

## **2020 Virtual WITSA Global ICT Excellence Awards Nomination Form**

### **AWARD CATEGORIES:**

Awards will be given to individuals, academics, businesses, NGOs, government branches etc., on the basis of particular programs, web sites, strategies of ICT / Internet deployment; i.e. the awards will not be political but technical, honoring use and implementation of technology in accordance with the criteria described below (i.e. a government per se will not be a “winner”, but one of its integrated web sites or services may be). The winners may not necessarily represent the most advanced technology solutions, but should be excellent examples of ICT deployment which have made a difference for the community of interest (whether providing public services, boosting profits or advancing connectivity):

Please note that nominees will be judged on the basis of the following criteria and weighting:

<b>Judging Criteria</b>	<b>Weighting</b>
Global Impact/Potential	30%
Scalability	30%
Innovative Features and Functionalities	10%
Proven Solution	30%

### **7. Innovative eHealth Solutions Award**

#### **Award Criteria:**

This Award recognizes Individuals, healthcare institutions, academic institutions, corporations, NGOs or governments that have made remarkable and successful efforts at utilizing ICTs as a tool to promote health and health care such as telehealth, mHealth (mobile health), eHealth or through eLearning, electronic health records, big data, legal frameworks, or social media. Solutions utilized may range from provision of information to keep citizens healthy, to support for public health in communities, care and support systems in health facilities, and from all the above the data needed to inform management and policy-makers.

#### **REASONS FOR NOMINATION** (please justify why you think your candidate is qualified):

Belun™ Ring is an innovative and user-friendly platform with medical grade accuracy for sleep health conscious users and suspected obstructive sleep apnea (OSA) patients. Fully utilizing ICT, a scalable cloud-based artificial intelligence (AI) platform with user friendly interface motivates users to check and monitor sleep health anywhere anytime. Lower cost comparing with

traditional medical checking system and fully automated process speed up the assessment time and treatment process. It is no doubt that it can help to promote smart and healthy living to the general public.

### **The challenge and a global problem**

People with obstructive sleep apnea (OSA) tend to be sleep deprived. They may suffer from sleeplessness and a wide range of other symptoms such as difficulty in concentrating, depression, irritability, sexual dysfunction, learning and memory difficulties, and falling asleep while at work, on the phone, or driving. Untreated OSA is associated with high blood pressure, heart attack, congestive heart failure, cardiac arrhythmia, stroke and depression.

Prevalence of OSA worldwide in both men and women is 15% to 20% of people over age 40, i.e. about 261M to 435M population. However, more than 80% of them are undiagnosed. Traditional sleep test is expensive, labor intensive, cumbersome and uncomfortable for patients. Patients need to stay overnight in a sleep lab connecting with more than 20 sensors on the body. Technician is required to set up the device for patients and data analysis is done manually by the technician after data collection.

The inaccessibility to sleep disorder diagnosis remains to be a huge challenge to public health, costing the healthcare system billions of dollars in associated co-morbidity and mortality.

### **How Belun solves the problem**

Belun® Ring is an FDA-cleared medical graded wearable device for assessing people's sleep quality with high accuracy. It is ergonomic designed to continually collect biometric data on finger during sleep without interruption to the user. It is a breakthrough technology with cloud-based AI analytics in sleep medicine practice which enables patients and healthcare providers to screen OSA and assess treatment effectiveness easily, comfortably and economically at home, as compared to the traditional sleep test in the hospital/clinic. Patients and their healthcare providers are empowered to track treatment progress remotely, motivating adherence to disease management programs. Belun® Ring also assesses how daily habits, e.g., exercise, alcohol intake and medication would affect users' sleep quality reflected by activity of autonomic nervous system (ANS).

Belun® Ring collects biometric data during sleep, which is uploaded to our cloud-based analysis platform. Our cloud-based artificial intelligence system automatically analyzes the data and generates sleep reports assessing the severity of OSA and activity of ANS. Reports are available to the patients or their healthcare providers within 5 minutes, significantly saving the time of labor interpretation by the healthcare providers and the waiting time of patients. Belun® Ring enables remote diagnosis and monitoring of treatment progress.

