**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI**
**SHORT ABSTRACT OF THESIS**

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## SHORT ABSTRACT


With the huge advancement in Internet technology as well as the availability of low cost 3D display devices, 3D image, and video transmission becomes popular in recent times. Since watermarking has been regarded as one of the potential digital right management (DRM) tools in the last decade; 3D image and video watermarking becomes an emerging research topic. In recent times, depth image based rendering (DIBR)-3D and depth based multi view 3D representation (MVD) are two popular 3D representations. In this dissertation, the entire thesis is primarily motivated to propose robust 3D image or video watermarking schemes for DIBR-3D and MVD representations against different hostile and non-hostile attacks.

In the first work, watermarking issues against 3D-HEVC compression and the view synthesis attack have been considered. It is observed from the literature that the most of the existing 3D video watermarking schemes not suit well against 3D-HEVC compression which is a state-of-art MVD based 3D video compression scheme. In the first phase of our first contributory chapter, a 3D video watermarking scheme has been proposed which can resist 3D-HEVC compression by employing independent view regions (Z-axis) based embedding. In the later part of this chapter, the proposed scheme has been extended to resist view synthesis attacks by exploiting the shift invariance property of the dual tree discrete wavelet transform (DT-DWT) for embedding.

In 3D representation, depth is a crucial information and thus securing depth is an important requirement. In the first part of this chapter, a watermarking scheme is proposed to secure depth information of the DIBR-3D image representation by SIFT based embedding zone selection procedure. This work has been extended for video in the next part of this chapter by employing MCDCT-TF to reduce temporal noise in 3D-HEVC representation.

In recent literature, it is understood that view synthesis process in multi-view 3D representation can destroy the embedded watermark for most of the existing schemes. As a countermeasure, in the third chapter of this thesis, a view invariant image watermarking scheme has been proposed with efficient embedding zone selection by employing dependent view region identification and layer based depth partitioning algorithms.

In the fourth chapter of this dissertation, different depth based attacks such as depth modifications, depth blurring, changing baseline distance etc. have been considered along with view synthesis attack. In this chapter, a 3D image watermarking scheme has been proposed to resist against these attacks by exploiting the shift invariance and directional property of the dual tree complex wavelet transform (DT-CWT) transformation.

Finally, the thesis is concluded by briefly summarizing the works presented in the dissertation and explaining the possible future research directions.