International Science Group
ISG-KONF.COM

MODERN SCIENCE, PRACTICE, SOCIETY

25 MAY 26 XVIII SCIENTIFIC AND PRACTICAL CONFERENCE

BOSTON, USA

DOI 10.46299/ISG.2020.XVIII
ISBN 978-1-64871-446-7

MODERN SCIENCE, PRACTICE, SOCIETY

Abstracts of XVIII International Scientific and Practical Conference

Boston, USA
25-26 May 2020

Library of Congress Cataloging-in-Publication Data

UDC 01.1
The 18 th International scientific and practical conference « MODERN SCIENCE, PRACTICE, SOCIETY » (25-26 May 2020). Boston, USA 2020. 514 p.

ISBN - 978-1-64871-446-7

Published on Bookwire by Bowker
https://www.bookwire.com/

Collection of scientific articles published is the scientific and practical publication, which contains scientific articles of students, graduate students, Candidates and Doctors of Sciences, research workers and practitioners from Europe, Ukraine. The articles contain the study, reflecting the processes and changes in the structure of modern science. The collection of scientific articles is for students, postgraduate students, doctoral candidates, teachers, researchers, practitioners and people interested in the trends of modern science development.

The recommended citation for this publication is:
Aleksandrova N.,the role of managerial culture in the educator's professional growth // Impact of modernity on science and practice. Abstracts of XVIII International Scientific and Practical Conference. Boston, USA 2020. pp. 14-18 pp..

URL: http://isg-konf.com .

FUSION OF VISUAL TRACKING AND INERTIAL MEASUREMENT UNITS FOR MOVEMENT ANALYSIS

Al-Jameel Hussain Ali,
student,
Bachelor's Degree
Department of Biomedical Engineering
Kharkiv National University of Radio Electronics

Hannawi Ali Hussein
student,
Master's Degree
Department of Biomedical Engineering
Kharkiv National University of Radio Electronics

The end of the 20th century and the beginning of the 21st century marked a significant leap in computer technology. Informatization has occupied all areas of human activity. One of the most conservative, and yet one of the most knowledge-intensive areas of human activity is medicine [1-3]. Modern medicine makes tremendous use of the before-mentioned technologies in different areas to resolve various issues [1-5].

One of the important directions of the process of medical diagnosis is the registration of many signs. Among such indicators, a special place should be given to motor activity [1-5]. Human movement is a defining characteristic of a living being. Movement disorders can be caused by various reasons. Therefore, the registration of motor activity is necessary during the examination of a person to assess his state.

To date, optical methods of registration have become widespread [8-9]. They are used in many fields, including medicine. However, the use of IMU is of growing interest. Today, every modern mobile phone has three-axis gyroscope, three-axis accelerometer and compass modules. That is why the use of these methods is increasingly relevant. It should be noted that each of these methods has its drawbacks, so their separate use is associated with difficulties. The development of a combined method should eliminate these shortcomings [10-14].

Therefore, the following block diagram is proposed (Fig. 1). Optical data from cameras (at least two) are used to calculate the position. In parallel, IMU data is also used to calculate the position. All this information is combined in the appropriate block. Specialized probability filters should be used to fuse dissimilar data. After analyzing the available mathematical methods, the most optimal is the use of an extended Kalman filter.

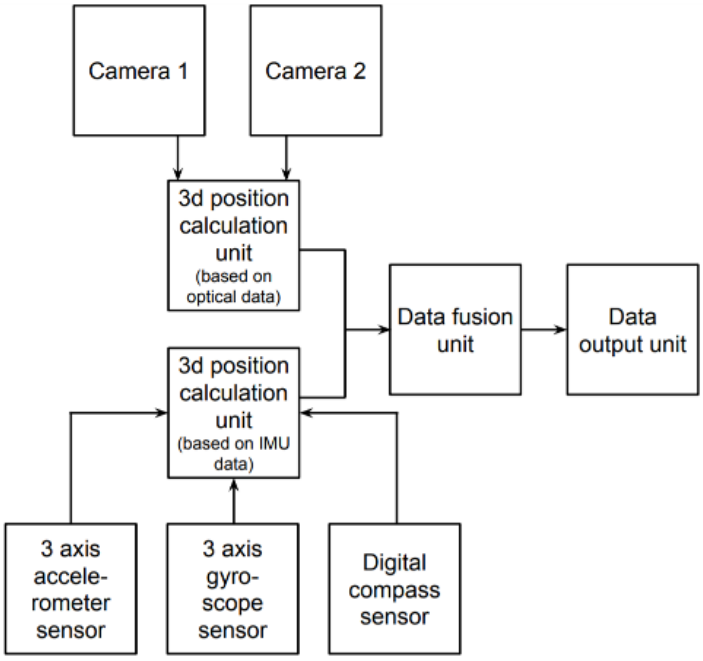

Figure 1 – Block diagram of the motion registration system based on the combination of optical data and IMU data

The study analyzed the possibility of combining these visual tracking and data IMU. The block diagram of a motion registration system based on a combination of visual tracking data and IMU data is proposed. The next stage of research should be numerical modeling of the process of registration of human movements. The prospect of work is the introduction of this method in everyday medical practice.

