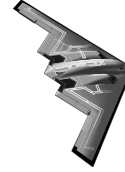


ECEN/MAE 3723 Systems I
Fall 2004
Oral Presentation
Section 002
October 9, 2004



Team 9: Control in Future Space Exploration

9:00-9:10AM

Leon Boomershine, Cody Bulter, Zachary Bahr

Abstract-

Controls will play a critical role in the both near- and intermediate-term space exploration because of the nature of space exploration itself. Situations which force mission planners to increase reliance on controls are times/places/situations which are too dangerous, too fast, or too complex for consistent operation by a human (solar radiation storms, high-speed atmospheric entry, or exotic drive systems). Certain processes may need to be monitored continuously, or have an inhumanly small margin-of-error (air and water recycling). Destination sites may need to be prepared by robotic agents before humans are launched toward the goal, or missions may be unmanned altogether. Any space mission outside of Earth's orbit will take place several light-minutes or -hours from Earth, meaning that real-time control and short- to intermediate-term task planning would have to be handled either by humans or control systems; it would be impossible to have humans monitoring and operating each and every critical system. Examples include high-speed atmospheric entry (may be too fast for human control), the Mars Direct plan for reaching Mars (calls for robotic production of methane fuel from Martian atmosphere prior to launch of humans toward Mars), long-term colonies on either the Moon or Mars (should have as close to zero loss of air and water as possible during recycling), and expansion of the satellite network around Earth (unmanned entirely, but controlled from Earth). The push towards developing the private sector space industry will also mean that lowest-cost solutions will be at an even higher premium, and controls have been a proven way to reduce costs in other industries; there is no reason to think that the space industry will be an exception.

Team 10: Control in Law Enforcement Applications

9:15-9:25AM

Kristoffer Abu-Sharar, Kruger Corn, Theodore Belshe, Kevin Clayton

Abstract-

With criminals progressing to more advance methods of mischievousness, law enforcement have to not only meet their challenges but exceed their expectations. Engineering therefore has to be a big part of that process. Three main advancements that requires a large amount of engineering is within forensics, non-lethal weaponry, and tracking surveillance. In the area of forensics you will find improving detection of latent prints, forensic imaging technology to replicate a crime scene, and aging a criminal to see what he looks like today. Non-lethal weaponry may look to go more into electrical shock bullets to disband riots of people. Finally the tracking surveillance to find anyone in the world ranges from internet data to satellite and even implantation chips.

Team 11: Future Sensor Technology

9:30-9:40AM

Juan Galindo, Scott Hilderbrand, Shelby Coulter, James Crain

Abstract-

This abstract shows what we will discuss in the presentation on future sensor technology. We will present a general definition of sensors and their behavior. After, we will show the general usages and the areas of application of sensors today. Most of the applications are going to be automotive, military, industrial and medical. Once we have shown a broad definition of sensors, we will go more into the demands and researches of sensors in these areas for the future. We will begin with future automobile sensors, new measurements and more precise sensors to increase the security of the driver. The next application will be the militaries' use of certain sensors, the advancement, miniaturization, and eventual public distribution of those sensors. Another application will be the usage of sensors in industry, their characteristics and the improvements for a better performance in the future. Lastly, will be the application in future sensor technology in the medical field. This will include the future of sensors in monitoring

patient health through telemetry and nanotechnology. Also covered will be the future of sensor technology in controlling diagnostic and treatment systems such as microsurgical procedures and long distance surgery (telesurgery).

Team 12: A Memorable Character in Control History 9:45-9:55AM

Daniel Humbolt, Brian Ivers, Jay Crowdus, Shaun Ehrhart

Abstract-

Finding a memorable character in control history was not as difficult as the group first imagined. Upon each team member doing an internet search for a possible character in history, we each seemed to stumble upon Br. Charles Stark Draper, the “father of inertial navigation.” Dr. Draper was responsible for not only the theory of inertial navigation, but for the development and advancement of it as well. His technology has led to useful advances in the operational use in aircraft, submarines, marine ships, and space vehicles. The report on Dr. Draper will be divided into different subsections. We will try to divide up his life’s work into four different sections so as to allow each team member a chance to speak. The report on Dr. Draper’s life will begin with his early years at Stanford University and take the class through a journey of his accomplishments at MIT and every one of the various laboratories he was responsible for starting up. We will discuss how his guidance systems and gyroscopes were helpful to the military in the midst of World War II. Dr. Draper’s work was influential in the development of space travel as well. Dr. Draper had many accomplishments in his life and perhaps the ten minute time limit may not be enough. But this team will try to make sure the rest of the class understands how memorable of a character Dr. Draper was in control history.

