



EAEC Issue 1 • February 2010

news

Newsletter to the Members of
EAEC Automotive Engineers' Societies

Dear President,
Dear Secretary,
Dear Members of the National EAEC Societies,
Dear Friends and Colleagues,

The New Year of automotive meetings starts with the congress **10th International Electronics Recyrcycling Congress**, in Salzburg, Austria, 19 – 21 January 2010. This event will be followed by some other automotive meetings. As far I have been informed to date there are 21 events until the middle of 2010. They are all mentioned with links to the internet announcement in the column:

List of the local automotive events in Europe in the first half of 2010

I am sure that the list of European automotive events in this issue is not complete. When I get more information I will update the list step-by-step in the next issues. You can also find such congress information on the EAEC homepage, as well as all the previous Newsletters of 2009:

<http://www.eaec.net>

From the last "autumn" automotive meetings in November and December 2009, I can give you information how to get the proceedings in the column "*Post Congress and Event Information*".

May I draw your attention to the next FISITA World Congress which will be held in Europe:

FISITA 2010 Congress; Budapest, Hungary, 30 May to 4 June 2010

In this Newsletter, please find more information about this event.

The Preliminary Programme is now ready, was distributed in hard copy and can be found on the congress home page:

<http://www.fisita2010.com/>

In "*The Historic Corner*", I am continuing the information about historic vehicles with a presentation of the first electric cars.

2010 will be a year of important decisions:

We have to find a candidate for the EAEC 2013 Congress.

For the period 2011 to 2015, a new EAEC President has to be elected.

For both decisions, I am sending separate e-mails and letters to all EAEC Societies.

Both elections will take place at the FISITA World Congress in Budapest, Hungary, 30 May to 4 June 2010, at the annual EAEC Council Meeting.

Brigadier ret. Prof. Günter Hohl
EAEC President
Vice President FISITA Europe

Future Main European Events

Next year there is an important automotive meeting:



The **Preliminary Programme** is now ready and can be down loaded from the congress home page:

Preliminary Programme

<http://www.fisita2010.com/>

The biennial FISITA Congresses provide excellent opportunities for automotive experts to present the latest technologies and to exchange information in the field of automotive and related industries.

In cooperation with FISITA, GTE has embarked on a number of activities to ensure that it holds a successful conference.

The goal is to make the FISITA 2010 Congress a forum for the latest achievements of the automotive industry.

Important dates are:

15 March 2010

Deadline for submission of final paper

30 May - 4 June 2010

FISITA 2010 Budapest

The Congress Topics are:



A Environmentally friendly vehicles

- A1** IC engines: goals and developments
- A2** Tools for emission reduction, zero emission in the future
- A3** Alternative fuels and related systems (e.g. electric, hybrid, fuel cell, NCG, LCG, bio-fuel)
- A4** Sources of noise, reduction of vehicle noise



B Vehicle design and development

- B1** Styling, aerodynamics
- B2** New concepts, materials and tools in body design
- B3** Vehicle families based on platform-sharing, chassis design
- B4** Development of main parts, components and vehicle systems
- B5** Design for manufacturing, maintenance and repair
- B6** Development of vans and special vehicles (e.g. off road, mobile machinery)
- B7** Micro cars and low cost vehicles for emerging markets



C Test, simulation and calculation methods of vehicles and components

- C1** Advanced engineering technologies and tools
- C2** Methods of strength and service life estimation
- C3** Vehicle performance tests and simulation
- C4** Testing and simulation of vehicle and component dynamics
- C5** Tools and methods for whole vehicle systems engineering



E Intelligent systems in road traffic

- E1** Intelligent vehicle systems (e.g. driver-vehicle interaction, control of vehicles, crash avoidance)
- E2** Intelligent traffic systems (e.g. GPS based systems, driver's information, lane-keeping systems, control of traffic lights vehicle to vehicle communication)
- E3** Intelligent Transportation Systems (traffic and vehicle fleet management)
- E4** Connectivity of intelligent systems, security questions



