HELMET COMPLIANCE DETECTION USING COMPUTER VISION FOR SAFER ROADS

A Thesis Project
presented to the Faculty of
College of Computer Studies

In Partial Fulfillment of the Requirements
for the degree Bachelor of Science in Computer Science

By
Dela Justa, Aina Mae F.
Epres, Caren Joy L.
Matubis, Maria Angela N.

May 2025

APPROVAL PAGE

In partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science, this research entitled **HELMET COMPLIANCE DETECTION USING COMPUTER VISION FOR SAFER ROADS** prepared and submitted by **Dela Justa, Aina Mae F.**, **Epres, Caren Joy L.**, **Matubis, Maria Angela N.**, , has been examined and is recommended for approval and acceptance.

<u>**ADVISER NAME**</u>

Adviser

This research project entitled, **HELMET COMPLIANCE DETECTION USING COMPUTER VISION FOR SAFER ROADS**, in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science has been examined and is recommended for acceptance and approval for ORAL EXAMINATION.

RESEARCH COMMITTEE:

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ACCEPTED and **APPROVED** in partial fulfillment of the requirements in Bachelor of Science in Computer Sciencewith a grade of 90.

KAELA MARIE N. FORTUNO, MIT

Dean, College of Computer Studies

Date:_____

DEDICATION

Ad Majorem Dei Gloriam

ACKNOWLEDGMENTS

ABSTRACT

Title: Helmet Compliance Detection Using Computer Vision for Safer Roads

Authors: Dela Justa, Aina Mae F.
Epres, Caren Joy L.
Matubis, Maria Angela N.

Number of Pages: **??**

School: Camarines Sur Polytechnic Colleges

Degree Conferred: Bachelor of Science in Computer Science

Keywords: amet, consectetur, adipisci velit

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CHAPTER 1

INTRODUCTION

Background of the Problem

It is common knowledge that the star closest to Earth is the Sun, and also that the Sun is yellow. It is this yellow sunlight which is interesting for some of its properties [2] [3]. For instance, plants, algae, and cyanobacteria convert this light into energy via photosynthesis. In **??** is a photo of a galaxy which contains many stars.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{1.1}$$

Figure 1: **Barred spiral galaxy NGC 1300**

??

The stars in the sky are of particular interest to the aptly named S.T.A.R. Labs, which in many recent experiments has shown promising results in converting this energy in a non-photoelectric sense into usable energy [4]. Interestingly, Scientific and Technological

Advanced Research Laboratories (S.T.A.R. Labs) has theorized that the famous superhero known as "Superman" converts the light from our sun, which grants his fantastic abilities. There are many methods in industry for converting the sun's energy (of about $1000\,\text{W/m}^2$) into electrical energy. Some of these are highlighted in **??** [5].

Table 1
This is a table

installation	type	capacity (GW)	location
Longyangxia Dam	photovoltaic	0.85	China
Gansu Wind Farm	wind	6	China
Sihwa Lake	tidal	0.254	South Korea

Statement of the Problem

Enter the statement of the problem here. To cite a study add a bib entry in the references.bib, then use this code [1] to cite the study.

Objectives of the Study

General Objective

Enter your General Objective here.

Specific Objectives

More Specifically, this study aims to:

1. To write this research paper

2. To present it in the title defense.

Significance of the Study

Write your Significance of the study here.

Scope and Limitation

State the scope and limitation of your study here.

Project Dictionary

The Project Dictionary contains the technical terms that defined the conceptual and operation of this study:

- **Convolutional Neural Network (CNN, or ConvNet).** is a class of artificial neural network, most commonly applied to analyze visual imagery. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on the shared-weight architecture of the convolution kernels or filters that slide along input features and provide translation equivariant responses known as feature maps.

