I. J. Information Engineering and ElectronicBusiness, **2022, 6, 1-4**
Published Online on December 8, 2022 by MECS Press (http://www.mecs-press.org/)
DOI: 10.5815/ijieeb.2022.06.01

Design of Automated Fuel Consumption Recording System Based on Optical Character Recognition (OCR) and Blockchain Hyperledger Fabric

Kenny Aldi*
Faculty of Computer Science, Nusa Mandiri University, Depok, Indonesia
E-mail: 14240022@nusamandiri.ac.id
ORCIDiD: https://orcid.org/0000-xxxx-xxxx-xxxx
*CorrespondingAuthor

Kursehi Falgenti
Faculty of Computer Science, Nusa Mandiri University, Depok, Indonesia
E-mail: kursehi.falgenti@nusamandiri.ac.id
ORCIDiD: https://orcid.org/0000-xxxx-xxxx-xxxx

Nasir Hamzah
Faculty of Computer Science, Nusa Mandiri University, Depok, Indonesia
E-mail: nasir.hamzah@nusamandiri.ac.id
ORCIDiD: https://orcid.org/0000-xxxx-xxxx-xxxx

Ragil Yulianto
Faculty of Computer Science, Nusa Mandiri University, Depok, Indonesia
E-mail: ragil.yulianto@nusamandiri.ac.id
ORCIDiD: https://orcid.org/0000-xxxx-xxxx-xxxx

Muhammad Firmansyah
Faculty of Computer Science, Nusa Mandiri University, Depok, Indonesia
E-mail: muhammad.firmansyah@nusamandiri.ac.id
ORCIDiD: https://orcid.org/0000-xxxx-xxxx-xxxx

Received: Date Month, Year; Revised: Date Month, Year; Accepted: Date Month, Year; Published: Date Month, Year

Abstract: Efficiency and transparency in fuel consumption recording have become major challenges in the logistics sector, as receipt verification processes are still performed manually and are susceptible to input errors and data manipulation. This research proposes an automated fuel consumption recording system based on Optical Character Recognition (OCR) and Blockchain Hyperledger Fabric. OCR technology is used to automatically extract data from fuel receipt photos using PaddleOCR, while blockchain serves as an immutable ledger layer to maintain data integrity and traceability. The system workflow begins with drivers submitting receipt photos through n8n workflow automation, followed by text extraction by OCR, multi-layer validation by admin and finance personnel, and final recording to the Hyperledger Fabric network. The system is implemented using Docker-based microservices architecture that integrates OCR Service, Database (MongoDB), and Fabric Network. Test results demonstrate that the system can extract text effectively, accelerate the validation process, and enhance transparency and reliability of fuel transaction recording. This research is expected to provide a practical solution for digitalization of logistics administrative processes based on AI and Blockchain.

IndexTerms: Fuel, Blockchain, Hyperledger Fabric, Logistics, OCR, Document Automation, PaddleOCR

1. Introduction

In the era of logistics industry digitalization, efficiency and transparency have become primary factors in operational management, including in the aspect of recording and reporting fuel consumption. Drivers in logistics companies typically refuel at various Public Fuel Filling Stations (SPBU), then submit purchase receipts to the administration department for

validation and reconciliation with previously approved fund requests. This procedure is traditionally still manual and relies on human accuracy, which potentially leads to recording errors, process delays, and transaction data manipulation.

The main problem with this conventional method lies in the lack of automation and reliable verification systems. Human errors such as incorrect nominal input, loss of physical receipts, or validation mistakes frequently occur and cause data inconsistencies. Additionally, the validation process that must be performed by two parties—admin and finance—results in lengthy transaction verification completion times. In the scale of logistics companies with high transaction volumes, this can create significant administrative burden and hinder operational efficiency.

Along with the development of artificial intelligence technology, one approach that can be used to address this problem is Optical Character Recognition (OCR). OCR technology is capable of extracting text information from documents or images automatically, making the data recording process faster and more accurate. In this context, OCR is used to recognize important data on fuel receipts such as SPBU number, transaction date, volume, and total price. However, although OCR can accelerate the digitalization process, challenges related to data authenticity and integrity still need to be addressed.

To ensure the integrity of OCR extraction results, Blockchain technology, particularly through Hyperledger Fabric, is implemented as a security and transparency layer. Blockchain provides an immutable transaction recording mechanism, so that each OCR result data stored will have a digital trace that can be verified by all related parties. This integration between OCR and Blockchain produces a system that is not only efficient, but also accountable and resistant to manipulation.