G Vehicle standards, regulations, legislation

- G1** Globalization of vehicle standards and regulations
- G2** New directions in international regulations
- G3** General questions of vehicle and component approvals



D Safety on roads

- D1** Accident statistics, analysis and reconstruction techniques
- D2** Injury mechanisms, injury reduction and avoidance
- D3** Active safety issues (e.g. braking systems, steering, suspension, stability, lighting)
- D4** Passive safety issues (e.g. compatibility of vehicles, energy absorption, survival space concept, biological-load limitations, passenger retention systems)
- D5** Protection of vulnerable road users (pedestrian, bicycle)
- D6** Road infrastructure and vehicle safety



F Buses, trucks and heavy vehicles*

- F1** Development, new design, new vehicles
- F2** New propulsion system arrangements
- F3** Passenger comfort and safety
- F4** Protection of drivers and crew
- F5** Under-run protection
- F6** Fires in heavy vehicles, fire protection
- F7** Evacuation of buses, emergency exits
- F8** Performance based design of large special-vehicles for road use



H Efficient production and operation of vehicles and components

- H1** Performance/cost material selection, new materials
- H2** Modularisation in design for economical production
- H3** Life cycle concept in production, service and recycling
- H4** Supplying chain and logistics
- H5** Efficient new technologies in production
- H6** Customer based sales and services

CONGRESS PROGRAMME

Schedule

Monday 31 May		+ for det	Tuesday 1 June		+ for detail
09:00–09:30	Opening Ceremony		08:00–10:30	Technical Sessions	+
09:30–10:30	Plenary Lectures		10:30–11:00	Coffee break and poster presentation	+
10:30	Exhibition Opening		11:00–12:30	Plenary Sessions	
11:30–12:30	Technical Sessions	+	12:30–14:00	Lunch break, exhibition and poster presentation	+
12:30–14:00	Lunch break, exhibition and poster presentation	+	14:00–16:00	Technical Sessions	+
14:00–16:00	Technical Sessions	+	16:00–16:30	Coffee break and poster presentation	+
16:00–16:30	Coffee break and poster presentation	+	16:30–19:00	Technical Sessions	+
16:30–18:30	Technical Sessions	+			
19:00–20:30	Congress Concert				

Wednesday 2 June		+	Thursday 3 June		+
		for detail			for detail
08:00–10:30	Technical Sessions	+	08:30–10:30	Technical Sessions	+
10:30–11:00	Coffee break and poster presentation	+	10:30–11:00	Coffee break and poster presentation	+
11:00–12:30	Plenary Sessions		11:00–12:30	Technical Sessions	+
12:30–14:00	Lunch break, exhibition and poster presentation	+	12:30–13:30	Closing Ceremony	
14:00–16:00	Technical Sessions	+	13:30–14:00	Farewell Party	
16:00–16:30	Coffee break and poster presentation	+	14:00	Technical Tours	
16:30–18:30	Technical Sessions	+			
20:00	Gala Dinner				



The FISITA 2010 Congress will take place in the same area as the EAEC 2007 Congress, but with additional space for lectures and exhibition. The location is the new part of the Technical University of Budapest, near the River Danube, with excellent opportunities for Congresses.



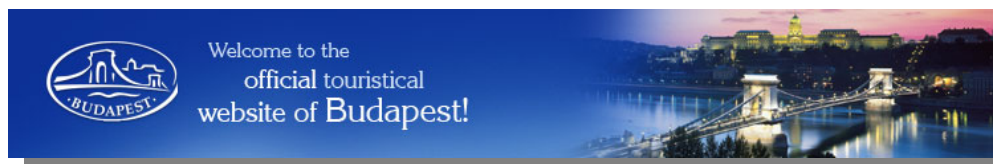
Chain Bridge



Parliament

More information about Budapest can be found on this website

<http://www.budapestinfo.hu/en/>



The next EAEC Congress will be one year later in 2011.