References

1. Селиванова К.Г. Биотехническая система диагностики состояния мелкого моторного развития / К.Г. Селиванова, Ж.Б Иванченко, О.Г. Аврунин // Вестник Нац. техн. ун-та "ХПИ": сб. науч. тр. Темат. вып. : Новые решения в современных технологиях. – Харьков : НТУ "ХПИ". – 2015. – № 39 (1148). – С. 78-82.

2. Avrunin O.G. A method of computer testing of the level of development of graphic skills / O.G. Avrunin, K.G. Selivanova, Farouk Ismail S. Husham // International Journal of Computer Science and Engineering, 2014; 3 (2). – P. 19-26.

3. Аврунин О. Г. Разработка метода автоматизированного тестирования мелкой моторики ведущей руки на графическом планшете / О. Г. Аврунин, К. Г. Селиванова // Прикладная радиоэлектроника : науч.-техн. журн. – Х. : ХНУРЭ, 2013. – Т. 12, № 3 – С. 459-465.

4. Селиванова К. Г. Экспериментальное исследование тонкой моторики рук с помощью цифрового графического планшета / К. Г. Селиванова // Вестник Нац. техн. ун-та "ХПИ" : сб. науч. тр. Темат. вып. : Новые решения в современных технологиях. – Харьков : НТУ "ХПИ". – 2013. – № 18 (991). – С. 137-143.

5. Селиванова К.Г. Возможности исследования тонкой моторики рук в динамике с помощью графического планшета / К.Г. Селиванова // Сборник материалов докладов «Биотехнические, медицинские и экологические системы и комплексы», Биомедсистемы, 2012. – С. 164-166.

6. Аврунин О. Г. Биомеханическая модель функционирования мышц для определения двигательных нарушений / О. Г. Аврунин, К. Г. Селиванова // Динаміка та міцність енергетичних і сільськогосподарських машин та біотехнічних систем: колективна монографія / за ред. О.В. Горика., С.Б. Ковальчука – П.: Сімон, 2015. – С. 7-10.

7. Selivanova K.G. Method of hand movement testing on graphic tablet / K.G. Selivanova, O.G. Avrunin // Biomedical engineering: I Russian-German conference on Biomedical engineering (RGC-2013), October, 23rd -26th, 2013: proceedings of conference. – Hannover, Germany, 2013. – P. 58.

8. Avrunin O. G. Computer system for testing of fine motor skills / O. G. Avrunin, K. G. Selivanova // Сучасні напрями розвитку інформаційно-комунікаційних технологій та засобів управління // Матеріали п’ятої міжнародної науково-технічної конференції. Полтава: Наукове видання, 2016. – С 44.

9. Казимиров Н. А. Разработка виртуальной системы записи движений рук для определения тремора / Н. А. Казимиров, К. Г. Селиванова // Матеріали 23 Міжнародного молодіжного форуму. Т. 1. – Харків: ХНУРЕ. 2019. – С. 167 - 168.

10. Avrunin, O., Tymkovych, M., Drauil, J. Automatized technique for three-dimensional reconstruction of cranial implant based on symmetry (2015) Information Technologies in Innovation Business Conference, ITIB 2015 –Proceedings, pp.39-42.

11. Avrunin, O. G., Tymkovych, M. Y. (2015). Optimization of neurosurgical access using the digital atlas of intracerebral structures. Vestnik NTU KhPI, 39(1148), 63-67. ISSN: 2079–5459.

12. Avrunin O., Tymkovych M., Kononenko T., Capabilities to Visualize the Operating Region of Surgical Intervention Relatively to Cranial Landmarks for Neuronavigation, EUREKA: Physical Sciences and Engineering, 1 (2016), 21–30.

13. Капля М. А. Возможности применение гироскопа для оценки тремора конечностей / М. А. Капля, Д. А. Костин, М. Ю. Тымкович // XVII Міжнародна науково-технічна конференція «Фізичні процеси та поля технічних і біологічних об’єктів»: матеріали конференції. – Кременчук: КрНУ, 2018. – С. 215-216.

14. 1Тымкович М. Ю. Оптический метод регистрации пространственного положения хирургического инструмента в компьютерной навигационной системе / М. Ю. Тымкович // Вестник Нац. техн. ун-та "ХПИ" : сб. науч. тр. Темат. вып. : Новые решения в современных технологиях. – Харьков : НТУ "ХПИ". – 2013. – № 18 (991). – С. 124-130.