



# **Laporan Akhir Projek Penyelidikan Jangka Pendek**

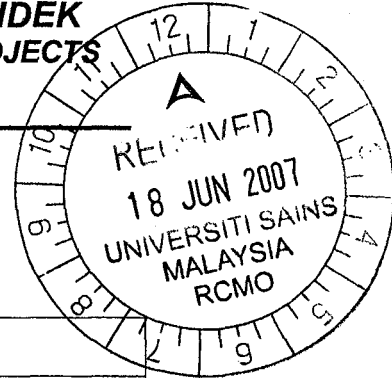
## **Image Data Compression using DCT (Discrete Cosine Transform) and Interpolation and Allied Topics in Digital Image Processing Applied to Satellite Imaging**

**by**

**Dr. Pabbisetti Sathyanarayana**

**Dr. Aftanasar Md Sahar**

**LAPORAN AKHIR PROJEK PENYELIDIKAN JANGKA PENDEK**  
**FINAL REPORT OF SHORT TERM RESEARCH PROJECTS**



1) **Nama Ketua Penyelidik :**  
*Name of Research Leader :* **Dr. PABBISSETTI SATHYANARAYANA**

Ketua Penyelidik <i>Research Leader</i>	PTJ <i>School/Centre</i>
<b>Dr. PABBISSETTI SATHYANARAYANA</b>	<b>Aerospace Engineering/ Engineering campus</b>

**Nama Penyelidik Bersama**  
*(Jika berkaitan) :*  
*Name/s of Co-Researcher/s*  
*(if applicable)*

Penyelidik Bersama <i>Co-Researcher</i>	PTJ <i>School/Centre</i>
<b>Dr. AFTANASAR Md SAHAR</b>	<b>Aerospace Engineering/ Engineering campus</b>

2) **Tajuk Projek :** .....  
*Title of Project:*

**Image data compression using DCT(Discrete cosine transform) and interpolation and allied topics in Digital Image Processing applied to satellite Imaging.**

.....

3)

### **Abstrak untuk penyelidikan anda**

(Perlu disediakan di antara 100 – 200 perkataan di dalam Bahasa Malaysia dan Bahasa Inggeris. Ini kemudiannya akan dimuatkan ke dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & luar).

#### *Abstract of Research*

*(Must be prepared in 100 – 200 words in Bahasa Malaysia as well as in English. This abstract will later be included in the Annual Report of the Research and Innovation Section as a means of presenting the project findings of the researcher/s to the university and the outside community)*

Digital image processing plays an important role in modern scientific endeavors. It has specific uses in satellite imaging, remote sensing, telemetry and medical imaging. Image processing requires huge memory space to store the data, and to process the data in real time high speed computers are required. For transmission, the channel capacity requirement is much more stringent. To circumvent such problem in storage and transmission one of the methods is to compress the data as much as possible before transmission and after reception decompression is to be applied with out loss of much information. The compression process can be carried out by using DCT (Discrete cosine transform), Discrete Hartley transform and also Discrete Fourier transform. Algorithms are developed for all the three methods. Matlab software is used for the compression and decompression process. Numbers of images are tested for the process. Detailed analysis is carried out. Mean square error estimation of the image obtained by compression and decompression process is carried out with respect to the original image. Interpolation is the other technique to recover the original image from the sampled image. Interpolation in two dimensions is the method to recover replica of the original image from the sampled image. There are different methods to implement interpolation. 2-D FFT is used for this and for this method also error estimation is done and compared with other methods.

- 4) Sila sediakan Laporan teknikal lengkap yang menerangkan keseluruhan projek ini.  
 [Sila gunakan kertas berasingan]  
*Kindly prepare a comprehensive technical report explaining the project  
 (Prepare report separately as attachment)  
 Refer to Attachment -1*

Senaraikan Kata Kunci yang boleh menggambarkan penyelidikan anda :  
*List a glossary that explains or reflects your research:*

Bahasa Malaysia

Bahasa Inggeris

Discrete cosine transform  
 Discrete Hartley Transform  
 Image compression  
 Interpolation  
 Mean square error  
 Image processing

- 5) **Output Dan Faedah Projek**  
*Output and Benefits of Project*

- (a) \* **Penerbitan (termasuk laporan/kertas seminar)**  
*Publications (including reports/seminar papers)  
 (Sila nyatakan jenis, tajuk, pengarang, tahun terbitan dan di mana telah diterbit/dibentangkan).  
 (Kindly state each type, title, author/editor, publication year and journal/s containing publication)*

1. International Conference: "Image data compression techniques using discrete Hartley type transform and FFTs: A comparison", Pabbiseti Sathyanarayana, Hamid R. Saheedipour, Aftanazar Md. Sahar and Radzuan Razali, International Conference on Robotics, Vision, Information and Signal Processing, (ROVISP-2005) 21-22 July 2005 Pinang, Malaysia

2. International Conference: "Data compression techniques using CAS-CAS transform applied to remotely piloted vehicle (RPV) digital images before transmission to ground station", Pabbiseti Sathyanarayana, Hamid R. Saheedipour, and K.S. Rama Rao 9<sup>th</sup> International Conference on Mechatronics Technology (ICMT-2005) 2005, 5-8 December 2005, Kuala Lumpur, Malaysia.

3. International Conference: "Digital image compression and decompression using three different transforms and comparison of their performance", Pabbiseti Sathyanarayana, and Hamid R. Saheedipour, International Conference on Man-Machine Systems (ICoMMS2006), 15-16 September 2006. Langkawi, Malaysia

- (b) **Faedah-Faedah Lain Seperti Perkembangan Produk, Prospek Komersialisasi Dan Pendaftaran Paten atau impak kepada dasar dan masyarakat.**  
*Other benefits such as product development, product commercialisation/patent registration or impact on source and society*

Different methods of image compression and decompression are tested and merits and demerits of them are also discussed. The algorithm is developed. The implementation in real time using hard ware and software is to be developed as further work in this project.

- \* Sila berikan salinan  
 \* *Kindly provide copies*