



# A Concept of Smart Ergonomics System for Increasing Labor Efficiency

ITMO University, Russian Federation

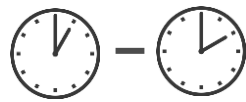
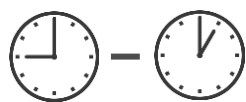
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- Growth of technologies such as IoT, BigData, ML
- Industry 4.0 shifts labor to higher-level tasks
- Related to business, healthcare, education, lifestyle etc.
- Non-classic, agile and individual approach
- Aims at increasing human potential



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- Sleepy

- Can't relief

- Scattered

- Inaccurate

- Dissatisfied

- Overtime work

## Consequences

- ⊗ Depression

- ⊗ Procrastination

- ⊗ Insomnia

- ⊗ Passive Lifestyle

- ⊗ Distraction

- ⊗ Conflicts

Disturbances in the working dynamic stereotype, **negative** emotions and **lower productivity**

## Collect Data IoT, CV

## Analyze and Predict Big Data, ML

## Affect Proactively IoT, AR/VR, Robotics



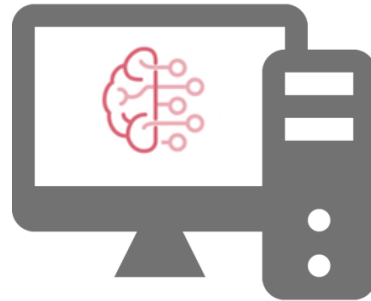
Brain  
Activity  
Breath  
Heart  
rate



Events  
Sleep rate



Environment



Individual  
Scenarios






Warnings  
Recommendations



Proactive Adjustment



Learn

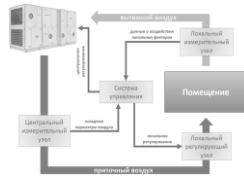
Static	Passive	Active	Autonomous	
<ul style="list-style-type: none"><li>• Scientific knowledge about human and it's bio-rhythms</li><li>• Generally accepted principles for improving work efficiency</li><li>• Organization specifics</li><li>• Specific employee profile</li></ul>	<ul style="list-style-type: none"><li>• Iterative information retrieval</li><li>• Slowly changing environment</li><li>• Helps to form a long-term picture</li></ul>	<ul style="list-style-type: none"><li>• Applies to individual parts of the workflow or the entire working day</li><li>• Highest measurement frequency</li><li>• Highest reading accuracy</li></ul>	<ul style="list-style-type: none"><li>• Context of measurements is out of the working day</li><li>• Can be analyzed throughout a whole person's life</li><li>• Improve accuracy and efficiency of other sources</li></ul>	
	 <p>FOCI – Wearable Breath Tracker (Concentration)</p>	 <p>Tobii – Eye Tracking Solutions (Awareness)</p>	 <p>Emotiv – Brain Data Measuring (Excitation)</p>	 <p>Garmin – Heart Rate Monitoring (Stress Level)</p>

Static	Passive	Active
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- Ensuring stable quality working conditions
- It can be universal for large groups of workers
- May act as a requirement outside the business day

- Applied outside the workflow: during preparation, rest or between tasks
- Long lasting effect
- Difficult to dose

- They are applied directly in the process of work.
- Aimed at maintaining high productivity
- Wide dosing range
- Depend on dynamic status indications



Adaptive  
Conditioning



Lighting  
Color and Intensity



Aromatization



Sounds  
and Music



Kinesthetics

- Principles of Smart Ergonomics and SEMS are formulated
- Impact methods and information sources are analyzed and classified
- Technologies described
- List of scientific materials with the justification of the principles is formed

- Development and broadening the concept of Smart Ergonomics
- Research of additional information sources and effect methods
- Research of scenarios of increasing work efficiency
- Development of SEMS prototype



**Thank you for your attention!**

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**UNIVERSITY**