App-Entwicklung mit Python, Kivy und Plyer

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Keywords—component, formatting, style, styling, insert (key words)

# Einleitung

Im Rahmen der zu Grunde liegenden Bachelorarbeit (vgl. [7]), wird ein Projekt des Studiengangs „Technische Physik“ der Hochschule Coburg aus dem Sommersemester 2018 aufgegriffen. Ziel dieses Projekts bildet die Konstruktion einer sogenannten „Science Escape Box“. Um an das Innere der Box zu gelangen, müssen Teilnehmer naturwissenschaftliche Aufgaben lösen und Codes knacken. Genauere Informationen zu Hintergrund und Verlauf der Projektarbeit sind in [7] sowie im hochschulinternen Projektbericht gegeben.

Motivation und Zielsetzung der Bachelorarbeit bildet die Erweiterung des bereits bestehenden Spielgeschehens um eine digitale Komponente. Zu diesem Zweck, wird ein Tablet in das Projekt integriert, welches sich ergänzend in den Verlauf einfügt und das bisherige Spiel somit nicht ersetzt (vgl. [7]).

Da die Abschlussarbeit in einem naturwissenschaftlichen Studiengang entstanden ist, entzieht sich die Kenntnis und Einhaltung bestimmter Architektur- und Modellierungsprinzipien von Software, wie z.B. dem Model-View-Controller-Aufbau, dem Anforderungsniveau. Dennoch ist im Zuge der Arbeit die Entscheidung für eine bestimmte Programmierumgebung, sowie den grundlegenden Aufbau der Software zu treffen. So wird die Programmiersprache Python zur Implementierung der Logik eingesetzt. Für die Darstellung der Benutzeroberfläche wird auf das Framework „Kivy“ zurückgegriffen. Schließlich verschafft die Nutzung der Bibliothek „Plyer“ Zugriff auf Hardware-interne Features, wie z.B. Sensoren des Tablets.

Das vorliegende Paper beschäftigt sich mit den Bewegungsgründen für die Wahl dieser Sprachen bzw. Toolkits. Im Konkreten werden zwei aufeinander aufbauende Fragen verfolgt: Wieso wird in der gegebenen Abschlussarbeit auf eine Entwicklungsumgebung mit Python, Kivy und Plyer zurückgegriffen? Und welche Vorteile hat es, insbesondere Kivy als Framework für die UI-Gestaltung einzusetzen und wo treten Schwierigkeiten auf?

Unter den Quellen zur genannten Thematik sind kaum aktuelle Paper oder Untersuchungen zu finden. Deshalb dienen in erster Linie Lehrbücher und die offiziellen Dokumentationen als Wissensgrundlage. Im Falle der Programmiersprache Python ist hier beispielsweise das Werk von Grotz [2] zu nennen. In Bezug auf das Framework Kivy, geben Solis [5] und Vasilkov [6] äußerst brauchbare Einführungen und Beispiele in die Applikationsgestaltung. Weiterhin sind die offiziellen Softwaredokumentationen von Kivy [3] sowie Plyer [4] übersichtlich und verständlich aufgebaut, sodass problemlos darauf zurückgegriffen werden kann.

Im Folgenden werden zunächst Gründe dargelegt, die für die Verwendung von Python als Programmiersprache zur Implementierung von Logikbestandteilen sprechen. In Abschnitt zwei wird genauer auf Kivy als Graphik-Toolkit eingegangen. In diesem Zusammenhang werden Vorteile des Frameworks herausgearbeitet sowie die spezielle „Kivy language“ zur Beschreibung der UI-Elemente vorgestellt. Weiterhin wird auf Probleme eingegangen, die bei der App-Entwicklung mit Kivy auftreten. Der anschließende dritte Abschnitt beschäftigt sich mit Plyer als Schnittstelle zur Hardware, bevor in Abschnitt vier ein zusammenfassendes Fazit gezogen wird.

# Python

* Verwendung zur Implementierung der Programmlogik
* Python als Programmiersprache im Rahmen des Moduls „Angewandte Informatik“ (vgl. [1, 17f]) im Studiengang Technische Physik gelehrt
* Python zeichnet sich als eine Programmiersprache aus, die vergleichsweise einfach zu erlernen ist und mit deren Hilfe somit schnell Anwendungen programmiert werden können. Weiterhin ist Python-Syntax gut lesbar und erleichtert dem Benutzer damit die Umsetzung der eigenen Ideen in ausführbaren Codes. Auf Grund dieser Vorteile, sowie die Existenz diverser Mathematik-Module ist Python vor allem im akademischen und schulischen Bereich weit verbreitet [2, S. 3].
* Python damit als grundlegende Programmiersprache für die Programmlogik heranzuziehen bietet sich demnach an
* Fehlen weiterer Programmierkenntnisse (weder durch Studiengang, noch sonstige Ausbildung zu diesem Zeitpunkt Kenntnisse aus anderen Sprachen vorhanden)
* Im Rahmen der Bachelorarbeit eine neue Programmiersprache von Grund auf neu zu lernen würde den Rahmen sprengen
* Zudem bereits Einarbeitung in zusätzliches graphisches Framework notwendig, um Benutzeroberfläche zu realisieren

# Kivy

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections A-D below for more information on proofreading, spelling and grammar.

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## Vorteile und Leistungen von Kivy

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

## Kivy Language

* Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive”.
* Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
* Do not mix complete spellings and abbreviations of units: “Wb/m2” or “webers per square meter”, not “webers/m2”. Spell out units when they appear in text: “. . . a few henries”, not “. . . a few H”.

Identify applicable funding agency here. If none, delete this text box.

* Use a zero before decimal points: “0.25”, not “.25”. Use “cm3”, not “cc”. (*bullet list*)

## Aufgetretene Probleme

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Number equations consecutively. Equation numbers, within parentheses, are to position flush right, as in (1), using a right tab stop. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

*a**b* 

Note that the equation is centered using a center tab stop. Be sure that the symbols in your equation have been defined before or immediately following the equation. Use “(1)”, not “Eq. (1)” or “equation (1)”, except at the beginning of a sentence: “Equation (1) is . . .”

## Some Common Mistakes

* The word “data” is plural, not singular.
* The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
* In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
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* Be aware of the different meanings of the homophones “affect” and “effect”, “complement” and “compliment”, “discreet” and “discrete”, “principal” and “principle”.
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* The prefix “non” is not a word; it should be joined to the word it modifies, usually without a hyphen.
* There is no period after the “et” in the Latin abbreviation “et al.”.
* The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

An excellent style manual for science writers is [7].

# Plyer

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Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is “Heading 5”. Use “figure caption” for your Figure captions, and “table head” for your table title. Run-in heads, such as “Abstract”, will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named “Heading 1”, “Heading 2”, “Heading 3”, and “Heading 4” are prescribed.

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#### Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 1”, even at the beginning of a sentence.

1. Table Type Styles

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1. Sample of a Table footnote. (*Table footnote*)
2. Example of a figure caption. (*figure caption*)

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# Zusammenfassung

##### Acknowledgment *(Heading 5)*

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

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Unless there are six authors or more give all authors’ names; do not use “et al.”. 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]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

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Literatur

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