EAEC 2011 Congress



The homepage of the **EAEC 2011 Congress** is now installed.



The information about the Congress will be updated step by step

Important dates are:

November 2009

First Announcement

March 2010

First Call for paper

October 2010

Deadline for abstract submission

January 2011

Publication of the Preliminary Programme

The main topics are:

Topic A 'Powertrain and Green Technologies'

- Hybrid Engines
- Electric Engines
- Powertrain Performance
- Fuels a & Lubricants
- Noise and Vibration

Topic B 'New Control Systems and Materials'

- Passenger Cars
- Busses and Trucks
- New Materials
- Vehicle Systems
- TIC Systems

Topic C 'Vehicle dynamics'

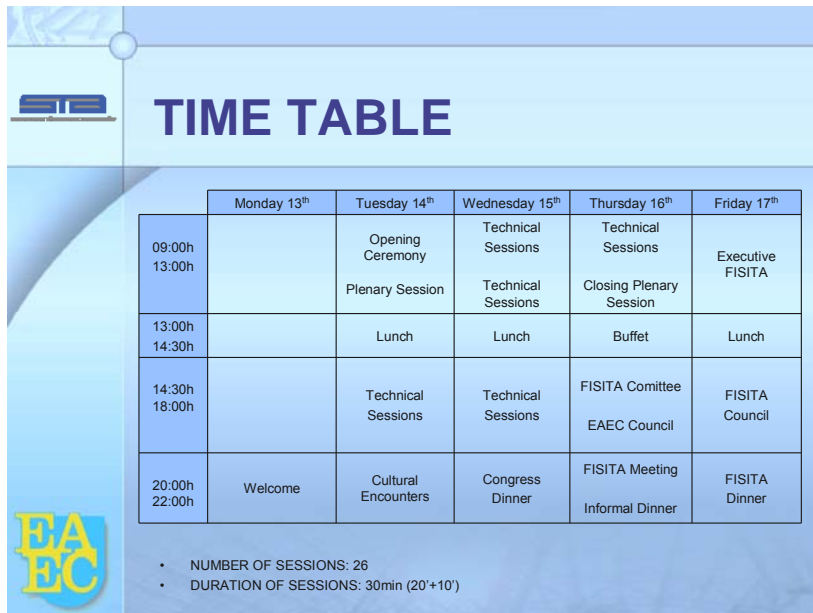
- Suspension
- Steering systems
- Brakes
- Tyres
- Advanced Dynamic Vehicle Control
- Stability

Topic D "Manufacturing & Process innovation"

- Production Technology
- Production Process

Topic E "Safety & Human factors"

- Safety Vehicles
- Human Factors and Safety
- PMR Safety
- Traffic Management and Logistics



	Monday 13 th	Tuesday 14 th	Wednesday 15 th	Thursday 16 th	Friday 17 th
09:00h 13:00h		Opening Ceremony Plenary Session	Technical Sessions Technical Sessions	Technical Sessions Closing Plenary Session	Executive FISITA
13:00h 14:30h		Lunch	Lunch	Buffet	Lunch
14:30h 18:00h		Technical Sessions	Technical Sessions	FISITA Comittee EAEC Council	FISITA Council
20:00h 22:00h	Welcome	Cultural Encounters	Congress Dinner	FISITA Meeting Informal Dinner	FISITA Dinner

• NUMBER OF SESSIONS: 26
 • DURATION OF SESSIONS: 30min (20'+10')

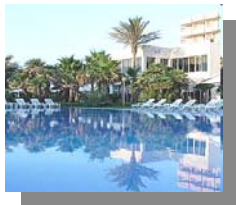
The EAEC 2009 Congress will take place at the:

Universidad Politécnica de Valencia

- Auditorium: 400 people
- Amphitheatre: 100 people
- Simple hall: 40-45 people
- Double hall: 80-85 people



The Technical University of Valencia is located in a big campus in an American style, with all room and administration facilities for middle sized congresses. A bus transfer from the hotels will be provided,



