



**GUJARAT TECHNOLOGICAL UNIVERSITY**

# Report on

Two Day Workshop On

**Validation and Verification of  
Embedded Systems**

&

**Internet of Things (IOT)**

On 26 & 27 May 2015

# CiC3

**Community Innovation & Co-Creation Centre**

Room No: 128, Gujarat Technological University, ACPC Building,  
L.D. Engineering College Campus,  
Navrangpura, Ahmedabad

### Report

Gujarat Technological University continually endeavours to provide Latest Technical Knowledge to its faculty and students. To enrich the knowledge bank of our country, GTU regularly organizes workshops and seminars by inviting international experts. With such an aim GTU organized 2 Day Workshop on **Validation and Verification of Embedded Systems and INTERNET OF THINGS (IOT)** on 26 and 27 May, 2015 at its Chandkheda Campus, Ahmedabad.

The workshop commenced with welcome speech by Ms. Nidhi Thakore. Mr. Naresh Jadeja (Deputy Director-GTU) welcomed the speaker Dr. Subramaniam Ganesan of Oakland University and explained the objectives and importance of the workshop.

#### **About Resource Person:**

**Dr. Subramaniam Ganesan** is a Professor in the department of Electrical and Computer Engineering, Oakland University, Rochester, MI 48309, USA. He is a senior member of IEEE, was IEEE Computer Society Distinguished Visiting Speaker, IEEE Region 4 technical activities member and Fellow of ISPE. He received HIND RATTAN award from India, Life time Achievement award from ISAM, Lloyd L. Withrow Distinguished Speaker Award from SAE, Best Paper award from ISAM, Best Teacher award from ASEE, and Oakland University.

He is the editor in chief of an International Journal of Embedded system and Computer Engineering and International journal of Sensors and applications. He is the session organizer on “Systems engineering” at SAE world congress for the past 15 years. His research interests are in Real time system, parallel architectures and computer systems, Mobile computing, Automotive embedded systems and signal processing. He holds patents in embedded system.

Dr. Ganesan started the workshop with history of embedded system and explained how it changed to current situation of advance processors and controllers.

On First day of workshop Dr. Ganesan discussed following Topics:

- Automotive embedded system
- Life cycle, soft and hard real time system characteristics
- Validation and verification, modelling embedded system hardware and software
- Model in the loop, software in the loop, hardware in the loop tests
- Validation of requirement
- Requirement analysis
- Performance measure, task assigning, scheduling, meeting deadlines
- Use of simulation tools like etas intecrio/ascet to analyse the task timing behaviour
- Real time operating systems RTOS

- Real time communication, design analysis, non-ideal behaviour of components
- Wearable Technology
- System on Chip
- Worst case design of critical components
- Thermal/emc/failure analysis, fault tolerance, reliability issues, verification of integrated modules, diagnosis of embedded system
- Case study of engine controller development with various modelling and simulation
- Communication issues with lin, can, can-fd, flex ray, ethernet buses inside the car, software development with autosar standards and conclusion.

In the Embedded System session, the speaker gave various examples of latest technical innovations. He also suggested various research topics on which one can advance their skills and contribute to the development of newer technology.

Second day of the workshop addressed issues related to Internet of Things & its Security.

The following topics were explained briefly in that session:

- Internet of things (IOT) & billion dollar market in the coming year
- Wireless sensors
- RFID technologies
- Low cost-high performance-small size computer boards play a great role in IOT implementation & Challenges in IOT implementation
- Embedded system Security
- Advanced wireless sensors, handheld mobile devices, data routers with cloud based computing, and cheap PC boards like Arduino are security threat
- Some of the challenges and available solutions for reliable communication needed of IOT, system and data security.

Dr. Ganesan said that in the year 2020, many devices will be on internet and security will be a major issue that time. Routing and privacy will be other big issues. There will also be social issues, like some people would like to connect, some people would not like it. There will be legal and ethical issues too. People are using Cellophane, wearable watch phone and now wearable cloud is also coming. So on convergence front, there will be challenges, but afterwards it will be settled.

He discussed **Massive Open Online Course (MOOC)** concept which aims at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive user forums to support community interactions between students, professors and teaching assistants. In this system students can ask questions also. In traditional regular class-rooms, students learn in the class-room and then do homework after reaching home. In flipped class-rooms, the students will watch video lectures at

home and understand something, then come to class-room and they will do homework in front of the professor. If a student has some problem in understanding the lesson, professor can teach them immediately. This can be the best way of teaching and learning system as suggested by him.

