Maratha Vidya Prasarak Samaj's
Karmaveer Adv. Baburao Ganapatrao Thakare College Of Engineering
Nashik-13.
(NAAC ACCREDITED INSTITUTE WITH 'A' GRADE)

DEPARTMENT OF ELECTRONICS &TELECOMMUNICATION ENGG.

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Department Vision:-

To recognize as excellent department offering competent technical education to create competent electronics & telecommunication engineers for benefits of common masses.

Department Mission:-

Committed to serve the needs of society through innovative teaching learningprocess, promoting industry- institute interaction to provide competent and cultured electronics and telecommunication engineers.

Greeting,

Department of Electronics and Telecommunication is unveiling technical newsletter "TeChronicle" VOL-1, ISSUE-3 on 15TH September 2019,On the occasion of "Engineer's Day"as a tribute to the greatest Indian Engineer Bharat Ratna Mokshagundam Visvesvaraya. His birthday, 15 September is celebrated as the Engineers day.

INTERACTION WITH Mr. Saleel Raje

Team Editorial [2019]

ESDM Technology Private Ltd. is a Pvt. Organization, incorporated in July 2017. It is evolved in manufacturing of Electronics Circuits Boards using state of art technology.

Mr. Saleel Raje, CEO of ESDM Technology Pvt. Ltd., a dynamic senior level management professional with 27 years of experience of working with MNC's in engineering, quality assurance and manufacturing operations in the field of industrial electronics, high volume commodities and auto component manufacturing. Handling complete P&L(Profit & Loss management) responsibility since last 8 years. He has completed B.E. (Electronics) from MIT College, Pune (1985-1988).

After graduating he worked in Siemens Ltd. till 1997. Sir joined EPCOS India Pvt. Ltd. as senior manager in engineering and quality assurance department for four years nine months and promoted to general manager. In 2012 sir was appointed as vice president of TDK India Pvt. Ltd. In December 2013 he took over as the vice president of operations in Reliable Autotech Pvt. Ltd. Along with this he also contribute as the director of "NAME Foundation"(NGO) and ex-secretary of Nasik Run charity trust.

Few of the questions while conversing with Saleel sir are:

Student: According to you, do E&TC engineers play an important role in industry? How?

Saleel Sir: Yes, E&TC engineers do play an important role as they design and develop hardware of any product. But we know that all branches are co-related and dependent on each other to make a finished product. Hence, all engineers play a vital role to expand an industry in the world.

Student: As an industrialist, while recruiting students what qualities do you expect from them? How can we fit into that ideology?

Saleel Sir: A person should have a basic idea about current affairs around the world. The person should be easily adaptable to all circumstances. Students should think logically and be able to deal with any situation whether industrial or not. For this you need to improve your interaction skills by reading newspapers, magazines, and technical articles on daily basis.

Student: What advice would you like to give to the youngsters out there?

Saleel Sir: According to me, the best advice could be, "Discover your passion". If you do something which does not captivate you, your life is meaningless. So, follow your passion and it will ultimately bring you success.

ELECTRONICS IN AGRICULTURE: PRECISION AGRICULTURE

Mr. A.P.Meshram[Associate Professor]

Precision agriculture (PA), satellite farming or site specific crop management (SSCM) is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops. The goal of precision agriculture research is to define a decision support system (DSS) for whole farm management with the goal of optimizing returns on inputs while preserving resources.

The practice of precision agriculture has been enabled by the advent of GPS and GNSS. The farmer's and/or researcher's ability to locate their precise position in a field allows for the creation of maps of the spatial variability of as many variables as can be measured (e.g. crop yield, terrain features/topography, organic matter content, moisture levels, nitrogen levels, pH, EC, Mg, K, and others). Similar data is collected by sensor arrays mounted on GPS-equipped combine harvesters. These arrays consist of real-time sensors that measure everything from chlorophyll levels to plant water status, along with multispectral imagery. This data is used in conjunction with satellite imagery by variable rate technology (VRT) including seeders, sprayers, etc. to optimally distribute resources.

