2019 Germany Engineering Research Program Experience

By: Chun Chang
About me

- School: Michigan State University
- Major: Electrical engineering
- Year: Senior
Life in Germany

Three important things in Germany besides working:

- Beer
- Food
- Fun
Difference between Germany and US

- The convenience of public transportation
- The amount of plantation in the city
- The quality of food
- The people
Work and Research

Institute: IMS, Institut für Mikroelektronische Systeme

NIFE, Lower Saxony Centre for Biomedical Engineering, Implant Research and Development

Our Research: Intelligent Bioreactor system for cultivation of bioartificial vascular graft
The Bioreactor PCB

What made up our Bioreactor control PCB?

1. Microcontroller: Atmel, arm-cortex-m0+
2. Communication ports
3. DAC
4. LEDs
5. Switches
What can the board do?
- Communicate

Some examples...
- Directly control peripheral devices. i.e. Step motor, pumps, sensors.
- Read data from peripheral devices and reacted accordingly.
- Allow user to read and write date through a council. For example: PC

What does communicate means?
- The imparting or exchanging of information by speaking, writing, or using some other medium.

What does communication means for us?
- Exchange digital information. i.e. 0xFFAA, 000011110101
- In other words...use digital signals to talk to peripheral devices.
My job: Programming the bioreactor control PCB

- Editing the API to add more functionalities
- Establish all communications drivers including USART, SPI, I2C, CAN...
- Troubleshooting
- Fabricating PCB boards and component attachment
Typical setup during a work day

Coding
Typical setup during a work day
Typical setup during a work day

Attaching PCB Components
Our vision of this board

• In the future, PCB should be able to take care of most of the control of the whole system and requires minimum human resources looking after the Bioreactor.
Thank you!
Leibniz University Hannover