

Summary Statement of 2019 EA-RTM Symposium

"The future of medical engineering collaboration"

Dec 3rd 2019, Co-Creative Innovation Building, Osaka University, Osaka, Japan

The three academies of CAE, NAEK and EAJ exchanged and shared their current situation and future ideas about medical engineering collaboration in this symposium. The discussion was particularly focused on two aspects: 1) to deepen and expand collaboration with various academic fields, 2) to emphasize not only medical practice but also new basic research methods. Rather than specific technical aspects, talks on attempts for social outcomes were especially intended.

Session Summary

(1) Best Practice for Medical Engineering collaboration

As for the first presentation in the session, Prof. Sakata introduced his effort in Global Center for Medical Engineering and Informatics, Osaka University. The core concept of the center is not only to carry out advanced research but also to foster researchers that have multi-disciplinary knowledges and minds.

Then, Prof. Han at Hanyang University, Korea, explained about their achievement regarding wearable robots, which can be one of the most progressed and promising applications of engineering in the medical field.

As for the last speaker of the session, Prof. Cheng at Tsinghua University explained the development of gene chips to detect genetic diseases and its production. That is also one good example of medical-engineering collaboration at commercial level.

At this stage, it seems that commercially available achievements have come to practice in some limited area, and they are recognized as significant contributions to medicine from engineering side. However, since the significance of the collaboration has also begun to be understood from the medicine side, pure medical applications such as diagnosis, dosage, or clinical trials will come soon in practice.

(2) Extending Healthy Life Span

This session focused on the outcome side of medical-engineering collaboration in enhancing quality of life of elderly people. Prof. Kim at Seoul National University introduced his research group's effort on applying mobile and wearable devices in extending healthy life span. It is a very promising area but has many challenges as well.

Secondly, Prof. Li at Chinese Association of Psychology, for Aging Mental Health Division introduced another approach to aging society from psychology side which mainly focuses on improvement of mental health of elder people.

Then, Prof. Nakajima at Tokyo Medical and Dental University explained about future of applications of AI and other information technologies in medical field and its significance. Although there is still a way to go, his university is putting a big emphasis on the field.

Throughout 3 presentations, it was agreed that support of elderly people needs holistic approach by psychology, computer science, electronic engineering and so on. And, of course the key issue in this field is the progress of AI. It is a challenging but promising area in medical-engineering collaboration.

(3) Development of Welfare Engineering

In the third session, contribution of engineering in welfare was discussed. Firstly, Prof. Mei explained application of robotic technologies in advanced rehabilitation, which is also an application of AI.

As for the second lecture, Prof. Yuge at Hiroshima University also introduced their effort on using robots for rehabilitation. Simple but powerful idea to focus on ankle joint has already showed achievements in rehabilitation after stroke and so on. This fact shows that accordingly to the progress of methodologies for rehabilitation, robots have broad applications in the welfare field.

The third lecture from Prof. Kwon at Korea Advanced Institute of Science and Technology was about another important application of robots in medical field, that is the application in robot-assisted surgery.

While the second session was about holistic approach in medical-engineering collaboration, the third session keenly focused on application of robot technologies in medical field. Such approaches are very promising and have already reached to practical use stages. This is clear from the fact that all the three topics have collaborations with private companies and having fruitful results on the practical use of the technologies to patient treatments.

Summary Statement

Throughout all the sessions, it was agreed that medical-engineering collaboration is very significant and clearly necessary in response to the rapidly progressing aging society in three east Asian countries. Although there are many possible areas for collaborations, currently concrete projects can be categorized to some fields. The one is holistic approach from the medicine side which may pick many technologies such as electronics, advanced material for medical applications, sensor technologies, progress of imaging and so on to make efficient diagnosis. AI is the key factor to put this approach into practice. It might be called as “needs-pull” approach. The other is rather specific applications from engineering side which is to apply robotic technologies to rehabilitation support, elderly support and surgery assist. This can be called as “seeds-push” approach.

As for the next step, as well as the deepening of these 2 approaches, new area of medical-engineering collaboration should be considered. In addition, establishment of framework to enable wider application of technologies to human health issues will be necessary. Governmental or public support framework through tax system, insurance, fast and efficient approval of clinical trials will be necessary.

End of Symposium summary