### **How Belun makes a difference**

Belun Ring is ergonomic designed and won Red Dot award and 6 others awards in 2018 with its design and innovation. It is the first wearable medical-grade FDA-cleared device for sleep assessment at home comfortably. With only a single step, Belun® Ring can be easily managed by any person.

Light-weighted (10g) Belun® Ring is handy to be worn at night. It provides accurate and convenient sleep health assessment but at an affordable cost. After overnight sleep data collection, data is uploaded to Belun® cloud system and a sleep report assessing the risk of OSA

is automatically generated through proprietary AI platform. Through mobile network and cloud-based data analytics, users manage their sleep health at home and physicians remotely monitor their patients' treatment effectiveness and progress.

Belun® Ring enhances patient accessibility and motivation of sleep health and sleep disorder screening, empower physicians with remote monitoring, leads patients to early and adherent treatment at an affordable cost.

### **Proven in the healthcare market**

Belun® Ring has been cleared by the U.S. FDA as a class II medical device.

Belun® Ring has been validated in 3 clinical studies for its accuracy in detecting OSA as compared to traditional hospital test, with correlation close to 0.9. There are 3 on-going studies for pregnant women, post-stroke patients and post OSA surgery patients in HK, Taiwan and the US respectively.

Belun Sleep Platform has generated more than 3000 sleep reports in 2 years. Helping many people to get access to professional sleep study and start intervention early.

### **A scalable solution for global public health**

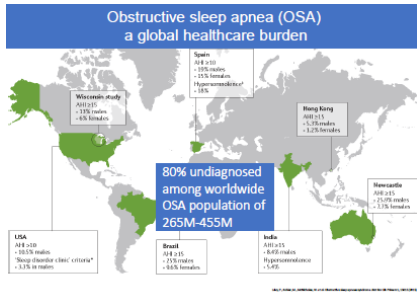
Belun is partnering with medical device distributors, sleep medicine centres, insurance companies, elderly homes, health check centres, mental rehab centres, and NGOs to make Belun® Ring available globally. Belun's regulatory strategy in getting its clearance with the U.S. FDA allows us to enter several important markets in an accelerated pace.

More than 300M worldwide population is suffering from OSA. Both sufferers and medical professionals are looking for accessible, reliable and affordable solution. The need for sleep test will continue to grow with aging population and increasing prevalence of chronic diseases.

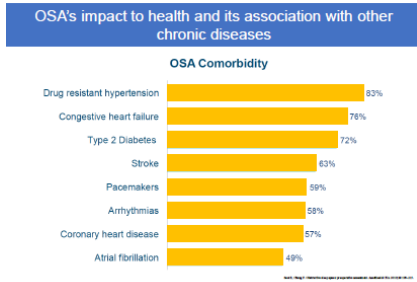
Belun's cloud-based AI platform is built with scalable architect which can process overnight biometric data and generate sleep report for more than 100K users at the same time from different countries. This platform will support worldwide users 24/7 anywhere anytime.

**SUPPORTING INFORMATION:** Please send any supporting information to the address above, including information from candidate (i.e. excerpt from program description, web site print-out, press release, etc.)

Attachment 1: OSA as a global problem and Belun Ring as a solution to early intervention.