Team 13: Control in Future Sports Activities 10:00-10:10AM

Joshua James, Nouman Khan, Anthony Evans, Aaron Gilmore

Abstract-

Our assignment is control systems in future sports activities. The first of four ideas that we have developed is a 3-D hologram. This idea will be implemented in races that have records or that have already taken place. This will allow the athlete the ability to race against his/herself or a record that has been previously set. Our second idea is a GPS chip that can be put into any object that is the primary focus of a sports activity. This GPS system would only be programmed for the field or playing surface of its particular game. Our third idea consists of sensors that record exact movement, speeds, and all other relevant information of a golfer’s swing. This information can help the individual golfer to perfect his or her game. The final idea that we will explain is an automated strike zone for baseball. This system will be able to call strikes or balls consistently without the aid of an umpire behind home plate.

Team 14: Employment Opportunity for Control Engineers 10:15-10:25AM

Eric Larson, Paul Moore, Timothy Hoehman, Jared Kochick

Abstract-

We plan to start our presentation with a brief one minute introduction which will overview what we plan to present and why we consider it important to present. Our first topic will cover the National control engineering market; what companies are hiring, what positions, requirements, internships, etc. In particular, it will focus on a comparison of employment characteristics for control engineers on a national and state level (time permitting). Our next topic will cover a comparison of employment opportunities between different degrees. In other words, it will cover occupational differences (in salary, responsibility, and experience required) between bachelors, masters, and doctorate degrees. Our last topic will cover which areas of engineering companies are hiring and why. In particular, what employment opportunities in the field of control systems are offered for electrical and mechanical engineers (and possibly aerospace and chemical engineers, time permitting). A real world project example will also be presented here for clarity. We will briefly conclude our presentation with a summary of our speech and a look to the future of employment for control engineers.

Team 15: Control in Future Transportation 10:30-10:40AM

Kazunori Nishimura, Benjamin Palmer, Adam Martin, Dennis Moore

Abstract-

The future of transportation is headed skyward. Despite all of today's technical advances in the automotive industry, streets are becoming more crowded than ever and speed limit remains the same. As the number of driver's increase, the rate at which we move from A to B has decreased. Companies like Moller International have taken the first step toward the sky, developing the skycar. It is a fully functional airplane with detachable tail and wing sections for conversion to a street vehicle. Sea transportation is also an important concept. There are two main models: the normal surface model and the submarine model. Major shortcomings of the submarine model include its size limitation, weight limitation, and efficiency of engines. To limit these problems, systems monitor: pressure around ship, engines, ship depth, navigation, and communications. Surface models allow for mass transportation and are less expensive, yet they must deal with the severe weather and tides. To alter these problems, ship companies are producing the technology to control sea tide with super-electromagnetic technology along with ships that are equipped with better engines and structure to maximize speed with less shock. Controls for this model include: communications, ship depth, engines, and tide monitors. As for ground transportation, technology is leaning toward the automated navigation and collision-avoidance systems. Underground Automated Highway Systems (AHS) for high-density cities appears to be the wave of the future. This not only includes the systems to monitor and control the vehicles, but the automated digging system to create the tunnels that they will travel through. Transportation is also reaching new landmarks outside of the atmosphere. Space technologies are beginning to focus on long-term human living quarters in conjunction with extremely distant voyages. This field is leaning toward things such as: solar sails for deep space travel, systems to produce and control artificial gravity, and an infrastructure designed specifically for space travel.

Team 16: Control in Medical Applications

10:45-10:55AM

Jibran Siddiqui, Choong-How Tang, Duane Moore, Raymond O'Quinn

Abstract-

The development of control systems in medical applications has become an integral part of the advancement of modern medicine. Currently four major aspects of research are: space applications, military applications, remote and computer assisted surgery, and nanotechnology. Presently, NASA is testing a patient simulator to develop solutions to medical problems encountered during short and long term zero gravity exposure; this patient simulator will give astronauts the tools to work through an emergency medical situation more effectively. Another quickly growing aspect of medical technology today deals with military applications. The MicroElectroMechanical System (MEMS) has revolutionized battlefield casualty treatment by allowing surgeons to monitor patients from the combat zone to the surgery unit. This system will someday be augmented by the use of remote surgery, which has had successful civilian applications. Doctors have accomplished multiple successful long distance remote surgeries, as well as delicate computer assisted surgeries, using equipment developed for use in remote applications. Physicians are also enthusiastic about future advancements in Nanotechnology. Nanotechnology in medicine is primarily concerned with Nano-Pharmacology and Nano-Machines, with current uses involving the combating of the AIDS virus and mapping of Cancer cells.

Team 17: Control in Economics Applications

11:00-11:10AM

Thomas Sherwood, Travis Reese, Clayton Sanmann, Ming-Yee Voo

Abstract-

New developments in Computation and Control Systems have opened wide the fields of economics and finance. Never before have we been able to analyze such a vast data base as the stock market, but steps are being made in the simulation of such complex models. Artificial Market programs are being written with the capabilities of behaving like real markets, exhibiting intelligent decisions based on many variables and assets. Neural Networks are being utilized in the market forecasting processes, along with many other complex control systems to aid investors and agents in making better decisions when it comes to money. As more developments are made within this field, hopefully the market will also benefit from smarter investments.