

China Scholarship Council – University Maastricht

PhD Programme Application form

Basic information

- To be filled in by the prospective UM supervisors -

1. Information on prospective UM supervisors and Promotor

1a. First Supervisor/promoter:

- Title(s), initial(s), first name, surname: Prof. Dr. Frits Prinzen
- Research group: Department of Physiology
- Address for correspondence: Universiteitssingel 50, 6229 ER, Maastricht, the Netherlands
- Telephone: +31 433881080
- E-mail: frits.prinzen@maastrichtuniversity.nl

1b. Second Supervisor/copromoter:

- Title(s), initial(s), first name, surname: Dr. Hongxing Luo
- Research group: Department of Physiology
- Address for correspondence: Universiteitssingel 50, 6229 ER, Maastricht, the Netherlands
- Telephone: +31 685704703
- E-mail: h.luo@maastrichtuniversity.nl

1c. Promotor (if applicable): – see above

- Title(s), initial(s), first name, surname:
- Research group:
- Address for correspondence:
- Telephone:
- E-mail:

2. Information on UM Faculty/ Department/ Institute/ School contact person:

When the application is granted by both the CSC and UM, the contact person is responsible for the practical arrangements (i.e. assistance in obtaining a visa, finding accommodation, etc.) of the visit of the PhD candidate:

- Initial(s), first name, surname: Ms. Jolanda Gulpen
- Research group: Department of Physiology
- Address for correspondence: Universiteitssingel 50, 6229 ER Maastricht, Postbus 616, 6200 MD Maastricht, the Netherlands
- Telephone: + 31 433881200
- E-mail: j.gulpen@maastrichtuniversity.nl

- To be filled in by the applicant if already known -

1. Information on the applicant

- Initial(s), first name, surname:
- Male/female:
- Current work address:

- Telephone:
- E-mail: WeChat:
- Private address:

2. Details of applicant's home university

Note! A separate letter of recommendation by the supervisor or faculty dean of the home university is required.

- Name of home university:
- Address:
- Telephone:
- E-mail:
- Website (if available):

3. Applicant's home university Master Thesis supervisor:

- Title(s), initial(s), first name, surname:
- Address for correspondence:

- Telephone:
- E-mail: WeChat:

4. Research field(s)

前沿技术 / Frontier Technologies

5. Title of research plan for CSC-UM PhD Programme

Heart Sounds for Heart Failure Monitoring Enabled by Digital Health

6. Short summary of research plan (max. 250 words) (A full plan has to be submitted later)

Background: Limitations in health care systems urge to increase out-of-hospital monitoring of patients. In the aging population, heart failure (HF) is a growing problem. Several kinds of HF are recognized, such as systolic, diastolic and dyssynchronous HF. Previous works from our group showed that innovative analysis of heart sounds can provide useful markers of HF, such as amplitude and frequency contents of heart sounds and heart sound splitting. We were able to derive such variables using simple digital stethoscopes and even smartphones, thus opening the possibility to use those simple apparatus for monitoring patients at home.

Study objective: 1) To characterize heart sound features related to the various forms of HF in patients; and 2) to develop algorithms including machine learning, mobile Apps and (optionally) hardware for improving monitoring of HF.

Expected Results: The study will pave the way for large-scale applications of heart sounds for remote HF monitoring. Expected results include novel algorithms for early identification of HF progression, novel tools (e.g., mobile App and hardware) for large-scale home monitoring of heart failure patients, and novel datasets for exploiting machine learning algorithms. High-impact publications may result from the study.

Requirements: The candidate should have a (bio)medical background with preferably experience in clinical research, computer programming (e.g., Matlab, Python), signal processing and/or machine learning. He/she should be highly motivated with good English and communication skills, able to work in an interdisciplinary environment.

Keywords: Heart failure; heart sounds; digital health; remote monitoring; signal analysis; machine learning; mobile App.

Group's performance:

Google Scholar:

Frits Prinzen: Citations – 19145, H-index – 75;

Hongxing Luo: Citations – 373, H-index – 7.