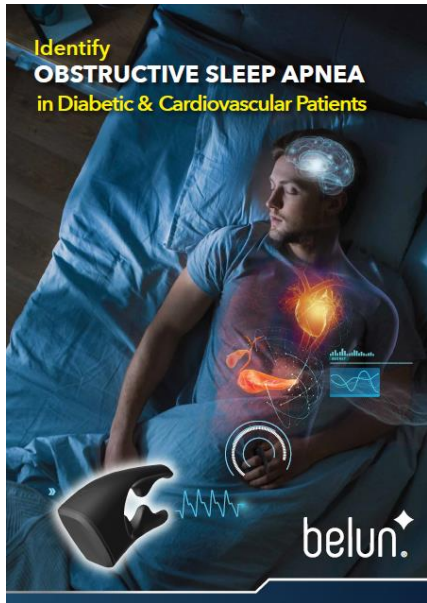


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|---|--|
| <b>Traditional medical device</b> <ul style="list-style-type: none"> <li>• Expensive</li> <li>• Cumbersome set up</li> <li>• Labour intensive</li> <li>• Uncomfortable for users</li> </ul> | <b>Belun Ring</b> <ul style="list-style-type: none"> <li>• AI analytics via mobile network</li> <li>• Comfortable &amp; easy for users</li> <li>• Lower cost</li> <li>• Enable telecare</li> </ul> |
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- FDA-cleared medical device
- Ergonomic wearable
- Comfortable and easily done at home by yourself
- Data upload through mobile network
- Cloud-based AI analytics
- Empower healthcare providers and patients
- Remote monitoring of treatment progress

Attachment 2: OSA co-exists with diabetes and cardiovascular diseases but mostly undiagnosed.



### OSA IS A COMMON DISORDER

The estimated prevalence of OSA (AHI ≥15) was 5.3% among middle-aged men in Hong Kong<sup>12</sup>

The prevalence of OSA (AHI ≥15) increased to 29.9% among the community elders in Hong Kong<sup>13</sup>

• Signs and symptoms of OSA include\*

- Excessive daytime sleepiness
- Morning headache
- Insomnia with repeated awakenings
- Snoring
- Nocturia

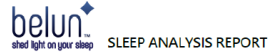
**HOWEVER, THE RATE OF UNDERDIAGNOSIS IN OSA IS UP TO 80%<sup>14</sup>**

• The following barriers limit the use of polysomnography (PSG) and also the diagnosis rate of OSA

- High cost<sup>15</sup>
- Cumbersome procedure<sup>16</sup>
- Unpleasant experience to patients<sup>17</sup>
- Labor intensive<sup>18</sup>

Attachment 3: Sleep analysis report generated by Belun's cloud-based AI platform.

# Interpretation of the Belun Ring Sleep Report



User Information		SevereCase	
User ID		Age/Sex	50/M
Height	170 cm / 5' 7"	Weight	72.0 kg / 158.8 lbs
BMI	24.91 kg/m <sup>2</sup>	Ring Size	11

Test Information	
Start Time	2020-02-21 00:16 (UTC+8)
End Time	2020-02-21 07:15 (UTC+8)
Total Recording Time (TRT)	416.5 mins

Sleep Summary	
bAHI	70.8 /hr
Total Sleep Time (TST)	374.5 mins
Sleep Efficiency (TST/TRT)	89.9 %
Min. SpO <sub>2</sub>	≥ 70 %
SpO <sub>2</sub> < 90% (T90)	83.7 mins

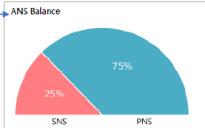
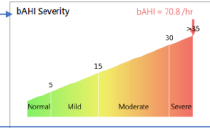
Personal data is entered as optional after the home sleep test. Data will not be transferred to Belun.

User information is entered before the home sleep test. Data will be transferred to Belun.  
 - User ID is unique to each sleep test.

Severity levels of OSA according to AASM:  
 - Normal: AHI of <5  
 - Mild OSA: AHI of 5-15  
 - Moderate OSA: AHI of 15-30  
 - Severe OSA: AHI of >30

Overall activities of sympathetic and parasympathetic nervous system during all night.

Optional field for medical history, diagnosis or recommendation. Data will not be transferred to Belun.



Comments/Conclusion

**bAHI**  
 belun Apnea and Hypopnea Index, expresses the number of respiratory events per hour of actual sleep which has been shown to be an accurate estimate of AHI. AHI is the recommended measurement for the severity of Obstructive Sleep Apnea (OSA), by the American Academy of Sleep Medicine (AASM). The index includes the following respiratory events as measured by polysomnography:  
 Apnea: Cessation of breathing for 10 seconds or more during sleep.  
 Hypopnea: Reduction of breathing followed by an oxygen desaturation of at least 4%.