Precision agriculture has also been enabled by unmanned aerial vehicles like the DJI Phantom which are relatively inexpensive and can be operated by novice pilots. These agricultural drones can be equipped with hyperspectral or RGB cameras to capture many images of a field that can be processed using photogrammetric methods to create orthophotos and NDVI maps. These drones are capable of capturing several metric points of the land that can later be used to deliver proper water and fertilization to crops.

Precision agriculture is a key component of the third wave of modern agricultural revolutions. The first agricultural revolution was the increase of mechanized agriculture, from 1900 to 1930. Each farmer produced enough food to feed about 26 people during this time. The 1960s prompted the Green Revolution with new methods of genetic modification, which led to each farmer feeding about 155 people. It is expected that by 2050, the global population will reach about 9.6 billion, and food production must effectively double from current levels in order to feed every mouth. With new technological advancements in the agricultural revolution of precision farming, each farmer will be able to feed 265 people on the same acreage.

Precision agriculture aims to optimize field-level management with regard to:

Crop science: by matching farming practices more closely to crop needs (e.g. fertilizer inputs)

Environmental protection: by reducing environmental risks and footprint of farming (e.g. limiting leaching of nitrogen);

Economics: by boosting competitiveness through more efficient practices (e.g. improved management of fertilizer usage and other inputs).

Tools:

Precision agriculture is usually done as a four-stage process to observe spatial variability:

- **Data collection -** Information gathered from analysis of soils and residual nitrogen, and information on previous crops and soil resistivity.
- **Variables -** Intra and inter-field variability may result from a number of factors. These include climatic conditions, soils, cropping practices, weeds and disease. Permanent indicators—chiefly soil indicators. Point indicators allow them to track a crop's status; Electrical Conductivity (ECa) is another chief parameter.
- **Strategies -** Using soil maps, farmers can pursue two strategies to adjust field inputs: a) Predictive approach: based on analysis of static indicators (soil, resistivity, field history, etc.) during the crop cycle. & b)Control approach: information from static indicators is regularly updated during the crop cycle Decisions may be based on decision-support
- **Implementing practices -** New information and communication technologies make field-level crop management more operational and easier to achieve for farmers.

Emerging technologies

Precision agriculture is an application of breakthrough digital farming technologies.

Robots: Agricultural robots, also known as AgBots, already exist, but advanced harvesting robots are being developed to identify ripe fruits, adjust to their shape and size, and carefully pluck them from branches.

Drones and satellite imagery: Advances in drone and satellite technology benefits precision farming.

The Internet of things: The Internet of things is the network of physical objects outfitted with electronics that enable data collection and aggregation.

Smartphone Applications: Smartphone and tablet applications are becoming increasingly popular in precision agriculture.

Machine Learning: Machine learning is commonly used in conjunction with drones, robots, and internet of things devices.

Economic and environmental impacts

Precision agriculture management practices can significantly reduce the amount of nutrient and other crop inputs used while boosting yields. Farmers thus obtain a return on their investment by saving on water, pesticide, and fertilizer costs.

The concept of precision agriculture first emerged in the United States in the early 1980s.The future of agriculture moves more towards efficient and precise farming with less human manpower.

Reference:

1)https://idealog.co.nz/tech/2016/10/five-technologies-changing-agriculture

2)https://www.economist.com/technology-quarterly/2016-06-09/factory-fresh

3)https://earthobservatory.nasa.gov/features/PrecisionFarming

SERVER LESS COMPUTING

Siddhant Joshi [T.E E&TC]

Server less computing is a cloud computing execution model in which the cloud provider runs the server, and dynamically manages the allocation of machine resources. Pricing is based on the actual amount of resources consumed by an application, rather than on pre-purchased units of capacity.