He also explained the concept of **Global Village** which is gradually growing. People from rural and remote area will be benefitted from this revolution through Facebook and Google Hangouts. In future, manufacturing will not be done at a single place. Infact there will be cloud manufacturing. Different parts will get manufactured at various locations and then it will be assembled at a single place. So the cloud will control where and how the product will be manufactured and assembled. Cloud controlling can change the shape or size or design according to specifications. Manufacturing will have tremendous impact of cloud. Such manufacturing is called agile or distributed manufacturing.

At the end of workshop Dr. Ganesan said that he finds too much potential in students of India. He also expressed his interest in guiding GTU PhD students and research scholars. Faculty and Students asked several questions to Dr. Ganesan and got their doubts cleared with real life examples given by the expert.

### **Feedback from Participants**

- I'm glad to say that I enjoyed all the moments of this seminar. Lots of knowledge about EMBEDDED & IOT workshop were provided. Nice arrangements and my experience for this seminar is the best. I fully enjoyed.  
- Patel Kuntalkumar Bharatbhai, Government Engineering College
- It was a good workshop to get overall idea of technology.  
-Meet shah, LJIT
- It was well organised and the expert had a great knowledge .Within 2 days our concepts are brushed and we really gained a lot from these sessions.  
-Supraja, Gandhinagar Institute of Technology
- I am very happy to see management of GTU. All the workshop and facility is extraordinary. Dr. Ganesan is a Great person who taught us really well. Thanks GTU.  
-Moral Gor, Government Engineering College, Modasa
- Quite useful. We came to know about latest trends on embedded system and IoT. We got chance to listen and gain knowledge from eminent speaker Dr. Ganesan. It was really worth to attend.  
-Lata Gohil , School of Computer Studies, Ahmedabad University

### **Some photographs of the Workshop:**



### Media Coverage

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## 2020માં ઓફિસમાં બેસી ઘરે ફીજ, એસી ઓન-ઓફ કરી શકશો

### GTU WORKSHOP

સિટી રિપોર્ટર • ગુજરાત ટેકનોલોજીકલ યુનિવર્સિટી, અમદાવાદ દ્વારા 30-31મી દરમિયાન બે દિવસનો વર્કશોપ 'એમ્બેડેડ સિસ્ટમ્સ અને ઇન્ટરનેટ' વિષય પર વર્કશોપનું આયોજન કરવામાં આવ્યું હતું. આ પ્રસંગે વિદ્યાર્થીઓ સાથે ખાસ વાતચીત કરવા માટે ઓફિસ યુનિવર્સિટીનાં પ્રોફેસર ડો. સુબ્રમણ્યમ ગણેશે

હાજરી આપી હતી. તેમણે જણાવ્યું કે, વર્ષ 2020 સુધીમાં માનવ-માનવ વચ્ચે તેમજ માનવ-ઉપકરણ વચ્ચેનો સમન્વય વધશે. તેમજ કનેક્ટિવિટી અને સ્પીડ એ ઇન્ટરનેટનો મહામંત્ર બનશે. આપણે ઓફિસમાં બેસીને દૂર રહેલાં ઘરમાં ફીજ, એસી કે ગેસ કનેક્શન ચાલુ-બંધ કરી શકીશું. આપણે 2020માં અનેક ઉપકરણ ઇન્ટરનેટથી જોડાયેલાં હશે,



ડો. સુબ્રમણ્યમ

મોટો પડકાર બનશે. વધુમાં તેમણે કહ્યું કે, સામાજિક સમસ્યાઓને બીધે કાયદાકીય અને નૈતિક

એટલે નેટ સિક્યોરિટી સૌથી મોટી સમસ્યા બનશે. ઇન્ટરનેટ પર ગુપ્તતા જાળવવો તે

### ઘડિયાળ દ્વારા હેલ્થ પર નજર રાખી શકશો

ઇન્ટરનેટનો ઉપયોગ અને એમ-હેલ્થનાં વપરાશથી આરોગ્ય ક્ષેત્રે અનેક ફેરફારો થશે. કલ્પના કરો કે તમારા પુત્ર કે પુત્રીએ હાથમાં ઘડિયાળ પહેરી હોય અને તે ઘડિયાળના સેન્સરથી તેની શરીરની સ્થિતિ, હૃદયનાં ઘંઘરા પર નજર રાખી શકશો .

સમસ્યાઓ પણ ઊભી થવાની સંભાવના છે. લોકો સેલફોન અને કાંડા ઘડિયાળમાં રહેલાં ફોનનો ઉપયોગ કરતાં થયાં છે ત્યારે કાંડા ઘડિયાળમાં પહેરાય તેવાં કલાઉડ પણ આવી રહ્યાં છે. કન્વર્ઝન્સનાં અનેક પડકારો પણ ઊભા થશે, જે કે તે પછીથી સુધરી પણ જશે.