On 4 February 2010, there was a Congress Organizing Committee Meeting in Valencia at the Politechnical University of Valencia. The Committee consisted of:

- EAEC President: Günter Hohl
- Chairman Congress: Rafael Boronat (STA President)
- Vice-Chairman and Congress Director: Josep Font (STA VALENCIA)
- Chairman Bratislava Congress 2010: J. Lesinsky (SAITS President)
- STA & Comisión Territorial STA Valencia *)

*) This Commission consists of STA members and authorities of the local administrations, as the Regional Province Government of Valencia, the City of Valencia and the Politechnical University Valencia.

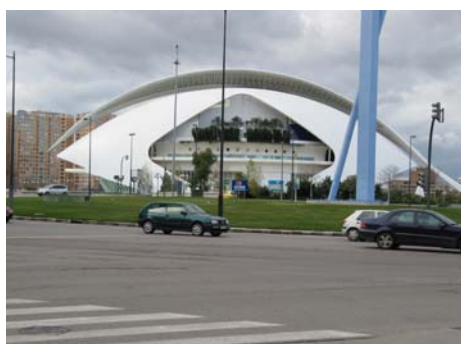


R. Boronat J. Font G. Hohl



Members of the STA & Comisión Territorial STA Valencia

Valencia is not only famous for its historical buildings. Some of them were shown in the last issue of the EAEC Newsletters. The River Turia sometimes overflowed the city; therefore the river was detoured in a new river bed. In the former river bed, the famous star architect "Santiago Calatrava", son of Valencia, built his "City of Art and Science".



Post Congress and other Event Information

Kleintransporter und leichte Nutzfahrzeuge

Sicherheit, Wirtschaftlichkeit und Umweltschonung
bei Personen- und Gütertransport

19 - 20 November 2009



Proceedings are available via:

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Tagungen und Kongresse
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Westendstraße 199
80686 München

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Telefax +49 89 5791-2833

E-Mail ute.alius@tuev-sued.de

AAC 2009

AACHEN Acoustic COLLOQUIUM

24 – 25 November 2009

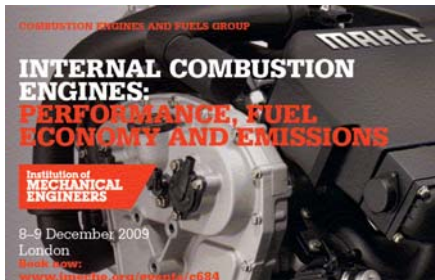
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10th International Electronics Recycling Congress

January 19–21, 2011, Salzburg, Austria

More details please find on the **icm** home page:

<http://www.icm.ch/>

Proceedings are available via:

ICM AG; **Susann Schmid**

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Automotive Engineer Magazine

Automotive Engineer is the official EAEC Magazine and the leading magazine for automotive engineers. It is published by Professional Engineering Publishing Limited, the publishing company of the Institution of Mechanical Engineers (IMechE). One page is always reserved for EAEC matters. In the issues, the EAEC Congresses and other information about EAEC are announced.



It is usual that newspapers and magazines change their appearance from time to time. This change is the fifth one in the history of *Automotive Engineer*. Some aspects of the new layout of the magazine were presented by the publisher of the *Automotive Engineer* magazine, Mr. Paul Williams, at the EAEC Council Meeting in Bratislava and in the previous EAEC Newsletters.

The magazine will still be published 11 times a year (July and August are a double issue) and it is free for members of the national EAEC Member Societies.