It can be a form of utility computing. There is presence of server but it is not like to store the data into various location in a data center the servers are provided by vender's which allows us to use their space and do our task like computing this helps us to focus on the logical part of the project rather than to focus on the other aspect's like the updates of the server, the operating system which to be choose and many more thing's which make our way difficult during the process of design the application. There are various services provider which provide serverless services like "pay as you go" released in 2006 by Zimiki, then google app engine by google in 2008, AWS lambda by amazon.inc in 2014 and many more.

Server less computing is one of the types of cloud computing, cloud computing is differentiated into three main categories as:

1] IaaS: Information as Service

It is the most basic level of the cloud computing process; It helps us by renting various services like the virtual machine, storage network's and operating system.

Eg: Amazon EC2 and S3, Google Compute Engine, Windows Azure.

2] PaaS: Platform as Service

It provides all the infrastructure as all the basic computing environment needed is being provided by the venders in order to test the programs run it and to compute .it provides various SDKs in order to run various languages.

Eg:AWS Elastic Beanstalk, Heroku, Windows Azure, Force.com, Google App Engine

3] SaaS: Software as a Service

The server less computing is the software as the service technique, this technique can be defined as the process in which has the abstract of the services which is event driven and is charged as per the usage in time in milliseconds. [1]

Reference:

1) https://www.educative.io/edpresso/what-are-iaas-paas-and-saas?
2) Azure functions. Retrieved December 1, 2016, from https://functions.azure.com
3) Cloud functions. Retrieved December 1, 2016, from https://cloud.google.com/functions/

POWER OF A MUSTARD SEED

Esha Chokhar [S.E E&TC]

We have always seen mustard seeds used for cooking and how it crackles when tempered with hot oil. What if the same seeds were able to generate electricity?

Yes, it is possible. According to Indian Institute of Science, Education and Research (IISER) mustard seed generates power which can be used to glow small LED bulbs. A team of scientists carried out an experiment using mustard seeds, sandwiched between a layer of plastic and polymeric nano fibre pad subjected them to mild force and found that electric power was generated; similar tests were carried for flax and basil seeds. The crust or the surface layer of mustard seed offers better response to friction and it is found to be electrostatically more active than other seeds. The power is generated due to transfer of electrical charges afforded by the seed surface to the mildly impacting soft polymeric material.

It shows that the seed produces maximum 334MW/square meter electric power followed by flax (324MW/square meter electric power) and basil (72mW/square meter electric power).The test demonstrates that electricity generated by the seeds of about 2 grams can momentarily light 120 LED bulbs. Such power devices used in wearable electronics.

Reference:

https://www.azonano.com/article.aspx?ArticleID=1735

NEW CHARGING METHOD: LITHIUM BATTERIES CHARGE FASTER, LIVE LONGER

Shweta Bagade [S.E E&TC]

Introduction:

Lithium-ion (li-ion) battery technology has been undergoing a period of intense development and improvement, mostly due to the growth of the electric vehicle (ev) market. Since the charging time of ev is still far from the time it takes to refuel gas-powered cars, this is definitely a key parameter that needs to be reduced. Fast battery charging is a true challenge for researchers because the technology has to be capable of rapidly charging li-ion batteries while maintaining good cell cycle life and minimizing cell degradation.

Researchers from Sungkyunkwan University Korea presented a new approach in rapid charging pattern in a paper published in applied sciences. The team's new rapid-optimization pattern improves the cycle life of the cells by 45 percent compared to conventional fast-charging patterns and solves

the issue of capacity drop in the second half of cell life during rapid charging.

