PACMAN

Portable male fertility analysis tool based on the measurement of concentration and mobility of sperm

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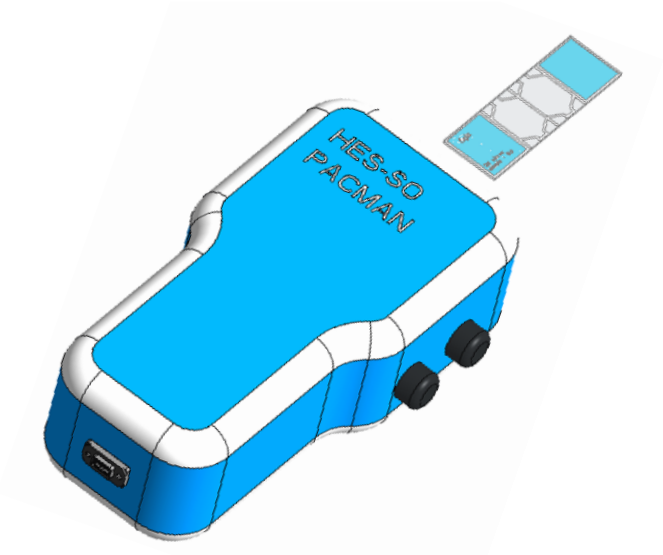
Brief description

The objective of this project is to design a portable low-cost device, usable outside the conditions of laboratory, allowing essential measurements of concentration and mobility of human and animal sperm. The technology developed must guarantee a standardized, reliable and rapid analysis, meeting the standards in force.

Key points

- Measurement of concentration and mobility
- Compatible with commercial sperm counting slides (Leja®)
- Compatible with human or animal samples
- Portable point-of-care device (handheld)
- Stand alone system (battery or USB powered)
- Display compatible with Laptop or Tablet screens
- Low-cost
- For laboratory and external use (sturdy)
- Computer-Assisted Sperm Analysis (CASA) software



Overview of the system prototype

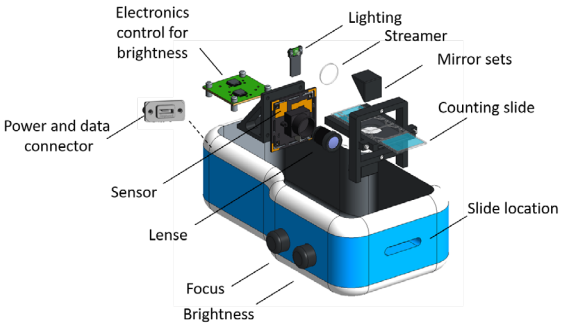
Human male infertility has increased alarmingly on one hand, and on the other hand, artificial insemination in farm animals has become prevalent. In this context, the PACMAN project's objective is to design a portable low-cost device, usable outside laboratory conditions and making it possible to carry out essential measurements like the concentration and mobility of spermatozoids. The developed technology must guarantee a standardized, reliable and rapid analysis that meets the standards in force. Obviously, medical and veterinary practices will be interested in this type of equipment.

To guarantee minimum cost and maximum accessibility, the device will only include the necessary optical, mechanical and electronic parts. It will be accompanied by a mobile application, on which the pre-processing and analysis of the images will be carried out. It will also allow the user to control the device and be guided through the image acquisition process.

To achieve this result, we offer the following innovations:

- use of lighting based on colored LEDs to allow sufficient contrast and to be able to skip or limit the stages of sample preparation;
- use of pre-processing algorithms to improve the acquired images in order to guarantee a sufficient quality, enabling the analysis to determine the relevant parameters (concentration and mobility);
- adaptation of existing analysis techniques and algorithms to allow operation with images acquired under the conditions of the device, in a remote location on a smartphone.

The proposed solution clearly differs from similar devices existing on the market because they only allow to measure the concentration and are not certified for use in diagnostic purposes.



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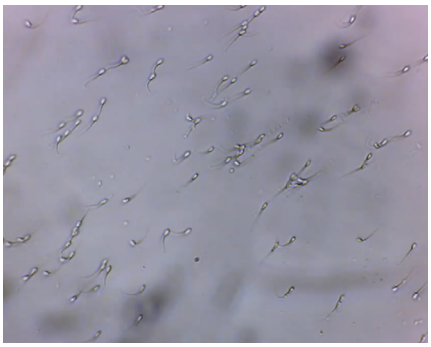

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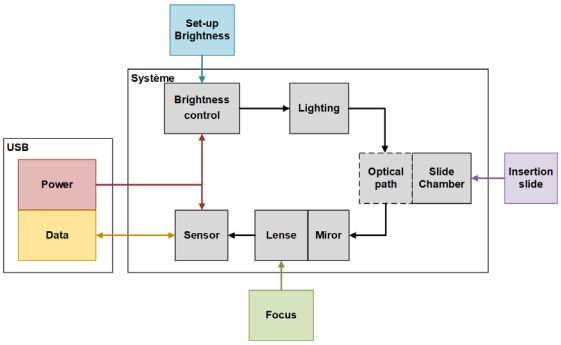

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Output

Various applications are expected to benefit from the PACMAN project: the company AKYmed, leader in CASA software in Switzerland, will test and validate the system. The device could also be used for cell counting purposes in cell culture.

Special equipment

Electronic, microtechnical and mechanical equipment
Data acquisition, data transmission and data analysis

Legends

1 - Exploded view of the system prototype
2 - Pig sperm sample captured with the system
3 - Block diagram of the system

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