Virtour: Telepresence system for remotely-operated building tours

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ABSTRACT

Virtour is a public facing system for teleoperated building tours. It aims to facilitate lab and departmental tours by creating a system wherein prospective students can remotely operate a wheeled robot around the Learning Agents Research Group lab and the Gates Dell Complex. Virtour builds on the existing Building-Wide Intelligence autonomous robot platform, which uses a Segway base for movement, a car battery for power, a Linux computer for processing, a Kinect and scanning range finder for obstacle avoidance and sensing, and a camera to visual recognition. In particular Virtour uses the existing work on planning and autonomous navigation to move the robot, as well as the servo and camera drivers to allow users to perceive what the robot sees. The end-user interface is built using modern web technologies to allow users from around the world to control our robots from any internet device (eg: cellphone, tablet, computer). Users can select a robot to either spectate a tour (if one is already on-going) or control their own. The goal is to provide an immersive experience where users can view what the robot sees, as well as control the robot's rotation and camera angle in real time. Navigation is provided using a map where users can select their desired destination and have the robot autonomously navigate there, thus eliminating the risk of exposing real-time teleoperated movement. As a result we can provide users an immersive telepresence system, which is safe to use (all navigation is handled autonomously), and provides real value to our lab and department by allowing students that are unable to visit to experience the areas first-hand. Although there are existing telepresence systems, the novel contributions are the web-first user experience, balancing of autonomy and control for the robots, and the focus on immersive tours.

Keywords

ACM proceedings; LaTeX; text tagging

1. INTRODUCTION

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2. THE BODY OF THE PAPER

2.1 Citations

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3. CONCLUSIONS

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4. ACKNOWLEDGMENTS

This section is optional; it is a location for you to acknowledge grants, funding, editing assistance and what have you. In the present case, for example, the authors would like to thank Gerald Murray of ACM for his help in codifying this *Author's Guide* and the **.cls** and **.tex** files that it describes.

5. REFERENCES

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APPENDIX

A. HEADINGS IN APPENDICES

The rules about hierarchical headings discussed above for the body of the article are different in the appendices. In the **appendix** environment, the command **section** is used to indicate the start of each Appendix, with alphabetic order designation (i.e. the first is A, the second B, etc.) and a title (if you include one). So, if you need hierarchical structure *within* an Appendix, start with **subsection** as the highest level. Here is an outline of the body of this document in Appendix-appropriate form:

A.1 Introduction

A.2 The Body of the Paper

A.2.1 Type Changes and Special Characters

A.2.2 Math Equations

Inline (In-text) Equations.

Display Equations.

A.2.3 Citations

A.2.4 Tables

A.2.5 Figures

A.2.6 Theorem-like Constructs

A Caveat for the TEX Expert

A.3 Conclusions

A.4 Acknowledgments

A.5 Additional Authors

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A.6 References

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