Projeto de um Sitema de Abastecimento Pluvial baseado em *IoT* *

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***Abstract*— Based on the search for the production of technologies to reduce the degradation of the environment and, joining this, the trend towards the implementation of Smart Things, within the scope of IoT - Internet Of Things, the developed project aimed at the elaboration of a system to create an Automated Cistern which has a physical prototype for simulating the collection and distribution of rainwater, integrating the three areas of an IoT project: Hardware, Firmware and Software. No Firmware segment, through the use of microcontrollers and microprocessors in integration with sensors, actuators and the Intranet, it will be possible to collect data and perform real-time actions from user commands, as well as updates for continuous improvement of the Embedded Software (Firmware To update). In the Software section, the use of technologies for modeling Mobile and Desktop applications, such as React Native and Electron, ensured the creation of user-friendly interfaces for routines for registration, updating, monitoring and control of collection system processes. Finally, in the Hardware section, schematics were created, enabling the creation of layouts, which will later guarantee the manufacture of printed circuit boards - PCB's. With the purpose of validation, the built prototype has structures for: power, signal conversion, communication, control and activation.**

I. INTRODUÇÃO

A água é um recurso básico para a sustentação humana em um ambiente e ao longo do tempo várias civilizações evoluíram e padeceram em função de sua relação de uso com este recurso. Nos últimos anos, crises relacionadas ao abastecimento e à qualidade da água potável têm sido observadas em todo o Globo. Tomando o Brasil como exemplo, percebe-se uma distribuição desigual: No norte do pais há grandes reservas de água, porém nas regiões Nordeste e Sudeste há problemas de escassez e poluição dos rios.

A região norte, possuindo a maior reserva de água potável do Brasil e também os maiores índices de precipitação, é a região que possui as taxas mais altas de desperdício (gloco.com, 2021). O desperdício pode ser encontrado no ambiente doméstico e nas várias etapas de: coleta, armazenamento, processamento e principalmente na distribuição do recurso.

A instalação de uma cisterna garante, pelo menos, três pontos positivos: que seja possível utilizar a água de precipitações para afazeres domésticos, reduzindo o consumo mensal de determinada residência; pode diminuir o desperdício durante a etapa de distribuição da concessionária e contribuir para a redução da incidência de inundações em grandes cidades, uma vez que grande parte dessa água não seria descartada, mas armazenada.

A aplicação de uma cisterna automatizada garante uma supervisão do nível de água constantemente assim como o controle/acionamento de bombas para alimentação de tanques ou caixas d'agua para tarefas específicas trazendo comodidade e fomentando os motivos de aplicação.

II. PROBLEMÁTICA

Segundo a Gartner, Inc BizMeet (BizMeet, 2017) desde 2017 existem mais objetos conectados à Internet do que as 7 bilhões de pessoas no mundo. Isso demonstra uma crescente busca pela obtenção e controle das mais diversas tarefas. Os objetos e dispositivos estão adquirindo funcionalidades as quais se identificam com os ramos da *IoT*, tornando-se possível a concepção de diversas melhorias no funcionamento, através da obtenção e distribuição de dados. A utilização da **Internet das Coisas** está tão conectada ao nosso cotidiano que ocasiona o nascimento de tecnologias necessariamente conectadas, como *Smart Home* e *Smart Buildings*.

Diante disso, em ambientes como na região Amazônica, onde há altos índices de precipitação, a implantação de cisternas para utilização da água da chuva se torna bastante viável. Sabe-se que a água da chuva não é própria para o consumo e para o preparo de alimentos, porém a mesma pode ser utilizada em afazeres como limpeza de locais e também em descargas de banheiros, onde há o maior nível de desperdício.

Em virtude do que foi mencionado, a aplicação de uma cisterna se torna algo viável para a economia de água ajudando na conservação do meio ambiente, porém, é possível elaborar um projeto base para ser aplicado a diversas situações? Quais ferramentas são necessárias para realizar as medições de nível? Como fazer um sistema o qual os dados poderão ser acessados remotamente? Quais cuidados se deve ter ao implantar tal sistema?

III. PROCEDURE FOR PAPER SUBMISSION

A. Selecting a Template (Heading 2)

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the US-letter paper size. Please do not use it for A4 paper since the margin requirements for A4 papers may be different from Letter paper size.

*Use the \thanks command to put information here

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The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations

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Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

A. 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. 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.

B. Units

- 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".
- Use a zero before decimal points: "0.25", not ".25". Use "cm^3", not "cc". (bullet list)

C. Equations

The equations are an exception to the prescribed specifications of this template. You will need to determine whether or not your equation should be typed using either the Times New Roman or the Symbol font (please no other font). To create multileveled equations, it may be necessary to treat the equation as a graphic and insert it into the text after your paper is styled. 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

$$\alpha + \beta = \chi \tag{1}$$

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..."

D. 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, semi-/colons, 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.)
- A graph within a graph is an "inset", not an "insert". The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates).
- Do not use the word "essentially" to mean "approximately" or "effectively".
- In your paper title, if the words "that uses" can accurately replace the word "using", capitalize the "u"; if not, keep using lower-cased.
- Be aware of the different meanings of the homophones "affect" and "effect", "complement" and "compliment", "discreet" and "discrete", "principal" and "principle".
- Do not confuse "imply" and "infer".
- 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".

V. USING THE TEMPLATE

Use this sample document as your LaTeX source file to create your document. Save this file as **root.tex**. You have to make sure to use the cls file that came with this distribution. If you use a different style file, you cannot expect to get required margins. Note also that when you are creating your out PDF file, the source file is only part of the equation. *Your TEX → PDF filter determines the output file size. Even*

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A. Headings, etc

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.

B. Figures and Tables

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.

TABLE I
AN EXAMPLE OF A TABLE

One	Two
Three	Four

We suggest that you use a text box to insert a graphic (which is ideally a 300 dpi TIFF or EPS file, with all fonts embedded) because, in an document, this method is somewhat more stable than directly inserting a picture.

Fig. 1. Inductance of oscillation winding on amorphous magnetic core versus DC bias magnetic field

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization A[m(1)]", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K."

VI. CONCLUSIONS

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes should appear before the acknowledgment.

ACKNOWLEDGMENT

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.

References are important to the reader; therefore, each citation must be complete and correct. If at all possible, references should be commonly available publications.

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