A FRAMEWORK FOR COUNTING ARCHIVED FROGS

by

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ABSTRACT

A FRAMEWORK FOR COUNTING ARCHIVED FROGS

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TODO: To be updated later!

Dedicated to the Mighty Frog!

ACKNOWLEDGEMENTS

TODO: Thanks to everyone who contributed in counting frogs.

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CHAPTER 1

INTRODUCTION

TODO: Counting frogs (Fig. 1) has been traditionally done in the Web Science and Digital Libraries Research Lab (WS-DL)[1] to keep track of the days left until the next JCDL[2] submission deadline. Table 1 illustrates how the frogs are counted.

[1] https://ws-dl.cs.odu.edu/
[2] http://www.jcdl.org/

Fig. 1: The Mighty Frog

TABLE 1: How many frogs left?

Day wrt. JCDL	**Frogs left**
Immediately after	300+
Four months before	100+
Three months before	90
One month before	30
One week before	7
Three days before	3
Two days before	2
One day before	1
At submission deadline	0

CHAPTER 2

DESIGN APPROACH

TODO:

CHAPTER 3

PROJECT DELIVERABLES

TODO: Mat counted JCDL frogs[1] for last several years.

[1] http://matkelly.com/frogsLeft

CHAPTER 4

DESIGN SPECIFICATIONS

TODO: Mat counted JCDL frogs[1] for last several years.

[1] http://matkelly.com/frogsLeft

4.0.1 ENGINEERING STANDARDS

The first IEEE standard that applies to this project is the standard for Ontologies for Robotics and Automation. The purpose of this standard is to provide a methodology for knowledge representation and reasoning in robotics and automation together with the core ontology for the robotics and automation domain [1]. In this project, the NAO robots are expected to execute complex behaviors; therefore, the robot's capabilities and knowledge representation must be precisely defined to abide by this standard. Two NAO robots are expected to interact with each other with certain forms of data through vision recognition (i.e., colors, visible behavior states) and speech recognition when the robots are communicating with each other. This data will be facilitated and integrated through this robotic systems standard.

The NAO robots used in this project apply audio and video recognition for the means of communication. One robot will be given instructions to deliver a certain sound that will trigger an action from the other robot. In terms of video recognition, one robot must also be able to react to movements performed by the other. Due to these concepts, the IEEE standard for Advanced Audio and Video Coding is applied to this project. The purpose of this standard is to provide the tool sets for functions such as the compression, decompression, and the packaging of video data. The standard also includes in-depth descriptions of video coding as well as intra prediction and interpretation. These are used in the storage of the video which contains the actions performed by one of the robots, ultimately enabling the other NAO robot to perform the adequate response. The information presented in the standard will be used in detail in the completion of the project. [2]

The third IEEE standard that applies to this project is the Standard for Ethically Driven Robotics and Automation Systems. With having the capability to program the NAO Robots to do almost any task, we must make sure to ethically guide the NAO Robots in the correct direction. Throughout the project the NAO Robots must complete many tasks such as changing emotions, communicating with one another, assisting one another and doing specific body emotions such as moving the Robots arms and legs. It is crucial that the NAO Robots do not do anything unethical and cause any harm or damage to oneself or one another. For this to happen we must make sure the automation system of the robot is designed flawlessly; if the design for the automation system is not done correctly, the risk of the NAO Robot doing something unethical increases significantly. This is how the Standard for Ethically Driven Robotics and Automation Systems applies to this project.

As this project requires the use of Python 2.7, either by using Python itself or by

using Choreographe which relies on Python 2.7, Python 2.7 is an important and relevant engineering standard. Python 2.7.18 is the latest version of Python 2.7 that will be used on this project. Even though Python 2.7 is antiquated and out of support, it must be used for this project as the newer (and better) versions of Python 3.10 are not supported on the NAO robot. This also ties into project restraints as most libraries support Python 3 with limited or no support for Python 2. Despite this, Python 2.7 is still an important standard. It is necessary to have a standardized version of any programming language when its use is widespread. This ensures that any interpreter written for Python 2.7 can also process other Python 2.7 code. This also ensures that code is readable and standardized between users. If the standard version of Python 2.7.18 was not applied to this project, this would make using libraries very difficult as they rely on the standard Python version. Additionally, porting the written code to another platform would also be more difficult and it would make our results harder to reproduce. [3]

CHAPTER 5

PRELIMINARY DESIGN PERFORMANCE

TODO: Mat counted JCDL frogs[1] for last several years.

