Control Education and The ACPA Program In The Era of Information Technology

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Abstract

The advancement of information technology accelerates systematically the shifting of the role of professor from center of knowledge to be an active motivator for his/her students. The responsibility of professor then is to develop the student motivation, to be a smart graduate that makes world to be highly useful for themselves and everyone beyond them. The new paradigm of education may result also many kinds of freedom aspects. As important buyer, industries don't need only smart engineers who do control automatic, but also need the effective means for continuing education. It is right time for the ACPA to think systematically, how the standard and acceptable competence on automatic control could be achieved in the era of information technology.

Introduction

The positive nature of competition of human life makes science and technology continuously and systematically move forward very fast. Every day emerges new science and technology, that then instantly realize into many kinds of derivatives of profitable products. The new products that make life more and more efficient and may make the life to be independent of each other. Even though, it doesn't mean that the product causes the life

to be universally easy. As it indicates that, at present of time, one has to work hard to track the life conveniently.

The rapid growing of science and technology makes every one be so hard to absorb all of the new knowledge. Limitation of the nature of human thinking capacity makes every one has his/her own generation of science and technology. It is indeed very hard (if it is not impossible) to keep continuously stay a head on the wave of new science and technology. However, one has to acquire effectively every new thing come from the emerging of science and technology so that could stay conveniently in the wave of new generation. Among the realization of the new science and technology, it is noted that information technology has dominated mostly of every kind of the last day emerging technology.

The most important in this era of information technology is so many sources of knowledge are available practically free of charge. The problem now is how to use effectively and efficiently all of the sources of knowledge. In educational society, the era of information technology accelerates the shifting of role of the professors. The role of professor has been shifting systematically from the center of knowledge for his/her students. Now, the professor will be just an exciting motivator for his/her students, so that the student has very high motivation to be a smart graduate who has very high skill on exploiting effectively every resource of education that are available beyond him/her. The aim of the education then is to motivate students to make use any kind of educational resource, so that to become efficiently smart leaders in the future that make the world highly useful for themselves and for everyone beyond them.

The important aspect of the advancement of the information technology is the global phenomenon. In the global phenomenon, there is no more hard-line could divide workspaces that are available in the planet. This means that every one faces free global competition of each other. Therefore, engineer (graduate) needs world class (international standard) of competence, including knowledge as well as skill. In the world class of

competition forum, now one has to act very fast but correct. No opportunity to make an error, because no more space of time that is available to recover even very small of the error, alternatively it could be very expensive.

The Era of Information Technology

The advancement of internet technology (say information technology: computer and telecommunication) surely has been changing the way of human life. It has already emerged numbers of situations, at least:

1. The available of sources of information are connected together and to be virtually closed each other
2. Many of information are available and easily reachable free of charge
3. User actually is surrounded by sources of knowledge and information technology based virtual systems and tools that make ease of life
4. One tend to reach his/her individually life using personal reachable resources, independently without much deal to the others.

Using the internet technology one may make any form of source of information that physically distance at anywhere on the planet to be reachable without any constraint. Using the extremely super highway, in very short of time tomorrow, the internet technology makes all of sources of knowledge become virtually very close around the user. The increasing of efficiency of systems and tools at the present of time, any source of information (on the earth) becomes open and easy to be reached for every one, makes any form of information resources may be used whoever and wherever practically free of charge. The intelligent phenomenon has been being realized to any information based technology, that makes high effciency on transformation of knowledge, exchange of knowledge, and transfer of knowledge.

The emerging phenomena of the era of information technology change aggressively every level and sectors of human life. Numbers of indicators may be pointed out:

1. Director without office
2. University without campus
3. Professor and/or student without class
4. Doing experimentation without laboratory
5. Bank without money and cashier
6. Office employee without desk
7. Shoping without going to supermarket.

Using single (intelligent) card, one may get many kinds of ease of services. The oxygen project of MIT promises a system that makes one get the ease of human life tomorrow in the short of time (Scientific American, August 1999). There is no useful source of information (including of technology) that could not to be reached by whoever and from wherever in the univers.

