Asian Journal of Control, Vol. 00, No. 0, pp. 1Doc-Start–5Rules of usesubsection.8.2, Month 2008
Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/asjc.0000

–Demonstration–

A DEMONSTRATION OF THE LaTeX 2$_\varepsilon$ CLASS FILE FOR THE *ASIAN JOURNAL OF CONTROL*†

A. N. Other

ABSTRACT

This paper describes the use of the LaTeX 2$_\varepsilon$ asjcauth.cls class file for setting papers for the *Asian Journal of Control*.

Key Words: *Asian J. Contr.*, class file, LaTeX 2$_\varepsilon$.

I. INTRODUCTION

Many authors submitting to research journals use LaTeX 2$_\varepsilon$ to prepare their papers. This paper describes the asjcauth.cls class file which can be used to convert articles produced with other LaTeX 2$_\varepsilon$ class files into the correct form for publication in the *Asian Journal of Control*.

The asjcauth.cls class file preserves much of the standard LaTeX 2$_\varepsilon$ interface so that any document which was produced using the standard LaTeX 2$_\varepsilon$ article style can easily be converted to work with the asjcauth style. However, the width of text and typesize will vary from that of article.cls; therefore, *line breaks will change* and it is likely that displayed mathematics and tabular material will need re-setting.

In the following sections we describe how to lay out your code to use asjcauth.cls to reproduce the typographical look of the *Asian Journal of Control*. However, this paper is not a guide to using LaTeX 2$_\varepsilon$ and we would refer you to any of the many books available (see, for example, [1, 2, 3]).

Manuscript received July 8, 2008.

The author is with the Journals Production Department, John Wiley & Sons, Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK.

This class file was developed by Sunrise Setting Ltd, Torquay, Devon, UK. Website: http://www.sunrise-setting.co.ukwww.sunrise-setting.co.uk

†Please ensure that you use the most up to date class file, available from the ASJC Home Page at
http://www3.interscience.wiley.com/journal/117933310/homewww3.interscience.wiley.com/journal/117933310/home

II. THE THREE GOLDEN RULES

Before we proceed, we would like to stress *three golden rules* that need to be followed to enable the most efficient use of your code at the typesetting stage:

(i) keep your own macros to an absolute minimum;

(ii) as TeX is designed to make sensible spacing decisions by itself, do *not* use explicit horizontal or vertical spacing commands, except in a few accepted (mostly mathematical) situations, such as `\,` before a differential d, or `\quad` to separate an equation from its qualifier;

(iii) follow the *Asian Journal of Control* reference style.

[Fig. 1 about here.]

III. GETTING STARTED

The asjcauth class file should run on any standard LaTeX 2$_\varepsilon$ installation. If any of the fonts, class files or packages it requires are missing from your installation, they can be found on the *TeX Live* CD-ROMs or from CTAN.

Asian Journal of Control is published using Times fonts and this is achieved by using the `times` option as `\documentclass[times]{asjcauth}`.
If for any reason you have a problem using Times you can easily resort to Computer Modern fonts by removing the `times` option.

IV. THE ARTICLE HEADER INFORMATION

The heading for any file using asjcauth.cls is shown in Fig. 1Example header text figure.caption.2.

4.1. Remarks

(i) In `\runninghead`, keep the short title to no more than 50 characters; use '*et al.*' if there are three or more authors.

(ii) Please uncomment
`\categorytitle{Brief Paper}`
if this is the category of paper you are submitting. Do not use `\categorytitle{...}` for a regular paper.

(iii) Note that affiliations/addresses appear as a footnote. Include correspondence e-mail address in brackets at the end.

(iv) For submitting a double-spaced manuscript, add `doublespace` as an option to the document-class line.

(v) The abstract should be capable of standing by itself, in the absence of the body of the article and of the bibliography. Therefore, it must not contain any reference citations.

(v) Keywords are separated by commas.

(vi) Acknowledgements are included as a title page footnote.

V. THE BODY OF THE ARTICLE

5.1. Mathematics

asjcauth.cls makes the full functionality of $\mathcal{AMS}$TEX available. We encourage the use of the `align`, `gather` and `multline` environments for displayed mathematics.