In this research, an automated fuel consumption recording system based on OCR and Blockchain is developed. The workflow begins with drivers sending fuel receipt photos through communication platforms such as WhatsApp. The images are automatically processed using n8n automation to be directed to the OCR Service running in Docker containers using PaddleOCR. The extraction results are temporarily stored in MongoDB and subsequently verified by two user layers, namely admin and finance. After validation is complete, the final data will be recorded into the Hyperledger Fabric network as permanent and distributed transactions.

The integration of this system is expected to overcome problems of delays and administrative errors, as well as create a fuel transaction validation mechanism that is fast, transparent, and reliable. Thus, this research contributes to the development of AI and Blockchain-based digital solutions to support document automation processes in the logistics sector, while opening opportunities for broader application in financial auditing, e-procurement, and other digital transaction verification systems.

1.1. Full-Sized Camera-Ready (CR) Copy

Paper size: prepare your CR paper in full-size format, on A4 paper (210 x 297 mm, 8.27 x 11.69 in).

First page margins: top = 30 mm (1.18 in), bottom, left and right = 20 mm (0.79 in).

Other pages margins: top = 2.5 mm (0.98 in), bottom, left and right = 20 mm (0.79 in).

Type sizes and typefaces: Follow the type sizes specified in Table 1. As an aid in gauging type size, 1 point is about 0.35 mm. The size of the lowercase letter "j" will give the point size. Times New Roman has to be the font for main text. Paper should be single spaced.

Paragraph indentation: first-line 7.4 mm (0.3 in). For Abstract and Index Terms, no first-line indentation.

Alignment: left- and right-justify. Left-Aligned your table captions, figure captions. Center-justy your tables and figures. Use automatic hyphenation and check spelling. Digitize or paste down figures.

Title: use 24-point Times New Roman font. Its paragraph description should be set so that the line spacing is single with 6-point spacing before and 6-point spacing after. Use two additional line spacings of 10 points before the beginning of the Introduction section, as shown above. A title of article should be the fewest possible words that accurately describe the content of the paper. The title should be succinct and informative. Do not use acronyms or abbreviations in your title. Avoid writing long formulas with subscripts in the title.

Section headings: should be 11-point, Times New Roman Font, Bold, Left-aligned and numbered with Arabic numerals (1, 2, 3, . . . , except for Acknowledgement and References), followed by a period, two spaces, and Each word (except for Prepositions, Pronouns) first letter should be capitalized, others lowercase. The paragraph description of the section heading line should be set for 12 points before and 12 points after. The section or subsection headings should be typed on a separate line, e.g., 1. Introduction.

Table 1. Type Sizes for Camera-Ready Papers

Type size (pts.)	Appearance		
	Regular	Bold	Italic
6	Table captions, a table superscripts		
8	Section titles, tables, table names, first letters in table captions, figure captions, footnotes, text subscripts, and superscripts		
9	References, authors' biographies		
10	Authors' affiliations, main text, equations, first letters in section titles		Subheading
11		Authors' names Section headings	
24	Paper title		

1.2. PDF Creation

The PDF document should be sent as an open file, i.e. without any data protection.

Please do not use the Adobe Acrobat PDFWriter to generate the PDF file. Use the Adobe Acrobat Distiller instead, which is contained in the same package as the Acrobat PDFWriter.

Make sure that you have used Type 1 or True Type Fonts (check with the Acrobat Reader or Acrobat Writer by clicking on File $>$ Document Properties $>$ Fonts to see the list of fonts and their type used in the PDF document).

As always with a conversion to PDF, authors should very carefully check a printed copy.

2. Helpful Hints

2.1. Figures and Tables

Position figures and tables at the center of the page. Figure captions should be Left-Aligned below the figures; table captions should be Left-Aligned above. Avoid placing figures and tables before their first mention in the text. Use the abbreviation "Fig. 1," even at the beginning of a sentence.

Fig 1. Note how the caption is centered in the column.

To figure axis labels, use words rather than symbols. Do not label axes only with units. Do not label axes with a ratio of quantities and units. Figure labels should be legible, about 9-point type. Color figures will be appearing only in online publication. All figures will be black and white graphs in print publication.

2.2. References

Number citations consecutively in square brackets [1]. No punctuation follows the bracket [2]. Use "Ref. [3]" or "Reference [3]" at the beginning of a sentence:

Give all authors' names; use "et al." if there are six authors or more. Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. In a paper title, capitalize the first word and all other words except for conjunctions, prepositions less than seven letters, and prepositional phrases.

