**DEVELOPMENT OF A NON-INVASIVE BABY SLEEP MONITORING AND INTELLIGENT CONTROL SYSTEM FOR THE PREVENTION OF UNEXPECTED DEATH IN PREVIOUSLY HEALTHY BABIES AND EARLY DETECTION OF RISKY SITUATIONS**

FP7-SME-2013 BSG-SME (Research for SMEs) Grant Agreement Nº 606088

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**Summary description of project context and objectives**

Sudden Infant Death Syndrome (SIDS) is the highest cause of death in the post-neonatal period (between 2nd and 6th month of life). Only in Europe, each year 2 400 infants still die of SIDS, an unexpected disease happening to infants who die in their sleep with no evidence of accidental asphyxia, inflicted injury or organic disease; being a multifactorial syndrome mainly related to overheating, prolonged apnea, gastroesophageal reflux or inadequate bedding system and posture. In addition, SIDS is ten times more frequent within preterm newborns, around 385 000 babies per year are born preterm in Europe.

BabyCareSleep project aims to develop a novel non-invasive intelligent monitoring system to prevent unexpected deaths in previously healthy infants and to detect risky situations in an early stage. Integrated in the cot through biosensing textiles, matrix of sensors will detect the most relevant biological parameters that will enable the detection of potential risky situation and performing preventive actions. The preventive actions will be comprise by early-warning advices to parent and by a system that will stimulate sufficiently the baby’s instinct to breath (generate a sleep arousal) avoiding infant’s hypoxia and resuming breathing activity; and will be so gentle to not awake the baby from sleep.

As a result, the SMEs will strength their competitive position facing foreign competition, achieving cumulative benefits during the four year of post-project commercialization over €10 million. In addition, our proposed system will help to avoid dramatic situations in families and at the same time will give confidence to parents by a non-invasive and cot-integrated monitoring and warning system that will improve their quality of life.

BabyCareSleep project counts with all the involved SMEs through the supply chain (textiles, electronic communication, mattresses and a paediatrician sleep clinic); with RTDs of biomechanics, smart textiles and intelligent control systems; and with the support of an association for paediatric research.

The project, which will be finished after two years, has currently ended the first 9 months of work.

**Description of work performance and main results**

In WP1, the definition of requirements of paediatricians and parents, a first proposal for user interfaces and the description of use cases have been performed. In addition, the first tests with babies gave promising results about the stimulation system being able of generate an arousal without awaking the babies. This first prototype of stimulation system has been developed under the activities of WP2.

In addition, first lab working prototypes of biosensing textiles have been obtained in WP3. While in WP4, a first lab scale system for the sensor box has been developed to interface with the sensors and test the signals coming from the sensors being researched and developed.

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The BabyCareSleep project is still being executed, developing now trials with babies to define the proper stimulation for each case and the matrix of biosensing textiles in communication with the control system.

Expected final results and potential impacts

The fulfilment of BabyCareSleep project will produce a number of key innovations with direct applications to products and services of the participating SMEs. Those innovations are embedded into the five results that the BabyCareSleep project will generate:

- **R1:** Smart real-time biosensing textile.
- **R2:** Intelligent Control System.
- **R3:** Risk Assessment and Actuation Algorithm for SIDS prevention.
- **R4:** Management and Control User-friendly Interface.
- **R5:** BabyCareSleep integrated system.

Wider benefits at European level

In addition, our project will contribute to wider societal benefits derived from the use of the BabyCareSleep system by preterm newborns for the prevention of SIDS death. The more important ones are:

*Reduction of SIDS infant deaths*

Over the 5 years post project, 76 babies' life will be saved in a very conservative case-scenario where 60% of deaths for monitored babies can be avoided thanks to the BabyCareSleep system. In addition, in a scenario where the use of BabyCareSleep system is fully extended (100% of market penetration), it could save up to 1.426 babies' life.

Furthermore, our system will not only save babies' life, but also avoid the fatal consequences for those parents who lose a baby. The death of a child is one of the worse experiences that a parent could suffer and it is even more traumatic if it is unexpected as it is outlined in a study from the journal of Pediatric Child Health.

*Overall increase of the quality of life*

The continuous monitoring will ease the parents and reduce their stress because the system developed will not only prevent the SIDS but also will do continuous health monitoring and advice newborns’ parent, providing crucial parameters for early detection of unnoticed events, and possible complications. This easiness and stress reduction will lead also to increase quality of life for more than 5M European infants and their families (about 5.4 millions of newborn per year in Europe).

More information and contact details

Coordinator contact details are the following:

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More information about the project can be found at: http://babycaresleep.com

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