50th DAC Global Forum

Turkey

Innovation and Technology Center Where Continents Meet

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I. Introduction

Turkey (Turkish: Türkiye), officially the Republic of Turkey (Türkiye Cumhuriyeti), is a transcontinental country, located mostly on Anatolia in Western Asia and on East Thrace in Southeastern Europe. Turkey is bordered by eight countries: Bulgaria to the northwest; Greece to the west; Georgia to the northeast; Armenia, Iran and the Azerbaijani exclave of Nakhchivan to the east; and Iraq and Syria to the southeast. The Mediterranean Sea is to the south; the Aegean Sea is to the west; and the Black Sea is to the north. The Sea of Marmara, the Bosphorus and the Dardanelles (which together form the Turkish Straits) demarcate the boundary between Thrace and Anatolia; they also separate Europe and Asia[1]. Turkey's location at the crossroads of Europe and Asia makes it a country of significant geostrategic importance.

Turkey is a democratic, secular, unitary, constitutional republic with a diverse cultural heritage. Turkey has become increasingly integrated with the West through membership in organizations such as the Council of Europe, NATO, and OECD. Turkey has the world's 15th largest GDP-PPP and 17th largest nominal GDP [2]. Turkey is among the founding members of the OECD and the G-20 major economies.

Technology and innovation has been two important drivers in the country and according to the results of R&D Activities Survey 2011[3] conducted by TurkStat, R&D Expenditures (GERD) in Turkey increased by 20.4% compared to the previous year and reached to 11.2 Billion TRY in 2011.

In 2011, 45.5% of R&D expenditure was performed by higher education sector, 43.2% by business enterprise sector and 11.3% by government sector.

II. Microelectronics In Turkey

Most of the microelectronics design companies in Turkey are design companies without actual foundry. There are both analog companies such as Hitit, Maxim, and Microelectronic. There are also digital design companies such as S&T Electronics, Dialog Semiconductor, Vestel Technologies (Vestek). Among these, Vestel is a huge TV manufacturer with millions of TV unit sales to Europe and Middle East.

There are also military defense companies which design and manufacture microelectronics for weapons and military equipments.

Capital	Ankara
Largest City	Istanbul
Language	Turkish
Area	783,562 km2
Population	75,627,384
Currency	Turkish Lira (TRY)
Time Zone	UTC +2
Internet TLD	.tr

III. Academic initiatives

There are various groups in academia who work on different parts of the design automation field. These groups are mostly in Istanbul and Ankara.

Beta Laboratory of Bogazici University (Istanbul) was established in 1993 with the aim of conducting research in various aspects of the evergrowing field of Very Large Scale Integration and establishing links between industrial companies in order to meet their ASIC demands. With the recruitment of new faculty members with backgrounds in the field, new projects were sought for and as a consequence of the received support from various sources both internal to the university and the leading industrial companies.

Dependable Systems Group (DSG) at Bogazici University work on verification (both formal and simulation-based) of computer systems, performance evaluation and benchmarking for design space exploration of computer architectures. MSRC in Koc University work on formal methods for program analysis and verification, automatic static/dynamic program verification, model checking, design, analysis and verification of concurrent software.

In Ankara, there are also various groups working in the field. Computer Architecture Group at Bilkent University work on reliability-aware three-dimensional integrated circuits (3D ICs) and heterogeneous manycore architecture design. Similarly, communication framework design and layout optimizations are done at Ankara University led by Suleyman Tosun. Kasirga group at TOBB University focuses on VLSI Design, Embedded System Design, and Energy Efficient Design at both circuit and architectural level.

IV. National Laboratories

There are two main nanotechnology centers in Turkey, both of which are located in Bilkent University. UNAM is developing as a national research facility and center of excellence in nanotechnology, where research laboratories are equipped with state-of-the-art equipments and are operational 7 days 24 hours. Nanotam houses various nanotechnology related research groups with a huge class-100 level clean room dedicated to nano-lithography. Marmara Research Center (MAM) was also established in 1972 to conduct industrial research and development.

V. Government Support

TUBITAK and Ministry of Science and Technology provide support for research and industry projects in many different programs. Main goal is to increase the competitive advantage of the industry through R&D. The measure also targets to help increase the GERD as a percentage of GDP and the share of business in R&D spending in Turkey. It was financed by Technology and Innovation Support Programmes Directorate of the Scientific and Research Council of Turkey (TUBITAK-TEYDEB) and the Undersecretariat of Foreign Trade (DTM) together between 1995 and 2010. However, with the recent changes in the regulations, TUBITAK become the single financing body for the measure.

References

[1] National Geographic Atlas of the World (7th ed.). Washington, D.C.: National Geographic. 1999. ISBN 0-7922-7528-4. "Europe" (pp. 68–69); "Asia" (pp. 90–91): "A commonly accepted division between Asia and Europe ... is formed by the Ural Mountains, Ural River, Caspian Sea, Caucasus Mountains, and the Black Sea with its outlets, the Bosporus and Dardanelles."

[2] "Gross Domestic Product 2010" (PDF). The World Bank: World Development Indicators Database. Retrieved 2013-02-09.

[3] Tubitak,www.tubitak.gov.tr.

[4] "Gross Domestic Product 2010" (PDF). The World Bank: World Development Indicators Database. Retrieved 2013-02-09.

Dr. Ozturk has been on the faculty at Bilkent since 2008 where he currently is an Assistant Professor in the Department of Computer Engineering. His research interests are in the areas of cloud computing, GPU computing, manycore accelerators, on-chip multiprocessing, computer architecture, heterogeneous architectures, and compiler optimizations. Prior to joining Bilkent in Spring 2008, he worked as a software optimization engineer in Cellular and Handheld Group at Intel and Marvell. Dr. Ozturk's research has been recognized by Turk Telekom Research Collaboration Award in 2012, IBM Faculty Award in 2009, European Network of Excellence on High Performance and Embedded Architecture and Compilation (HiPEAC) Paper Award in 2009, and ICPADS Best Paper Award in 2006. He has published over 90 journal and conference papers.