Fourth Year Project Progress Report

Faculty of Systems and Computer Engineering

Project Name: TART

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Supervisor: Prof. V. Aitken

Date: December 1st, 2003

4 pages incl.

Summary

This report concerns the progress for the development of a camera control system for the Tracked Autonomous Robotics Testbed (TART) project. In this project, it is required to control a video camera pan, tilt, zoom and focus unit mounted on TART using the on-board computer systems. A custom-made motor controller board was donated[1] for use on the project.

Accomplishments thus far include significant headway in understanding the donated hardware, specifically, how to use the individual components from which this donated hardware was constructed. As well, software and electric circuits were developed and used to test the various features and further the understanding of the donated hardware. Finally, software was developed that interprets commands and controls the various components on board the donated hardware, which in turn will control the camera on board TART. The overall progress of the project is good, and it is expected that the goals goals will be achieved as in the modified project time line.

Introduction

This document is a progress report for work on a fourth year engineering project undertaken by Brad Barnes (281671), a student in the Computer Systems Engineering program at Carleton University. The project is supervised by Prof. V. Aitken of the Systems and Computer Engineering faculty at Carleton University. This document will report the progress achieved over a three month time period beginning September 5th, 2003, ending December 1st 2003, marking a remaining four months until the project completion deadline of April 2nd, 2003.

The project involves the design, implementation, testing and integration of a camera control system for an Unmanned Ground Vehicle (UGV). The camera control system will interface with the existing computers and controls on board the vehicle. Previous to the undertaking of this project, the camera was not under any control. It is my responsibility to provide an interface from the on-board computers to the control of the camera such as its pan, tilt, zoom and focus. Using this interface, and the existing communication system, the operator will be able to control the camera via the remote operating station. If time permits, an interface for digital capture of the video stream will be developed. Other group members are working on the closed loop control of the treads of the vehicle and the control station.

My contribution to the project is organized into four main phases. The phases include background research, communication system development, camera control system development and video storage interface development.

This document includes this project introduction, followed by a progress summary which details the progress of the project, and finally conclusions as to the overall progress and future of the project.

Progress Summary

Project progress will be addressed chronologically herein.

1 Donated by Graham Eatherley of EOD Performance Inc.

Background research was conducted on the Handyboard motor controller device before a custom made motor controller board was donated. It was decided to make use of the donated board instead of a Handyboard. Much research was conducted to understand the various devices on the board, such as the Motorola micro controller unit, the motor drivers, and the octal switch. Meetings were conducted with the motor controller developer to reduce the learning curve required to understand device.

Software and simple electric circuits were developed for testing the various features of the motor controller board, such as discrete device switching, driving motors of different loads and serial communications. The test software is well commented to help out future users of this board. Developing the test software also served as means to better understand the motor controller board itself.

Following the development of the test software and simple circuits, a command interface and a program for the motor controller board was designed and implemented.

At present, programs to send commands to the board for use in testing the software that has been developed are in development. Some of the circuitry on the board will be modified during this testing phase to achieve the desired range of use from the motor drivers on board.

Future work includes the development of software for the single board computer that resides on board TART which will communicate with the motor controller board via a serial link and implementing the command interface.

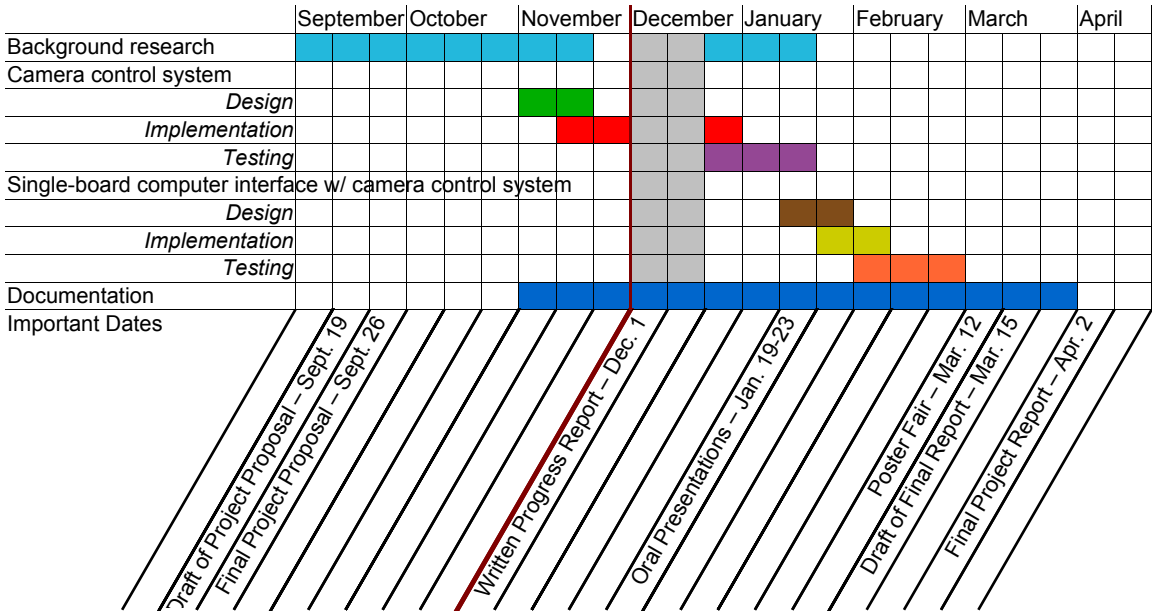
If time permits, it would be beneficial to mount an orientation sensor to the camera and interface it with the motor controller so it is known exactly where the camera is pointing. As well, a digital video capture interface could be developed to archive video from the camera and allow for image processing.

Conclusion

The purpose of the project is to control the operation of the camera mounted on TART. Throughout the work thus far, several problems have been encountered. One such problem delayed the development of the micro controller software, due to a misleading circuit diagram in the data sheet for the octal switch which lead me to believe the board was not functioning properly. Another problematic area is time management. Thus far, it has been difficult to devote concentrated time to the project due to my current course load. Though I have the same amount of courses next semester, the load is much lighter because it will involve much less lab work and less engineering courses. I will therefore be able focus more time to this project.

It was decided that a communication system between groups and group members would not be necessary as our group was reduced to half the group members as originally expected. Electronic mail is a sufficient communication mechanism for the amount of collaboration between members of the group.

The overall progress of the project is good, and more the outlook for the project future also looks good. A modified project schedule follows. Video capture interface development has been removed from the schedule and single board computer interface development has been added.


September
October
November
December
January
February
March
April
Background research
Camera control system
Design
Implementation
Testing
Single-board computer interface w/ camera control system
Design
Implementation
Testing
Documentation
Important Dates
Draft of Project Proposal – Sept. 19
Final Project Proposal – Sept. 26
Written Progress Report – Dec. 1
Oral Presentations – Jan. 19-23
Poster Fair – Mar. 12
Draft of Final Report – Mar. 15
Final Project Report – Apr. 2