- **Digital image processing** is the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital imais the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmges through an is the use of a digital computer to process digital images is the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmis the use of a digital computer to process digital images through an algorithmthrough an algorithmis the use of a digital computer to process digital images through an algorithmalgorithmis the use of a digital computer to process digital images through an algorithm [3].
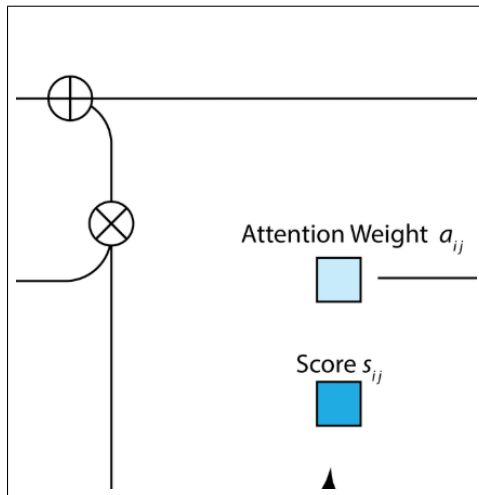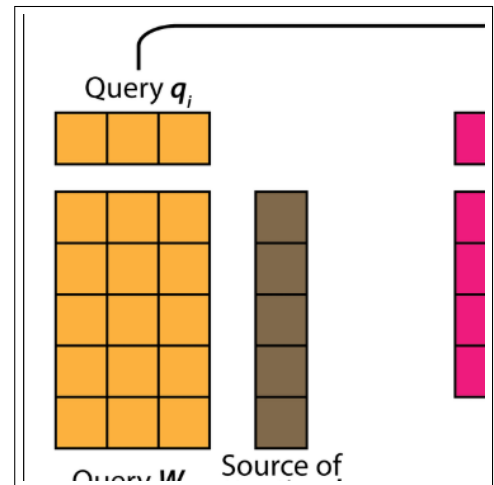
(a) **Caption for subfigure a**
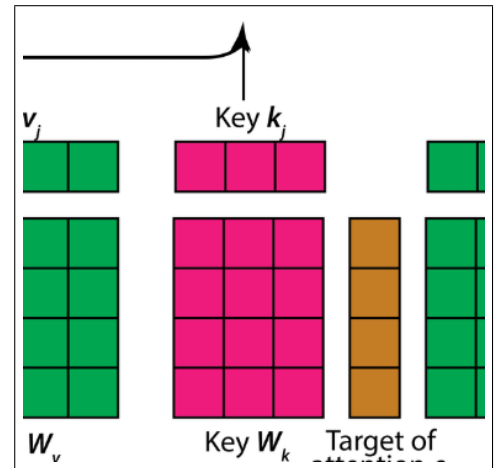
(b) **Caption for subfigure b**
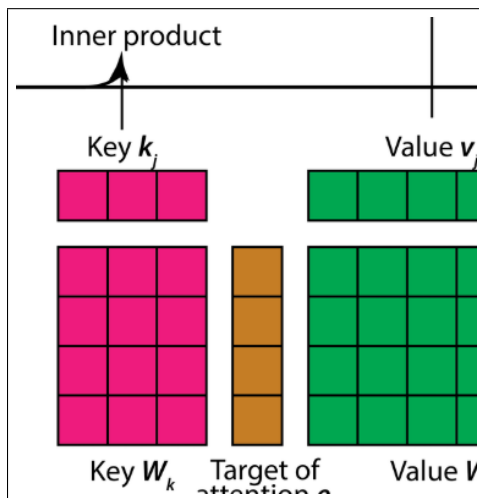
(c) **Caption for subfigure c**

(d) **Caption for subfigure d**

Figure 2: **Main caption for the entire figure showcasing four different aspects.**

This is sample in-text citation of **??** and **??**.

Notes

[1]   [n. d.] Biblatex - How to use biber. Retrieved Feb. 16, 2022 from https://tex.stackexchange.com/questions/26516/how-to-use-biber.

[2]   Joseph Jessie S. Oñate and Marianne Ang-Tolentino. 2021. Exploring RAU-net for semantic segmentation of Philippines satellite images in identification of building density. en. *International Journal of Remote Sensing*, (Nov. 2021), 1–19. DOI: 10.1080/01431161.2021.1986239.

[3]   Gregory D Scholes, Graham R Fleming, Alexandra Olaya-Castro, and Rienk Van Grondelle. 2011. Lessons from nature about solar light harvesting. *Nature chemistry*, 3, 10, 763. doi:10.1038/nchem.1145.