In addition to the hard copy of the *Automotive Engineer* magazine, the publisher also has a very informative home page:

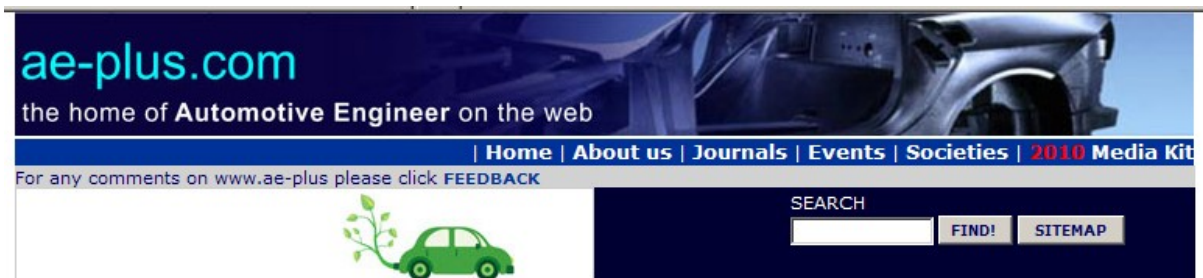
<http://www.ae-plus.com>

ae-plus.com is the official website of **Automotive Engineer** magazine

ae-plus.com is for all automotive engineers, executives, researchers and enthusiasts who wish to update themselves on the industry's technology, business, news and general information. It is an English language website but it is intended by the publisher that the articles are written at a level of the English language which should be understood by all automotive engineers and other people who might be interested in automotive engineering, no matter from which country they come from.

ae-plus.com will not replace **Automotive Engineer** magazine or detract from its contents, but will be complementary to the printed publication. Articles published in the magazine are often archived on this site after three months (or longer).

However, **ae-plus.com** is more than an on-line archive for it will generate its own copy, with business and technology news, the key topics and car company news updated regularly.



Headline of the start page

In addition, within each Key Topics subject is a Technical Review banner which takes the visitor to another page listing refereed papers from the journals published by Professional Engineering Publishing Limited. These are updated on a regular basis. This is an invaluable resource for those interested in true academic research and is the only freely available source of this information.

The site is wholly under the direction of the **Automotive Engineer** editorial team so that the high standard of editorial integrity and quality that has become a trademark of the magazine is maintained on **ae-plus.com**.

In the page "**About us**" are explanations in nine languages

Entering the page **Journals** there is information about the portfolio of Journals represent the best in mechanical engineering published by the Institution of Mechanical Engineers

List of the local automotive events in Europe in the first half of 2010:

The list of automotive events in the first half of 2010 are based on information from the national European Societies and from information of automotive organizations I have received directly.

Should there be more events in your country which are not on the list, please let me know and will distribute the updated list again to all Member Societies directly or via the next Newsletter. Also congresses, conferences, workshops or symposia, which are held in the language of your country, will be announced and mentioned on the list. All European events will be put into the EAEC home page.

10th International Automobil Recycling Congress

Venue: Basel, Switzerland

Organizer: ICM – International Congress and Marketing

03 – 05 March 2010

Website: http://www.icm.ch/index_auto10.htm

80th INTERNATIONAL GENEVA MOTORSHOW

Venue: Geneva, Switzerland

Organizer: GENEVA PALEXPO PALEXPO

04 – 10 March 2010

Website: <http://www.salon-auto.ch/en/>

**IAMF 2010 –FORUM FOCUSED ON
THE MOBILITY OF THE FUTURE**

Venue: Geneva, Switzerland
Organizer. GENEVA PALEXPO PALEXPO
09 – 10 March 2010, during the Geneva Motorshow
Website: <http://www.iamf.ch>

11th European Fuels Conference,

Venue: Paris, France
Organizer. World Refining Association
09 - 12 March 2010
Website: <http://www.wraconferences.com/europeanfuels>

Biomass Power & Trade,

Venue: Rotterdam The Netherlands,
Organizer. Centre for Management Technology
11 – 13 March 2010
Website: <http://www.cmtevents.com/>

World Biofuels Market-

Venue: Amsterdam, The Netherlands
Organizer. Green Power Conferences
15 - 18, March 2010
Website: <http://www.worldbiofuelsmarkets.com/2010>

LPG & CNG Show 2010-

Venue: Warsaw
Organizer. ECP Communications Sp. z o.o.
17 – 19 March, 2010
Website: <http://www.lpg-cng.pl/>