5.2. Two wheel robot model

Call q_{ci}, θ_i are current position and orientation of the robot. v_{ci} and ω_i are linear and angular velocity.

$$\begin{aligned} \dot{q}_{ci} &= \begin{bmatrix} v_{ci}\cos(\theta_i) \\ v_{ci}\sin(\theta_i) \end{bmatrix}, \\ \dot{\theta}_i &= \omega_i \end{aligned} \tag{1}$$

With

$$\dot{\mathbf{q}}_{\mathbf{ci}} = \begin{bmatrix} v_{cx} \\ v_{cy} \end{bmatrix} \tag{2}$$

Combining (1) and (2), we have:

$$\begin{bmatrix} v_{cx} \\ v_{cy} \end{bmatrix} = \begin{bmatrix} \cos(\theta_i) & 0 \\ \sin(\theta_i) & 0 \end{bmatrix} \begin{bmatrix} v_{ci} \\ \omega_{ci} \end{bmatrix}, \tag{3}$$

Where v_{cx} and v_{cy} are velocity of the center point of the robot in *x-axis* and *y-axis* of the *global coordinate*. Calling:

$$M(\theta) = \begin{bmatrix} \cos(\theta_i) & 0 \\ \sin(\theta_i) & 0 \end{bmatrix} \tag{4}$$

In the discrete domain, we have:

$$\frac{q_i(t+1) - q_i(t)}{\Delta t} = M(\theta) \begin{bmatrix} v_{ci} \\ \omega_{ci} \end{bmatrix} \tag{5}$$

Thus,

$$q_i(t+1) = q_i(t) + \Delta t M(\theta) \begin{bmatrix} v_{ci} \\ \omega_{ci} \end{bmatrix}, \tag{6}$$

$$\theta_i(t+1) = \theta_i(t) + \Delta t \omega_i(t) \tag{7}$$

On other hand, call v_l and v_r are velocity of the left and right wheels of the robot, correspondingly, we have:

$$\begin{aligned} v_{ci} &= \frac{v_l + v_r}{2} \\ \omega_{ci} &= \frac{v_l - v_r}{d_w} \end{aligned} \tag{8}$$

With d_w is the distance between two wheel.So:

$$\begin{bmatrix} v_{ci} \\ \omega_{ci} \end{bmatrix} = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{d_w} & \frac{-1}{d_w} \end{bmatrix} \begin{bmatrix} v_l \\ v_r \end{bmatrix} \tag{9}$$

Shown in Figure 2 is the diagram for the two wheel mobile robot.

[Fig. 2 about here.]

5.3. Experiment setup

5.3.1. Mobile robot

The mobile robot is depicted in Figure 3. The Arduino Mega board is used as the micro-controller, two wr703n router are used, one for streaming the video recorded from the web-cam equipped with paranormal lens, the other for receiving command remotely via the Internet. The overall control scheme is elaborated in Figure 4. There are three data collecting processes:

- The command sent to the Arduino board from the user is harvested at sampling time set to 50 milliseconds. However, due to the poor performance of the Arduino board, the actual sampling time fluctuates from 59 to 62 milliseconds. Thus,collapsing time between two samplings are recorded to be used in the simulation part.

- The scene recorded by the paranormal web-cam is streamed on-line via the router, which can be accessible by the IP address of the router. The control program running in the control PC records the stream with 5 frame per second, e.g. 5 Hz.
- The location of the mobile robot is tracked by the ceiling camera, by which it is updated with the same sampling rate as the streaming video.

[Fig. 3 about here.]

[Fig. 4 about here.]

5.3.2. Experiment environment

The testing environment is depicted in Figure 5. Robot is controlled in opened-loop manner by user, while the paranormal recording the surrounding scene.Two PCs are used in the experiment, one for sending command signals to the robot, the other for processing the images from the ceiling camera for tracking robot's trajectory, and recording the scene streamed from the paranormal camera installed on the robot.

[Fig. 5 about here.]

5.4. mat-lab code explanation

The command saved from the Arduino board is stored in *huan* file. The real robot's trajectory *in image frame coordinate* is exported in *output.txt* file. The scene recorded from the paranormal camera is saved in *record12115h08.avi* file.

The file *robotTrackSimulation.m* simulates the robot model which is described in 5.1. The simulated result is converted to the coordinate in picture's frame by the camera matrix stored in the file *calibmatrix.mat*. The trajectory then is processed through a second calibration by translation and scaling matrices to minimize the difference between the simulated and the real trajectory. The model is confirmed when the distance is sufficiently small.