Uses:

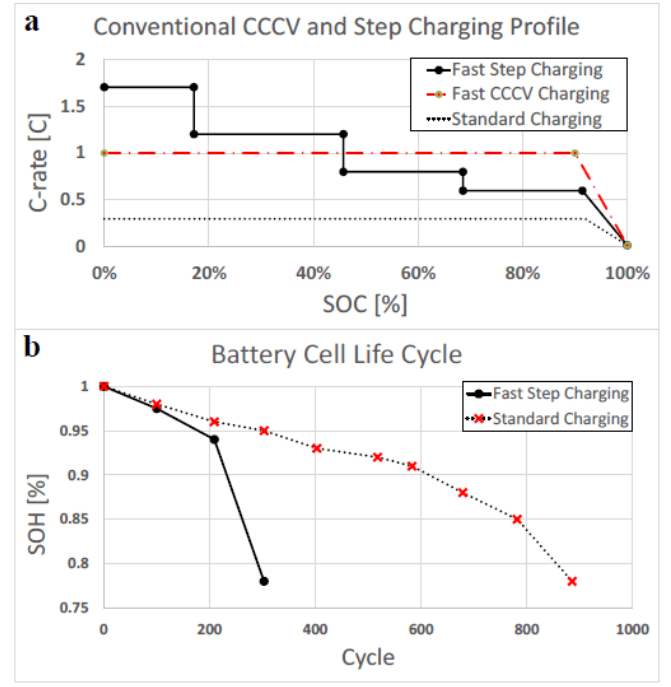
Conventional typical fast charging patterns use a single or multiple step constant-current constant-voltage (cccv) charging processes. To speed up the charging process, conventional methods use constant high current in the area in which battery capacity is still low. The charging current is decreased in steps as the state of charge (soc) increases (as the battery is charging), thus minimizing cell degradation.

These methods do not take into consideration environmental variables affecting the battery, nor the impacts of internal degradation, which influence rapid cell degradation.

Cycle life evaluations:

(a) A conventional charging profile according to charging method;

(b) A battery cell cycle life based on charging.



Other fast-charging methods that have recently been introduced include pulse charging and boost charging, which include intermittent pauses to avoid lithium plating. Plating is caused by high lithium ion concentration around the anode due to high charging current. A drawback of these methods is the use of higher charge currents to compensate for the pause time, resulting in rapid battery capacity losses. Generally, rapid charging design involves the proper balance between charging time and battery cycle life.

Applications:

Since the applications of li-ion batteries, and the environments in which they are used, are becoming increasingly diverse, understanding battery behavior is key to developing proper battery charging methods. Ev batteries feature high energy density and performance, and, thus, are more complex and have higher packing density. Predicting battery characteristics is more challenging as the cycle life is increased. Therefore, understanding Ev Li-ion batteries in the context of a charging pattern is difficult to achieve through the usual approaches, such as using simulations to predict battery performance based on lab analysis.

To improve its estimates, the Sungkyunkwan University team used differential voltage analysis (dva) to determine changes in voltage with varying capacitance (cv method)

dva=dv/dq

Where,

dv=the voltage increase

dq=the capacity increase

The peak values and sudden changes in the dv/dq graph indicate the active material losses and chemical changes.

Two new charging methods are combined to create an efficient charging pattern, constant voltage step charging pattern and a constant time (ct) pattern. The cv fast-charging pattern allows for self-charge control to reflect cell degradation and reduces cycle life degradation. Ct pattern controls the c-rate of the charging step, based on the capacity degradation of the battery cycle, to ultimately adjust the charging time to the initially set rapid-charging time.

"We here report our study on cell resistance characteristics based on dva, and further propose two adaptive rapid charging patterns that reflect the intrinsic characteristics of cells in a specific soc, in addition to considering variations in degradation characteristics as the battery cycle life progresses," the team said. The experiments performed on the lithium cobalt oxide/graphite 18650 cylindrical 3.3 ah cell have shown that the number of feasible cycle numbers for the new fast-charging method with a 20 percent capacity degradation increased by 61.7 percent, when compared to conventional cccv step charging. The new method has resulted in no capacity drop at the beginning of the cycle. The new rapid charging method is effective in controlling undesirable side reactions between the anode and electrolyte, which prevents capacity loss.

The researchers concluded, "We therefore expect that our method will be a good candidate in the development of rapidly charging electric vehicle battery packs while maintaining suitable cell cycle lives".

Reference:

https://www.research.ibm.com