AEA - Alternative Energies for the Automotive Industry

Venue: Poitiers, France
Organizer: SIA
18 - 19 March 2010
Website: http://www.sia.fr/evenement_detail_alternative_energies_for_the_1043.htm

31 INTERNATIONAL VIENNA MOTOR SYMPOSIUM

Venue: Vienna, Austria
Organizer: ÖVK
29 – 30 April 2010
Website: <http://www.oevk.at/>

IAMF 2010

Venue: Geneva, Switzerland
Organizer: Geneva Palexpo
9 - 10 May 2010
Website: <http://www.iamf.ch/en/>

Commercial Vehicle Workshop

Venue: Graz, Austria
Organizer: TU Graz; Institut für Fahrzeugtechnik
7. May 2010
Website: <http://www.ftg.tugraz.at>

Venue: Berlin, Germany
Organizer: VDI/VDE Innovation + Technik GmbH
European Technology Platform on Smart Systems Integration (EPoSS)
10 - 11 May 2010
Website: <http://www.amaa.de/>

ERTS Embedded Real Time Software and System 2010

Venue: Toulouse, France
Organizer: **AAAF**, the Association Aéronautique et Astronautique de France
SEE the French Electrical, Electronics, and
Information & Communication Technologies Society
SIA, the Société des Ingénieurs de l'Automobile (the French Society of
Automobile Engineers)
19 - 21 May 2010
Website: <http://www.erts2010.org/Default.aspx?Id=826&Idd=>

Diesel Engines, Facing the Competitive Challenges

Organizer: SIA
Venue: Rouen, France
26 - 27 May 2010
Website: http://www.sia.fr/evenement_detail_motorisations_diesel_face_au_1044.htm

FISITA 2010 World Automotive Congress

Venue: Budapest, Hungary
Organizer: GTE
30 May – 4 June 2010
Website: <http://www.fisita2010.com/>

ICME-2010

Venue: Tel-Aviv, Israel
Organizer: AEAI
2 - 3 June 2010
Website: <http://www.engineers.org.il/Index.asp?CategoryID=2299>

3rd Congress "The automobile future: Alternative powertrain systems"

Venue: Barcelona, Spain
Organizer: **STA**
8 - 9 June 2010
Website: <http://www.stauto.org/inicio.htm>

NGVA europe

Venue: Rome, Italy
8 – 10 June 2010
Website: <http://www.ngv2010roma.com/en/>

IFAC Symposium

Advances in Automotive Control

Venue: Munich, Germany
Organizer: VDI/VDE- Gesellschaft Mess- und Automationstechnik
Datum: 12 - 14 July 2010.
Website: <http://microsites.vdi-online.de/index.php?id=1946>

The Historic Corner

When we speak about electric cars, we have to look back how electricity was discovered and applied for practical use. The word “*electro*” (“*electron*” meaning amber in old Greek), which is in use in many word combinations like electricity, electrode, electrolyte etc. can be traced back to ancient times. Two natural phenomena, central to the study of physics, were observed and speculated upon by Greek natural scientists - probably in the 5th century BC.

One such phenomenon is the strange property of amber. If rubbed with fur, it will attract feathers or bits of straw. Modern science, in its terms for the forces involved, acknowledges this Greek experiment with amber. The behaviour of the amber is caused by what we call electricity, resulting from the transfer of what is now known as electrons.

Amber is fossilized tree resin (not sap), which has been appreciated for its colour and natural beauty since Neolithic times.



A mosquito and a fly in this Baltic amber necklace are between 40 and 60 million years old



A spider trapped in amber



In Greek mythology, amber come from the tears of the mourning sisters of **Phaethon** (Φαέθων), the son of **Helios**, the god of sun, and **Clymene**. Phaethon's only wish was to drive his father's chariot that pulled the sun across the sky.

