

A novel approach for remote monitoring of heart beat rate, respiratory rate and chewing activity in cows

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The ability of dynamic extraction of bio-medical parameters is very appealing. We have been able to develop a revolution technology that is based upon fast camera and small laser light source that allows the extraction and the separation of bio-medical parameters remotely, starting from short distances and to up to distances of few hundreds of meters. The approach is very modular and it does not apply any constraints regarding the orientation of the biological object or its relative position to the detection device. The optical setup doing the detection is very simple and versatile. The approach was already successfully demonstrated in reconstruction of various bio-medical parameters and sound sources on humans and animals using on-the-shelf components, while the target volume of the device for short distance applications is less than 1 cm³. The aim of this work was to perform feasibility study of remote measurement of cows' pulse (heart beat rate and shape), breath rate and chewing activity from a close distance of 30cm-2m by using the above mentioned remote monitoring technology. The future application is the development of tiny optical sensor for biomedical monitoring of cows for better optimization of their fertilization and milking processes. We tested two cases: a cow was located once at a distance of approx. 30cm and secondary at 2m from the optical sensing device. A laser beam was pointing to the neck of the cow. A reference measurement based on Polar watch readout was taken from the central body area of the cow. For breathing detection a laser beam was pointing to the stomach of the cow. In Fig. 1 one may see the image of the experimental setup used in the tests.



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