The frames are queried from the video in the file *frameQuery.m*. The experiment is executed in 112 seconds, e.g. sum of the sampling time from the command file and the length of the video is exactly matched. The command is sampled with 60 milliseconds sampling time, so there are 1852 sample points, which in turn are sub-sampled by factor of 1:4. Thus, there are **463** sub-sampling points. The video is recorded with 5 fps, so there are **558** frames for the video in total. The frames are numbered from 1 to 558. The sub-sampled command input is stored in the **commandSS** variable which is 463x3 matrix. The first two columns are the command input of linear velocity and angular velocity for the robot, correspondingly, the final column is exact time when a command was sent, in the time-line from 0 to 112.5 second. The variable **outPut** contains the real coordinate of the robot, sampled with frequency of 5Hz.

The frames and the sub-sampled command are matched in following manner:

The time (in second) for each sample point in 463 sample points of the command is calculated in the time-line from 0 to 111 second, then it is projected to the frames set by following equation:

$$framenumber = time \times \frac{558}{111} \tag{10}$$

The 463 sample frames are save in the *frames* folder.

5.5. Figures and tables

asjcauth.cls uses the graphicx package for handling figures.

Figures are called in as follows:

```
\begin{figure}
\centering
\includegraphics{<figure name>}
\caption{<Figure caption>}
\end{figure}
```

Recall that the
`\begin{figure*}...\end{figure*}`
commands are needed for a figure spanning both columns.

For further details on how to size figures, etc., with the graphicx package see, for example, [1] or [3]. If figures are available in an acceptable format (for example, .eps, .ps) they will be used but a printed version should always be provided.

The standard coding for a table is as follows:

```
\begin{table}
\caption{<Table caption>}
\centering
\begin{small}
\begin{tabular}{<table alignment>}
\toprule
<column headings>\\
\midrule
<table entries
(separated by & as usual)>\\
<table entries>\\
.
.
.\\
\bottomrule
\end{tabular}
\end{small}
\end{table}
```

5.6. Cross-referencing

The use of the LaTeX cross-reference system for figures, tables, equations, etc., is encouraged (using `\ref{<name>}` and `\label{<name>}`).

5.7. Bibliography

The normal commands for producing the reference list are:

```
\begin{thebibliography}{99}
\bibitem{<x-ref label>}
         <Reference details>
.
.
.
\end{thebibliography}
```

where `\bibitem{x-ref label}` corresponds to `\cite{x-ref label}` in the body of the article. and `{99}` is the widest such number expected and determines the width of the number column in the reference list.

5.8. Authors' biographies

Please supply brief biographies for each of the authors. These must be placed after the References. Please supply a recent photograph of each author.

5.9. Double spacing

If you need to double space your document for submission please use the `doublespace` option as shown in the sample layout in Fig. 1Example header text.figure.caption.2.

VI. SUPPORT FOR asjcauth.cls

We offer on-line support to participating authors. Please contact us via e-mail at
mailto:asjcauth-cls@wiley.co.uk`asjcauth-cls@wiley.co.uk`.

We would welcome any feedback, positive or otherwise, on your experiences of using asjcauth.cls.

VII. SETTING AN EDITORIAL

To set an editorial in single column format you need to use the `editorial` option. An example layout for an editorial is shown in Fig. 6Example editorial layout.figure.caption.7.

[Fig. 6 about here.]

VIII. COPYRIGHT STATEMENT

Please be aware that the use of this LaTeX 2_ε class file is governed by the following conditions.

8.1. Copyright

8.2. Rules of use

This class file is made available for use by authors who wish to prepare an article for publication in the *Asian Journal of Control* published by John Wiley & Sons, Ltd. The user may not exploit any part of the class file commercially.

This class file is provided on an *as is* basis, without warranties of any kind, either express or implied, including but not limited to warranties of title, or implied warranties of merchantablility or fitness for a particular purpose. There will be no duty on the author[s] of the software or John Wiley & Sons, Ltd to correct any errors or defects in the software. Any statutory rights you may have remain unaffected by your acceptance of these rules of use.

REFERENCES

1. Kopka, H. and P. W. Daly, *A Guide to LaTeX, Fourth Edition*, Addison-Wesley (2003).
2. Lamport L., *LaTeX: a Document Preparation System, Second Edition*, Addison-Wesley (1994).
3. Mittelbach F. and M. Goossens, *The LaTeX Companion, Second Edition*, Addison-Wesley (2004).