For papers published in translated journals, first give the English citation, then the original foreign-language citation [6].

For on-line references a URL and time accessed must be given.

At the end of each reference, give the DOI (Digital Object Identifier) number as long as available, in the format as "doi:10.1518/hfes.2006.27224"

2.3. Footnotes

Number footnotes separately in superscripts $^{1,2,\cdots}$ Place the actual footnote at the bottom of the column in which it was cited, as in this column. See first page footnote for an example.

Dates of manuscript submission, revision and acceptance should be included in the first page footnote. Remove the first page footnote if you don't have any information there.

2.4. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Do not use abbreviations in the title unless they are unavoidable.

2.5. Equations

Equations should be centered in the column. The paragraph description of the line containing the equation should be set for one-line spacings before and after. Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). Italicize Roman symbols for quantities and variables, but not Greek symbols. Punctuate equations with commas or periods when they are part of a sentence, as in

$$a + b = c \tag{1}$$

Symbols in your equation should be defined before the equation appears or immediately following. Use ”(1),” not ”Eq. (1)” or ”equation (1),” except at the beginning of a sentence: ”Equation (1) is ...”

2.6. Other Recommendations

Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) If your native language is not English, try to get a native English-speaking colleague to proofread your paper. Do not add page numbers.

2.7. A Quick Checklist

- **Paper size**=A4; **Fisrt Page Margins**: top=3 cm, bottom=left=right=2 cm; **Other Pages Margins**: top=2.5 cm, bottom=left=right=2 cm.
- For the whole document (”Ctrl-A” to select the whole document), **Font Type**=Times New Roman, do **NOT** use any Asian font type like SimSun in formulas, section numbers (1, 2, 3, ...), list numbers (1), 2), (1), (2), ...), or punctuation marks (”,”, ”.”, ”:”, ”;”, ”(”, ”)”, ...). Check Word Count (on the status bar at the bottom of the window) to ensure the number of Asian Characters (including textboxes and footnotes) is 0.
- In Paragraph settings for the whole document (”Ctrl-A” to select the whole document), **Line spacing** must be ”Single”, ”Snap to grid” must **NOT** be checked.
- In Paragraph settings for main text except section titles, **Indentation** left=right=0, first line=0.74 cm; **Spacing** before=after=0, not blank line between paragraphs.
- **Title and authors**: font style=regular NOT bold NOT italic; font size for title is 24 point, with 6 spacing before & after, for authors names font size is 11, bold, affiliations font size is 10.
- **References**: strictly follow the instructions in Section 3.2.
- **Biographies**: it is strongly recommended adding for each author a short bio to the end of the paper.

Appendix A Appendix Title

Appendixes, if needed, are numbered by A, B, C... Use two spaces before APPENDIX TITLE.

Acknowledgment

The authors wish to thank A, B, C. This work was supported in part by a grant from XYZ.

References

[1] G. Eason, B. Noble, and I. N. Sneddon, ”On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” *Phil. Trans. Roy. Soc. London*, vol. A247, pp. 529-551, April 1955.

[2] J. Clerk Maxwell, *A Treatise on Electricity and Magnetism*, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68-73.

[3] I. S. Jacobs and C. P. Bean, ”Fine particles, thin films and exchange anisotropy,” in *Magnetism*, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271-350.

[4] K. Elissa, ”Title of paper if known,” unpublished.

[5] R. Nicole, ”Title of paper with only first word capitalized”, *J. Name Stand. Abbrev*., in press.

[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, ”Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” *IEEE Transl. J. Magn. Japan*, vol. 2, pp. 740-741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7] M. Young, *The Technical Writer’s Handbook*. Mill Valley, CA: University Science, 1989.

Authors' Profiles

Kenny Aldi includes the biography here.

Kursehi Falgenti includes the biography here.

Nasir Hamzah includes the biography here.

Ragil Yulianto includes the biography here.

Muhammad Firmansyah includes the biography here.

How to cite this paper: Kenny Aldi, Kursehi Falgenti, Nasir Hamzah, Ragil Yulianto, Muhammad Firmansyah, "Design of Automated Fuel Consumption Recording System Based on Optical Character Recognition (OCR) and Blockchain Hyperledger Fabric", International Journal of Information Engineering and Electronic Business(IJIEEB), Vol.14, No.6, pp.1-4, 2022. DOI:10.5815/ijieeb.2022.06.01