[1] http://matkelly.com/frogsLeft

CHAPTER 6

PROJECT BROADER IMPACTS

6.1 ETHICAL IMPLICATIONS OR ISSUES OF THE PROJECT

6.2 KNOWLEDGE OF CONTEMPORARY ISSUES

6.3 LIFELONG LEARNING

6.4 IMPACT OF ENGINEERING SOLUTIONS IN A GLOBAL, ECONOMIC, ENVIRONMENTAL, AND SOCIETAL CONTEXT

Stephen Lamczyk, Jacob Strother, Seth Cummings, Zeph Amonoo-Harrison

6.4.1 GLOBAL

One very important tool the NAO robot has is its language barrier. The NAO robot can recognize up to 20 languages and also communicate with dialogue with the correct programming [4]. This is an extremely important feature and with this feature it can connect with almost anyone around the world.

Growingly, NAO robots are being used to help children learn their primary language with a second language [5]. With more people becoming bilingual it will connect different cultures around the world with the help of a robot. One thing a robot has over a language teacher is consistency and reliability. Also, NAO robots can be specifically programmed for certain students with learning disabilities which can help guide and motivate them. The NAO robots can also be placed as a security system or an alarm which can be used globally; the possibilities are endless with its ability to recognize multiple languages.

6.4.2 ECONOMIC

It is quite easy to realize the economic impact of developing such a robot. A NAO robot programmed in this manner has the potential to supplant preexisting jobs in the workforce that relate to the caretaking of kids with autism. For example, kids with autism may require caretakers with specialized education that also require a salary. While, NAO robots are expensive (around $10,000) this is not even close to the potential salary of one full time caretaker. Consequently, those organizations that employ NAO robots for autism intervention and caretaking instead of specialized employees could see reduced expenses and make them more efficient and productive [6]. However, such caretakers with specialized skills will find themselves out of a job. This same trend can be found in other industries such as car manufacturing where robots replace skilled workers and the workers are now unemployed [6].

6.4.3 ENVIRONMENTAL

The impact many forms of technology leave on the environment can be negative. The pollution of land and air that occurs from the disposal of chemicals affects more than just

agricultural yield. The short and long term exposure to pollutants comes with adverse health effects ranging from infections to cancer. The disposal of batteries used to power a variety of machinery plays a big part in the pollution process due to how they are absorbed in the environment. The NAO robots' use of a lithium-ion battery greatly reduces the amount of this adulteration. Lithium is not expected to bioaccumulate and its human and environmental toxicity are low [7]. To add to that, lithium in certain doses can stimulate certain plants [7]. Compared to other types of batteries, lithium is considered less toxic to the environment.

To reinforce the NAO robots' innocuousness to the environment, it is important to state the versatility of the robots. NAO robots make use of tactile sensors. These are devices that gather information based on physical interactions that include touch, pressure, and force. These are a big element to what allows the NAO robots to function, however, the chemicals used in the creation of these sensors are in question of being harmful to the environment. PVDF (Polyvinylidene fluoride), ZnO (Zinc Oxide), PZT(Lead Zirconate Titanate) are some of the materials used in the production of these sensors. This is where the versatility of the NAO robots comes into play. Even though the sensors are important, the robots can operate without them. Using a measure of the Instantaneous Capture Point, it is possible to develop an equilibrium-based interaction technique that does not require force or vision sensors [8]. The NAO robots are designed in a manner to not be hazardous to the environment.

6.4.4 SOCIETAL

In a societal context, robots are seeing increasing use in homes, work, and healthcare. More specifically, in healthcare, NAO robots can be used to simulate an Autism intervention, where one robot can be the child and another could be the parent. Eventually, this could lead to using the NAO bot as the "parent" and performing an intervention with a human child. There is currently evidence of other robots created by Softbanks Robotics being used in elder care homes, where the elderly interact with a robot instead of staff. In this case, the robot being used is called Pepper, a 4 foot tall robot that is built to interact with residents, as opposed to just carrying out manual tasks [9].

As stated before, the use of NAO robots is popular in aiding children with Autism either in the classroom or at home; this will be made more popular through the use of mobile apps being developed to control the NAO robots [10]. Having an easily accessible software application for non-technical professionals, such as therapists and teachers, to use can increase the level of comfort in using the NAO robots, thus increasing human and robot

relations and helping children with disabilities.

6.4.5 EXPECTED OVERALL EDUCATIONAL BENEFITS FROM THIS PROJECT

The overall study of the NAO robots greatly assists in the mastering of the Python API. The ability of the programming language to automate tasks, conduct data analysis, etc. is what makes it so useful. Due to this however, the language is very complex. It is quite in-depth in terms of syntax and can be difficult to produce results with if a user is not efficiently using it in its entirety. The programming of the NAO robots is a very thorough project which also implements the use of the Python language. The robots require well designed behavioral, recognition, and reinforcement modules to run properly. The completion of these will give the user a very extensive understanding of the language.

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APPENDIX A

SPECIES

TODO: To be updated later!

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