

REAL-TIME RENDERING OF FACIAL SKIN COLOURS TO ENHANCE  
REALISM OF VIRTUAL HUMAN

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This dissertation is dedicated to my family especially my father Prof. Dr. Hazim Ameen Alkawaz, my mother and my best friend Miss Lijah binti Rosdi for their endless support and encouragement.

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## **ABSTRACT**

The research on facial animation has grown very fast and become more realistic in term of 3D facial data since the laser scan and advance 3D tools can support for creating complex facial model. However, that approaches still lacking in term of facial expression based on emotional condition. Facial skin colour is one parameter that gives an effect to increase the realism of facial expression, since it's closely related to the emotion which is happens inside the human. This research provides a new technique for facial animation to change the colour of facial skin for the avatar based on linear interpolation by referring to the previous works which are (Jung *et al.*, 2009; Kyu-Ho and Tae-Yong, 2008; Nijdam, 2006), also describes facial animation and the emotion that is related to the facial skin changes like blushing, anger or even sadness. The result of colour generation is comparable to the real human expression; furthermore it's also able to enhance the appearance of facial expression of the virtual human.

## **ABSTRAK**

Penyelidikan mengenai animasi wajah telah berkembang pesat dan menjadi lebih realistik dari segi data 3D wajah sejak imbasan laser dan kemajuan alat 3D boleh menyokong untuk mewujudkan model muka yang rumit. Walau bagaimanapun, masih kurang pendekatan dari segi ekspresi wajah berdasarkan keadaan emosi. Warna kulit muka adalah salah satu ukuran yang memberi kesan untuk meningkatkan kesahihan ekspresi muka, kerana ia berkait rapat dengan emosi yang berlaku di dalam manusia. Kajian ini menyediakan teknik baru animasi wajah untuk menukar warna kulit wajah avatar berdasarkan perantara selaras dengan merujuk kepada kajian-kajian sebelumnya iaitu (Jung et al, 2009; Kyu-Ho dan Tae-Yong, 2008; Nijdam , 2006), juga menerangkan animasi wajah dan emosi yang berkaitan dengan perubahan kulit wajah seperti malu, marah atau sedih. Hasil dari penciptaan warna adalah setanding dengan reaksi manusia sebenar, tambahan pula ia juga dapat meningkatkan penampilan ekspresi wajah manusia maya.