

# Real-Time Hardware Platform for Medical Device Control



Technische Universität München

## Background

Cardiovascular disease is one of the major causes of death in Germany. The Lifebridge project aims to help people who suffer from a heart attack by providing an automated extra-corporal support during transportation from their current location to the nearest hospital. Different control mechanisms monitor the patient and give the best treatment according to the patient's needs and situational context. To achieve this goal current research is done in generating simulation models that can recreate emergency scenarios. With this models different control strategies may be tested. This also includes the analysis of essential safety features of a medical device.



Fakultät für Informatik

Lehrstuhl für Echtzeitsysteme und Robotik

## Description

The main task of this project is to develop a hardware platform that may be used for the control of a medical device, more specifically a portable heart-lung machine. The platform should be capable of doing real-time signal processing and implement a fuzzy inference system. The system must interface with diverse sensor devices and the heart-lung machine via RS232 connection. The implemented fuzzy logic should be reprogrammable via fuzzy model files. Once the system setup is validated, a clone platform is to be integrated. The clone should be activated, if the primary controller fails or gives errors. The redundant hardware setup increases fault-tolerance of the whole system. The place of work is at the Experimental Heart Surgery Lab of the German Heart Center (Lazarettstr. 62, 80636 München).

### Advisors:

Dr.Ing. Schreiber, U  
Dipl.-Ing. Baumgartner, B  
M. Sc. Mendoza, A

### Research project:

Lifebridge

### Type:

MA

### Research area:

Biomedical Engineering,  
Embedded Systems

### Programming language:

C++

### Required skills:

C++, Real-time systems, Fuzzy Control

### Language:

English, German

### Date:

16. Dezember 2009

## Tasks

This student project consists of the following tasks:

- Gathering of system requirements and specifications.
- Research on existing platforms that meet the specifications.
- Selection of components and/or design of electronic circuit.
- Software implementation of data acquisition and fuzzy logic.
- Integration of a clone platform and implementation of an intelligent communication between the two boards.
- Documentation of the developed platform and software.

## References

- Robotics and Embedded Systems, Informatics Department, TUM: <http://www6.in.tum.de>
- German Heart Center: <http://www.dhm.mhn.de>
- Official LIFEBRIDGE project homepage: <http://www6.in.tum.de/Main/ResearchLifebridge>

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