List of Figures

```
\documentclass[times]{asjcauth}
%\documentclass[times,doublespace]{asjcauth}%For paper submission

\begin{document}

\runninghead{<Initials and Surnames>: <Short title>}

%\categorytitle{Brief Paper}

\title{<ALL CAPITALS>}

\author{<An Author, Someone Else, and Perhaps Another>}

\address{<The author(s) is (are) with <author's address(es)>}

\received{<Article history>}

%\acks{<Acknowledgements as appropriate>}

\begin{abstract}
<Text>
\end{abstract}

\keywords{<Key words separated by commas>}

\maketitle

\section{INTRODUCTION}
.
.
.
```

Fig. 1. Example header text.

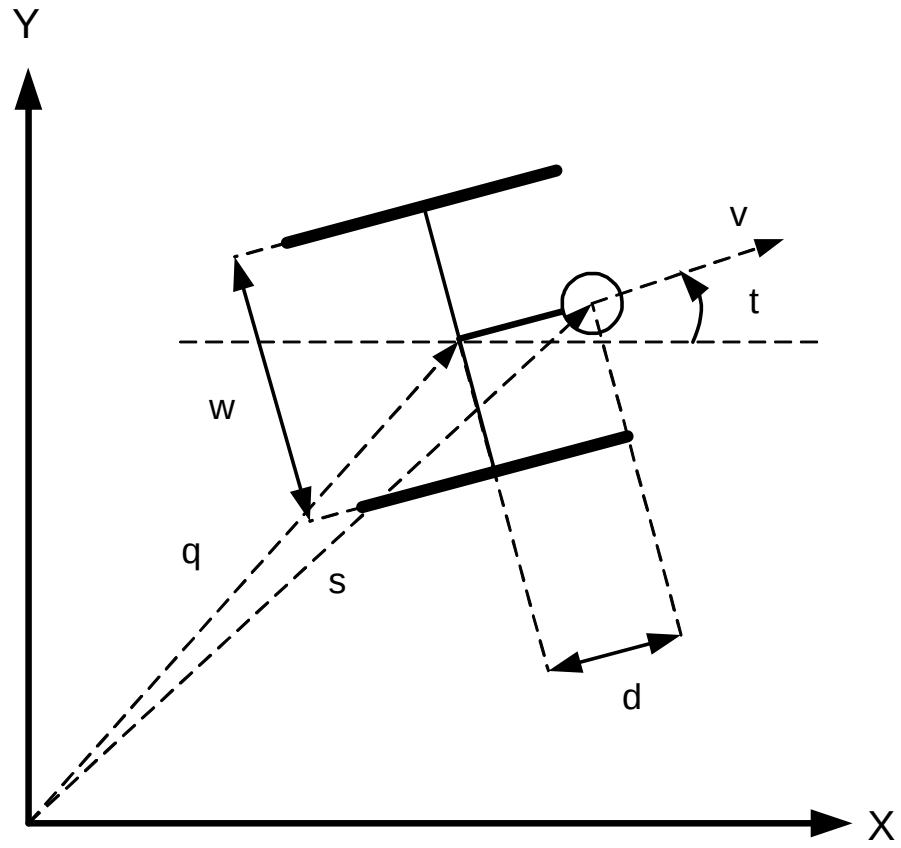

Fig. 2. Robot's Kinematics

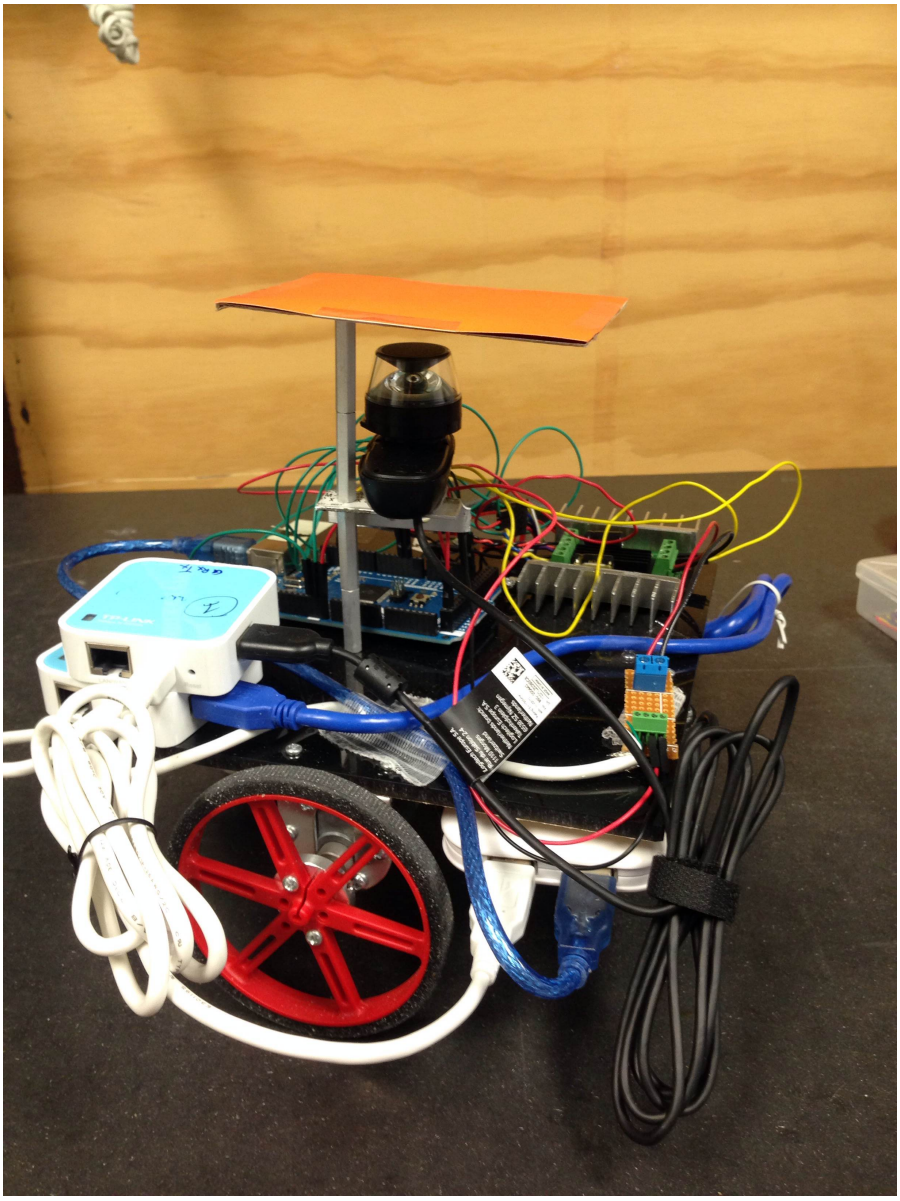

Fig. 3. Mobile Robot

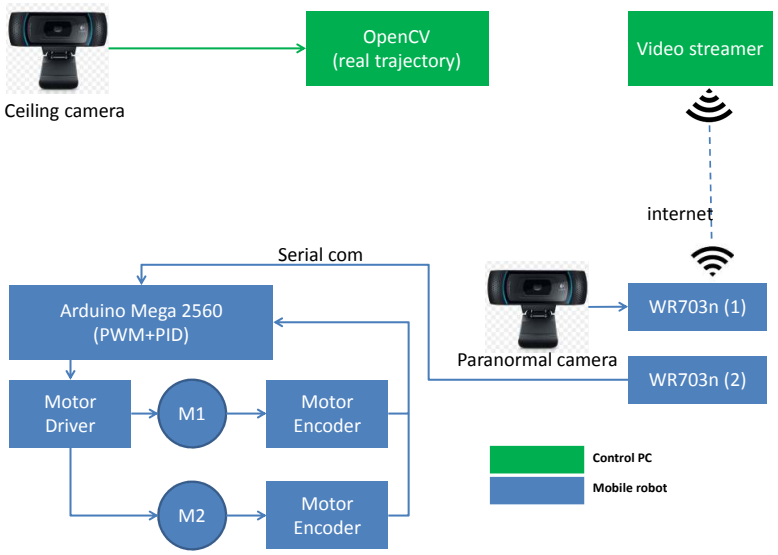

Fig. 4. Overall Control Scheme

Fig. 5. Testing Environment

```
\documentclass[editorial,times]{asjcauth}

\begin{document}

\runninghead{Editorial}

\title{<ALL CAPITALS>}

\maketitle

<Text>
.
.
.
\begin{flushright}
\textbf{Guest Editor(s)}\\[6pt]
\textbf{<Editor name>}\\
<Address>
.
.
.
\end{flushright}

\noindent <editor biography details>
\end{document}
```

Fig. 6. Example editorial layout.