The question then is how to get and to chose effectively all of the sources of information and other form of information based technologies, systems and tools that are available, and how to exploit efficiently all of the chosen resources. That is, the keys to get a world class of competition are indeed:

1. the personal motivation to get the maximum
2. the skill to choose effectively the sources of information and other form of information based technologies, systems and tools that are available
3. the skill to make use efficiently the choosen resources
4. the skill to create new derivative of the existing technology.

The very high motivation to exploit any available resource beyond is the important foundation to get an opportunity of following world class competition. However one needs

a skill of browsing the available resources, prior to choose and then to use the most valuable of the resources

Automatic Control Education and The Future of Information Technology

In the science of technology of automatic control, the information technology may influence in to both, the subjects of automatic control and to the strategy of education of automatic control. For the first, since decades ago, all of the aspects of information theory have been being embeded part of all of the subjects of theory and technology of automatic control. Among of the important aspects of the information technology on the control technology that have been being studied are:

1. time delay (transmission time)
2. data security and error correction (information exchange)
3. multirate (multisources)
4. continuity (availability) and source independency.

About the influences of information technology to the strategy of education, the new paradigm of education in the era of information technology should be valid also for the field of automatic control. There are shifting of phenomenon of student(s) position as well as the role of professor(s) in the university. Students, if it really necessary, may come to campus (to see professors) to know how to find effectively and efficiently resources of education that are available beyond them. The students want to know how to use the chosen resources to bring themselves to be what they want to be. Alternatively, student(s) may see WEB-site to get what they want from the professor(s). To be noted, on other side, industries realy want realization on-line (in place while working) education and on-line technology development. This industrial need contributes very important to the shifting of phenomena of the distance (information technology based) education.

In the next era of information technology, when the multimedia systems have be dominant in educational purposes (indeed it is not to far), responsible of the professors is how to make the environment easy to use by the students in his/her education process. The question that is equivalent is how professor brings his/her students to be master on exploiting effectively any educational resources that are available beyond the students. It can be found numbers of educational institutes and universities that have been creating information technology based educational systems. Among them Department of Automatic Control of Lund Institute of Technology since years ago has been realizing the internet-based distance learning on automatic control subjects (IEEE Control Systems Magazine, June 1998). Stanford University in California could be the first US research university offer a master' s degree based on courses taken solely over the internet (Larry Lange, The IEEE Spectrum, January 1999). Moreover, the internet-based real-time control engineering laboratory has been realized by Overstreet and Anthony Tzes (IEEE Control Systems Magazine, October 1999) since few years ago.

The ACPA Program(s)

Without doubt, as many kinds of education resources being available and reachable from anywhere, then the existing of classical class room courses will be in question. Alternatively, absolutely no more talk and chalk educational system, but multimedia based education will dominate the educational process. Furthermore, in the future internet-based educational system will be realized in real life. As practice and exercises are very important to understand every phenomenon of notion and theory, how then the virtual class room could be run successfully. As has been mentioned, numbers of institutes do education on automatic control have been developing and implementing many kinds of strategies of the new paradigm of education.

It may be concluded the some aspects of the information technology based education systems, are:

1. information technology based resources for distance education are available everywhere (open, free of charge)
2. syatems and tools to acces the resources are available, more and more efficient
3. how to exploit (to make use) the resources effectively and efficiently
4. how to get the (self) effective evaluation
5. how to have a standard of competence for first and second degree graduate
6. how to certify the graduate(s).

It is quit realistic that the ACPA should take care the new paradigm in education. Some strategic programs may be proposed. First it should be identified the critical aspects of the information technology that influence the education strategy in general of meaning. It is not concerning only for practical realization of the educational systems and tools but also the norms. It is not very simple thing to be solved, but we need very fast and accurate action(s) to formulate the problem(s), prior to think about the alternatives of solution. Joint work with industries could be very effective to start of the work. Industries don' t need only smart engineers who do control automatic, but also the effective means of continuing education. Industries don' t need only hand skill (professional) engineers, but also need very active and motivated research engineers. The new paradigm of education may result also many kinds of freedom aspects. Then it is right to think systematically, whatever so, how the standard and acceptable competence on automatic control could be achieved. It is also responsibility of professors (say: the ACPA). ♦

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