[4]   dssdsd ssdsdsd dssdsd. 2012. *Solid Waste Management and Flooding in Nabua*. Ph.D. Dissertation.

[5]   [n. d.] Techopedia: Educating IT Professionals To Make Smarter Decisions. (). Retrieved Jan. 24, 2023 from https://www.techopedia.com/.

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CHAPTER 2

RELATED LITERATURE AND STUDIES

The process of data collection began with analysis of the physical principles underlying optical light emission. For illustration purposes, see **??**.

Review of Related Literature and Studies

Depending on the energy of a photon, it may be referred to as "light" (in the case of optical photons) or as something else – for example, a gamma ray. By convention, there are many names for these particles Allen and West [2019].

Low-energy photons

The lowest energy electromagnetic radiation is carried by radio waves.

Intermediate-energy photons

These include several types of radiation, including the usually-harmful.

Microwaves

Microwaves have wavelengths on the order of 1×10^{-2} m, or a few cm.

Visible light

Visible light is that which is detectable by the human eye, with wavelengths about $380\,\mathrm{nm}$ to $750\,\mathrm{nm}$.
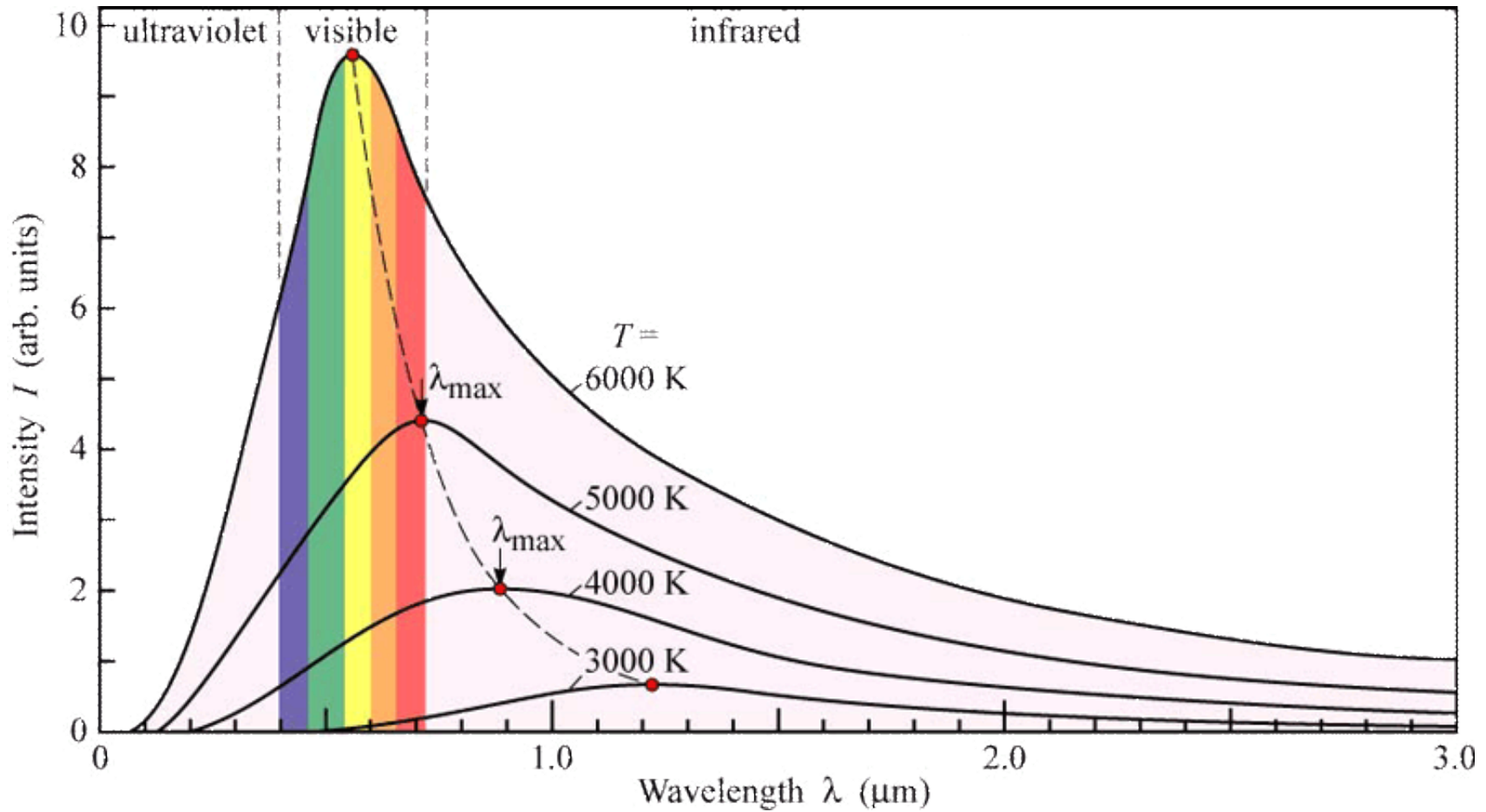
Figure 3: **Spectra of black-body radiation at various temperatures, according to Wien's displacement law [1].**

