

Human-Aware Spaces. Spaces that feel people

Indoor location technology without mobile phones or wearable sensors for human flow analytics, tracking, security, environment interaction, and beyond

Indoor location based services (ILBS) are a growing global market with a promising future. The applications are endless: human flow analytics, tracking, security, environment interaction, immersiveness, geofence, etc. to be applied in offices, museums, airports, railways, trade fairs, hospitals, hotels, shopping centers, industry, and more. The Grupo de Tratamiento de Imágenes (GTI) has developed a novel indoor location technology based on deep learning and computer vision to sense humans without mobile phones or wearable sensors. True information is collected from people indoors, unlike other existing solutions in the market, since no collaboration is required by people by using their mobile phones or wearing sensors for acquiring their location. The accuracy is higher or comparable to that achieved by the best sensor-on-human based indoor location technology.

Our technology is supported by patents, scientific studies, and projects, such as the "Living lab demonstrator for the bank office of the future" for the Santander Group, ISBAN, and PRODUBAN.

Technology solution supported by the Technical University of Madrid

Technology solution

Intelligent indoor location technology that convert any room in a smart space capable of feeling people without any collaboration or sensor on human. All the existing indoor locations technologies in the market require that people wear a sensor or mobile phone for their localization.

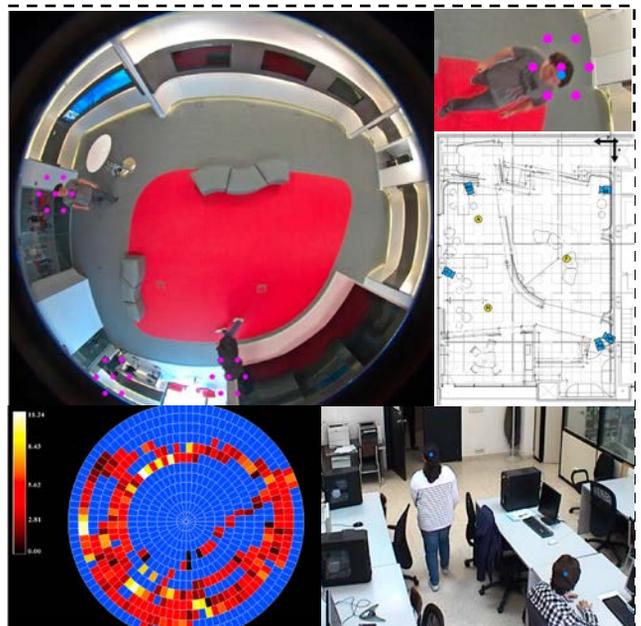
Our technology is based on the latest deep learning and computer vision algorithms to offer a transparent, non collaborative, and non-intrusive human localization with an accuracy in the range of centimeters.

The applications are endless: human flow analytics, tracking, security, space interaction, immersiveness, geofence, etc. ready to be used in offices, museums, airports, railways, trade fairs, hospitals, hotels, shopping centers, industry, and more.

Areas of application

- **Health:** staff and patient monitoring, space analytics.
- **Security:** geofence, restricted areas, overcrowded situations.
- **Transport:** flow analytics and hot spots in airports, railways, shopping centers, museums, office, industry, etc.

"The only human indoor location technology without any sensor-on-human requirement for flow analytics, tracking, security, environment interaction, and beyond"



Market demands

- Indoor location-based service (ILBS) has attracted much attention in recent years due to its social and commercial values. Application seem to be endless.
- Traditional outdoor localization, such as GPS, do not work well indoors with obstacles and room partitions. And the existing indoor localization technologies must face several challenges to achieve a high localization accuracy (within meter range).
 - Most of them are unable to achieve such accuracy.
- However, there exists even a bigger problem: all the existing indoor localization technologies in the market require the use of active sensors. People can only be located and tracked if they carry a sensor or mobile phone, and agree to share their data.
 - 55% of people disagree or strongly disagreed to cede their information to stores to create a picture of them to improve the provided services (Annenberg School for Communication).
 - About seven in 10 people disagree that it was fair for a store to monitor their online activities in exchange for free Wi-Fi while at the store (The New York Times).
 - With 45% of mobile users enabling Bluetooth across devices, North America boasts of some of the highest rates of Bluetooth usage across the globe (BeaconStat).
- Explicit or implicit people collaboration is unrealistic in security applications, and problematic in other applications that presume that people have their sensors/mobile phones always operative (battery issues, Wi-Fi or Bluetooth turn off, privacy agreement, etc.).
- Previous limitations seriously restrict the quality and utility of the obtained location and tracking data.
 - Only a fraction of the people is actually located and tracked: inaccurate and biased statistics.

"All the existing indoor localization technologies in the market require the use of active sensors and the collaboration of the own people to be localized and tracked"

Market potential

- The global market is expected to grow from USD 15.04 Billion in 2016 to USD 77.84 Billion by 2021, at a Compound Annual Growth Rate (CAGR) of 38.9% (MarketsandMarkets).
- A new industry has sprung up selling "indoor-location" services to retailers. There is money to be made in tracking shoppers' paths inside stores (The Economist).
- Main technological companies are aware of this opportunity:
 - Google has an indoor positioning tech in the works, called VPS (TechCrunch).
 - Apple hopes to enhance maps with indoor location and drone data collection (SearchEngineLab).

Competitive advantages

- Any room can be converted in a smart space capable of feeling people and obtaining valuable statistics.
- Transparent, non collaborative, and non-intrusive human localization with and accuracy in the range of centimeters.
 - 100% of people can be monitored.
 - Actual and accurate statistics.
- Applications are endless: human flow analytics, tracking, security, space interaction, immersiveness, geofence, etc. ready to be used in offices, museums, airports, railways, trade fairs, hospitals, hotels, shopping centers, industry, and more.
- Cost effective and easy deployment.
 - Save up to 80% in locations with existing camera networks.

References

- The Grupo de Tratamiento de Imágenes (GTI) has more than 35 years of experience in image processing, computer vision, visual communications, and multimedia telecom applications.
- Broad participation in European and national research projects.
- Collaboration with relevant international companies: Airbus, Nokia, Telefonica, Indra, etc.
- Living lab demonstrator for "the bank office of the future" for the Santander Group, ISBAN, and PRODUBAN.

IPR

- Patent pending in Spain.

Development stage

- Concept
- R & D
- Lab Prototype
- Industrial Prototype
- Production

Contact Human-Aware Spaces

Carlos R. del Blanco, Pablo Carballeira
e: cda@gti.ssr.upm.es; pcl@gti.ssr.upm.es
w: <http://gti.ssr.upm.es>

UPM contact

Innovation, Commercialization and
Entrepreneurship Area
Centre of Support for Technological Innovation
– UPM
e: innovacion.tecnologica@upm.es