

Technology Transfer Group

3D Reconstruction from Full Motion Video (FMV) for Terrain Awareness

Objective

This innovation is a new means to achieve domain awareness in 3D, which is a very desirable feature in many applications from mission planning, forensics, video games, archeology, all the way to disaster relief applications. It was developed by the IT group as part of AVNTK's intelligence, surveillance and reconnaissance (ISR) program. The algorithm is capable of extracting a 3D model from FMV with maximum accuracy/points or in real time using a reduced set of points for the reconstruction process. It automatically calculates relative camera position at each frame and tracks multiple features in order to generate a point-cloud, from which a 3D surface is formed. Multiple video feeds (combined with ground level intelligence photographs if available) can be used to carry out the reconstruction of 3D target data. This technology has potential applications in industrial, military, environmental, forensics and even entertainment areas.

Technology Advantages

Often a suitable satellite capable of imaging a region of interest might be many hours in arriving to a site of interest and SAR/LIDAR systems, although available aboard large unmanned vehicles, are expensive, limited in number and not generally available at short notice. Also, significant difficulties arise as cameras, such as those on unmanned vehicles webcams or smart phones, typically have imaging systems that need to be corrected for in order to make reconstruction viable, illumination changes through the data acquisition process or when using previously acquired video arises, and often vibration and relative movement often means that the target might come in and out of the field of view or be partly blocked by other features such as buildings or nearby mountains, further complicating matters! This system, on the other hand, can be carried by the smallest UAV, obtain 3D information from any video or photograph sequence of an objective, from many positions; even if the camera vibrates, loses the objective temporarily, etc. Occlusion/Obscuration is also contemplated. It also has the capability to compare to stored CAD information and align the object accordingly, by determining the pose and orientation of objects from images. The feature correspondence and pose calculations are done in an efficient iterative process.

Commercial Partner

We are looking for partners related to the defense, video games, inspection equipment or other industries that might advantageously use this technology. 3D information from video or still photography is potentially useful for many industries.

Approach

AVNTK ISR is looking to license and/or provide support services and consultancy for companies to include this technology within their products. In particular we are looking at defense applications in unmanned vehicles, industrial inspection and video games. Under an exclusive field-of-use license, AVNTK ISR will identify a specific customer base for application of the products made using the 3D-from-video technology. They will develop applications and demonstrate their effectiveness to customers primarily in the aforementioned industries. Upon acceptance, the products and/or services using the products will be sold to the customers, allowing them to exploit the benefits.

AVNTK Benefits

This technology brings the same benefits as a LIDAR system or a synthetic aperture radar (SAR) at a fraction of the cost to many applications for which it was impractical/prohibitively expensive in the past, such as disaster relief, archaeology, forensics, policing, fire fighting, etc. A competitive advantage could well be gained also in everyday use of commercial products such as games and production inspection. This technology was developed by AVNTK primarily for the defense market where its use gives the warfighter a significant tactical advantage.

TTG Role

Marketed the invention to industry through AVNTK ISR.
Provides industry with status of licensing availability.
Negotiates and finalizes license agreement.
Innovators presented the technology at the UAS Paris Conference in 2010.

Status

Available for licensing from AVNTK ISR

Point of Contact

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