ResearchGate:

Frits Prinzen: <https://www.researchgate.net/profile/Frits-Prinzen>

Hongxing Luo: <https://www.researchgate.net/profile/Hongxing-Luo>

Top 5 selected publications:

1. Electrical management of heart failure: from pathophysiology to treatment. **Prinzen FW**, Auricchio A, Mullens W, Linde C, Huizar JF. *Eur Heart J*. 2022 May 21;43(20):1917-1927. doi: 10.1093/eurheartj/ehac088. (IF = 36)
2. The 'Digital Twin' to enable the vision of precision cardiology. Corral-Acero J, Margara F, Marciniak M, Rodero C, Loncaric F, Feng Y, Gilbert A, Fernandes JF, Bukhari HA, Wajdan A, Martinez MV, Santos MS, Shamohammdi M, **Luo H**, Westphal P, Leeson P, DiAchille P, Gurev V, Mayr M, Geris L, Pathmanathan P, Morrison T, Cornelussen R, **Prinzen F**, Delhaas T, Doltra A, Sitges M, Vigmond EJ, Zacur E, Grau V, Rodriguez B, Remme EW, Niederer S, Mortier P, McLeod K, Potse M, Pueyo E, Bueno-Orovio A, Lamata P. *Eur Heart J*. 2020 Dec 21;41(48):4556-4564. doi: 10.1093/eurheartj/ehaa159. (IF = 36)

3. Surveillance of COVID-19 in the General Population Using an Online Questionnaire: Report From 18,161 Respondents in China. **Luo H**, Lie Y, **Prinzen FW**. *JMIR Public Health Surveill*. 2020 Apr 27;6(2):e18576. doi: 10.2196/18576. (IF = 15)
4. Left Ventricular Pressure Estimation Using Machine Learning-Based Heart Sound Classification. Westphal P, **Luo H**, Shahmohammadi M, Heckman LIB, Kuiper M, **Prinzen FW**, Delhaas T, Cornelussen RN. *Front Cardiovasc Med*. 2022 May 25;9:763048. doi: 10.3389/fcvm.2022.763048. eCollection 2022. (IF = 6)
5. Smartphone as an electronic stethoscope: Factors influencing heart sound quality. **Luo H**, Lamata P, Bazin S, Bautista T, Barclay N, Shahmohammadi M, Lubrecht JM, Delhaas T, **Prinzen FW**. *Eur Heart J – Digital Health*. (In press)

7. Motivation for CSC-UM PhD application (max. 250 words)

Two letters are required, one from the student and one from the promotion team.

The promotion team has long experience in cardiac electromechanics research and a good publication record. Recently, we are developing novel tools and algorithms for noninvasive remote monitoring of heart failure patients. Based on our ongoing works, the candidate may play a crucial role in developing novel algorithms such as machine learning for out-of-hospital monitoring of heart failure. The candidate may start with analyzing existing data (experimental and clinical, Ref. 4 and unpublished) as well as a large-scale dataset from our digital health study in collaboration with King's College London (Ref. 5), containing over 10 000 heart sounds. Further, the candidate will be involved in new clinical studies investigating the potentials to monitor the various forms of HF.

The promotion team has experience of supervising a Chinese student who has well adapted to Dutch culture rapidly and completed his PhD trainings with excellent performance and publications (Dr. Luo, co-supervisor in this project). We think that a Chinese co-supervisor will significantly improve the coaching of the CSC PhD student. Part of the study may be performed in collaboration with hospitals in China, potentially further improving the collaboration between Maastricht University and Chinese universities. The 4-year PhD trajectory will surely bring unique experience to the candidate and bring exciting progress to our current studies on cardiac signals.

Applicant's Curriculum Vitae (if available)

8. Personal details

Applicant

- Title(s), initial(s), first name, surname:

CSC-UM PhD programme start 1-9-2023

- Surname:

- Nationality: Chinese

- Date of Birth:

- Country and place of birth:

9. Master's degree (if applicable)

Note! Add a copy of your Master's degree to your application

University:

Faculty/discipline:

City and country:

Date:

Grade average:

Title Master's thesis (if applicable):

Thesis grade: