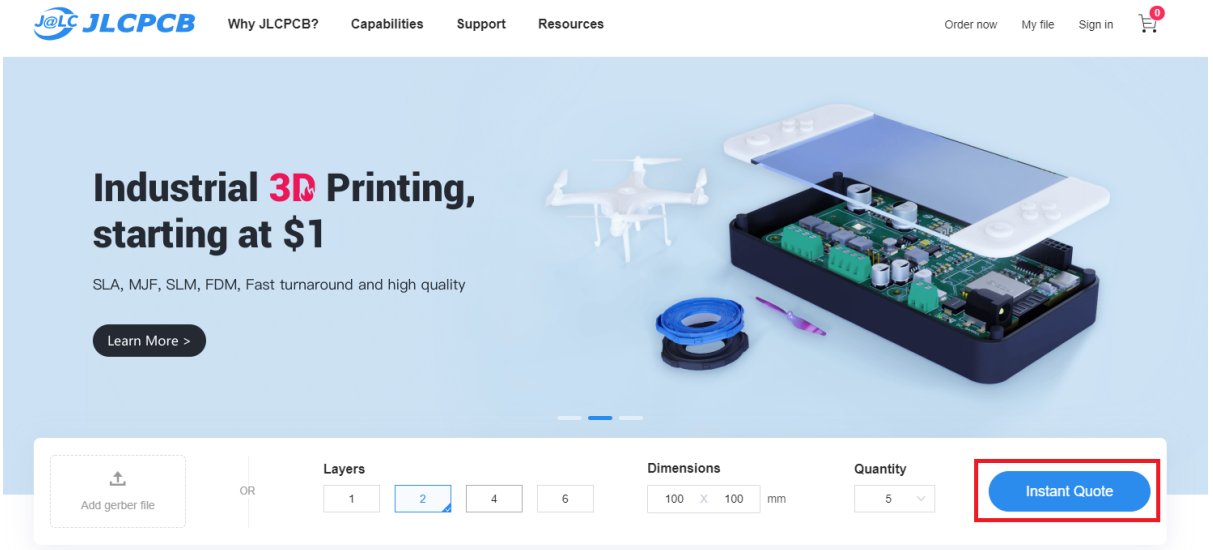
## Front-box pinout interface

APPS is a part of the front-box - a PCB stack that's located at the front of the car which we already covered in this article - thus it has to follow a certain pinout that allows for easy debugging and connection with other boards that's space efficient and easy to disassemble.

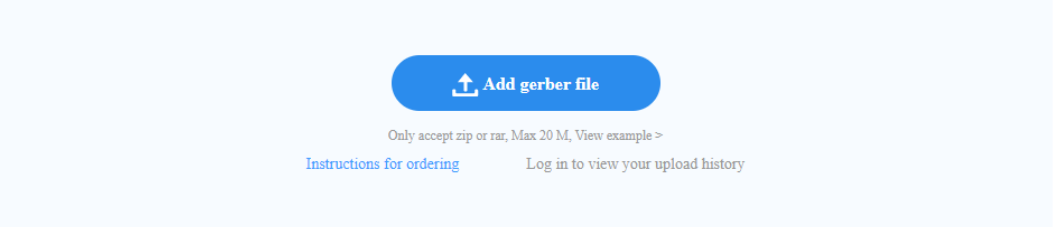
# Manufacturing

PCBs designed by our team are manufactured by JLCPCB - a hardware production company that specializes in batch PCB production. You can create PCBs with up to six layers, and order a batch size that fits your needs. Batch production is beneficial since during PCB assembly, many things could go wrong and the board could get damaged, that's where excess copies come in handy. If unlike us you don't enjoy assembling PCBs, JLCPCB has got you covered as PCB assembly is also a part of their offer!

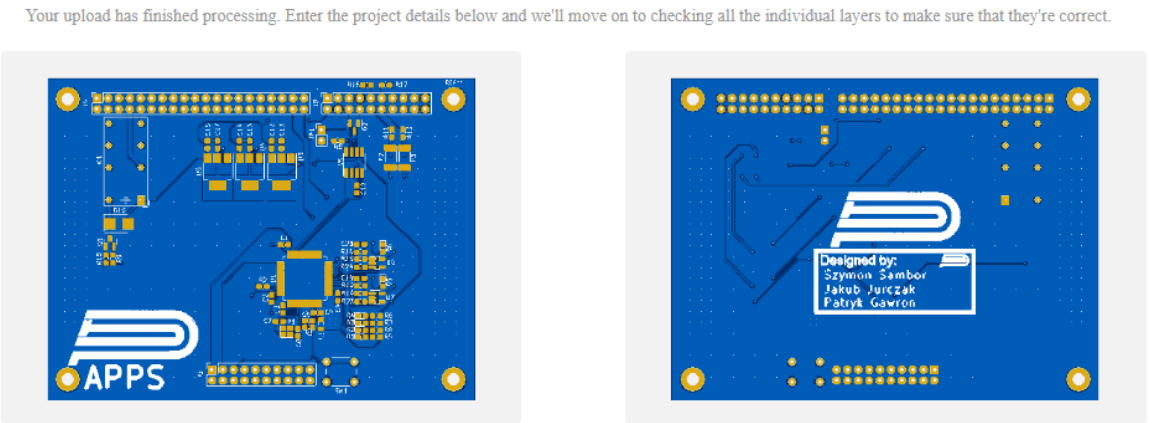
To order a PCB of your design, simply go to jlcpcb.com and click the "Instant quote" button.



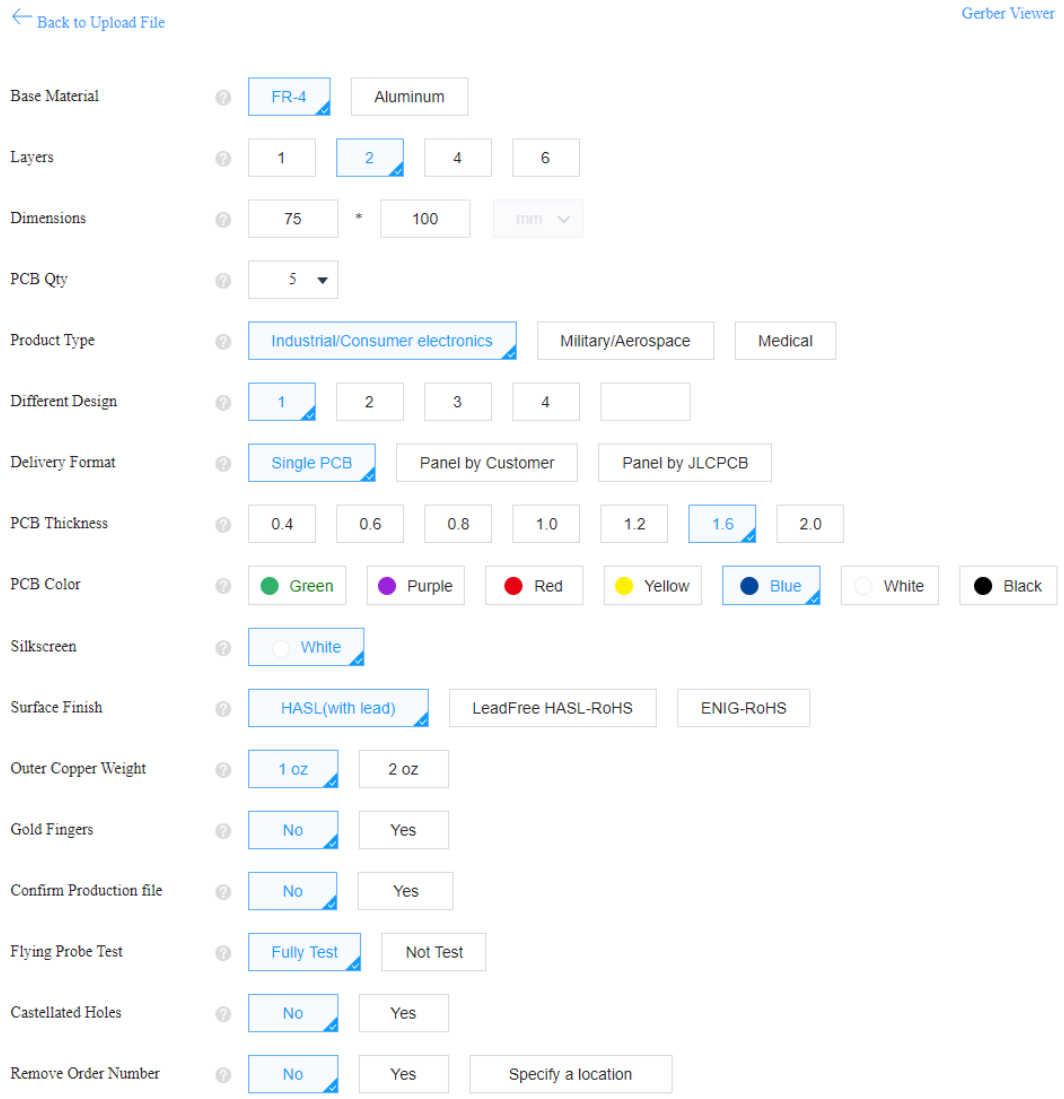

You will be forwarded to the order editor where you'll find plenty of options to customize your batch of PCB to fully meet your needs. Firstly you'll need to upload your gerber files archived into .zip or .rar format.



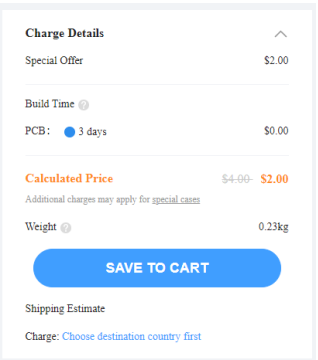

After the files have been uploaded successfully, you'll see a board preview.



The preview as well as the summary view will change accordingly to options you have chosen. Some of the options (like dimensions or layer number) will be pulled from the gerber files you have uploaded.




After you've customized the board, you can proceed to the checkout located at the right side of the editor.




Each and every board we've received from JLCPCB is of highest quality and we've always enjoyed working with them!