Figure 4: **Barred spiral galaxy NGC 1300 photographed by Hubble telescope. While the galaxy in the photo is not our sun, it does emit light, much like our sun. Image credit: NASA.**

Notes

[1]   Milton Abramowitz and Irene A. Stegun. 1964. *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*. (ninth Dover printing, tenth GPO printing ed.). Dover, New York City.

[2]   Barry Allen and Wally West. 2019. Attosecond-length perception of events toward truly sustainable energy. eng. *Journal of Ultrafast Physics*, 42, 1, 43–45.

CHAPTER 3

METHODOLOGY

Figure 5: **Barred spiral galaxy NGC 1300 photographed by Hubble telescope. While the galaxy in the photo is not our sun, it does emit light, much like our sun. Image credit: NASA.**

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CHAPTER 4

RESULTS AND DISCUSSION

Figure 6: **Barred spiral galaxy NGC 1300 photographed by Hubble telescope. While the galaxy in the photo is not our sun, it does emit light, much like our sun. Image credit: NASA.**

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CHAPTER 5

CONCLUSION

Figure 7: **Barred spiral galaxy NGC 1300 photographed by Hubble telescope. While the galaxy in the photo is not our sun, it does emit light, much like our sun. Image credit: NASA.**

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Milton Abramowitz and Irene A. Stegun. 1964. *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*. (ninth Dover printing, tenth GPO printing ed.). Dover, New York City.

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APPENDICES

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APPENDIX A

LANGUAGE EDITING CERTIFICATION

This is to certify that the undersigned has reviewed and went through all the pages of the
Bachelor of Science in Computer Science thesis manuscript titled
"Helmet Compliance Detection Using Computer Vision"
of **Dela Justa, Aina Mae F.**, **Epres, Caren Joy L.**, **Matubis, Maria Angela N.**, as
against the set of structural rules that govern research writing in accord with the
composition of sentences, phrases, and words in the English language.

JUAN DE LA CRUZ

Language Editor

Date:_____

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APPENDIX B

SECRETARY'S CERTIFICATION

This is to certify that the undersigned has provided accurate recommendations, suggestions, and comments unanimously agreed and approved by the panel of examiners during the oral examination of the thesis titled

"ENTER YOUR TITLE HERE"

prepared and submitted by **AuthorName1**, **AuthorName2**, **AuthorName3**, and that the same have not been amended, modified or obliterated.

MS. MARIA DAISY R. BELARDO

Secretary

Date:_____

APPENDIX C

JOINT AFFIDAVIT OF UNDERTAKING (PLAGIARISM)

JOINT AFFIDAVIT OF UNDERTAKING

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VITA

- **Joseph Jessie S. Oñate** is a faculty member of the College of Computer Studies. He finished his Master of Science in Computer Science degree at Ateneo de Naga University. His research interests focused on Intelligent Systems, Algorithm and Complexity, Web Technologies, Computer Vision, and Graphics.

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