Although Helios knew that none but him could drive it, he granted his son's wish after a hasty decision. Phaeton could, of course, not steer the chariot and when he was getting too close to Earth, Zeus killed him with a thunderbolt. Otherwise the sun would have burnt everything. Phaeton was buried by the River Eridanus (today's River Po).

Fall of Phaeton 1596
Painting by Joseph The Elder Heintz
Museum der Bildenden Künste,
Leipzig



A Phaeton carriage early
19th century



Volkswagen Phaeton

Phaeton is the early 19th-century term for a sporty carriage drawn by a single horse or a pair, typically with four extravagantly large wheels, very lightly sprung, with a minimal body, fast and dangerous..

It usually had no sidepieces in front of the seats. The rather self-consciously classicizing name refers to the disastrous ride of mythical Phaëton.

The name Phaeton found a revival in the name of the **Volkswagen Phaeton**, which is a full-size luxury sedan/saloon, and is described by Volkswagen as their "premium class". It was introduced at the 2002 Geneva Motor Show.

The other natural phenomenon also derives its scientific name from Greek experiments. It is lodestone, a naturally occurring mineral (formed of iron oxide), which will surprisingly attract small pieces of iron.

The Greeks found this mineral in a region of Thessaly called Magnesia. They called it lithos magnetis, the '*stone of Magnesia*'. Thus the magnet was identified and named, though like rubbed amber, it was only be a source of interest and amusement for the next 1000 years and more - until a practical purpose is found for it in the form of the compass.

The term "*electric car*" seems very modern, but the electric cars are about fifty years older than cars with combustion engines. Beside steam energy, electricity is one of the oldest automobile propulsion methods still used again today.

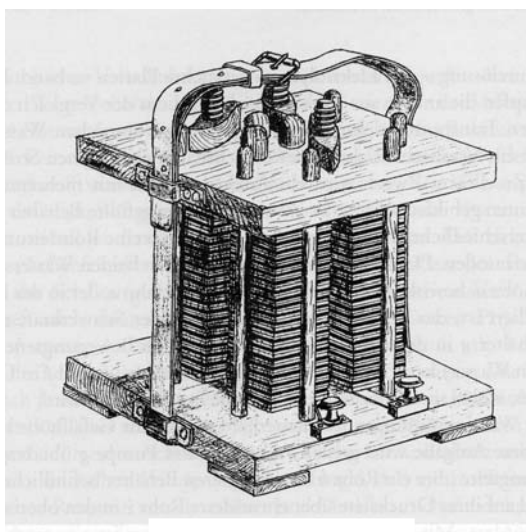
The invention of the electric vehicle is attributed to various people. But before mentioning the various engineers who developed the electric vehicles, there should be a short introduction of scientists who investigated electricity as a kind of energy and paved the way for its practical use.

Learning how to produce and use electricity was not easy. For a long time, there was no dependable source of electricity for experiments. Finally, in 1800, **Alessandro Volta**, an Italian scientist made a great discovery. As the result of a professional disagreement over the galvanic response advocated by Galvani, he invented the voltaic pile, an early electric battery, which produced a steady electric current. Volta had determined that the most effective way to produce electricity was a pair of dissimilar metals.

The battery made by Volta is credited as the first electrochemical cell. It consists of two electrodes: one made of zinc, the other of copper. The electrolyte was sulphuric acid or a brine mixture of salt and water. The zinc, which is higher than both copper and hydrogen in the electrochemical series, reacts with the negatively charged sulphate. The positively charged hydrogen bubbles start depositing around the copper and take away some of its electrons. This makes the zinc rod the negative electrode and the copper rod the positive electrode.



Alessandro Giuseppe Antonio
Anastasio Count of Volta
(1745 - 1827)



Volta Battery

In honour of his work, Volta was made a count by Napoleon in 1810. After the Napoleonic time, the Duchy of Milan, to which Como, his home city, became again a part of the Hapsburg Monarchy and he also had a good relationship to this dynasty. It is in honour to Volta that fifty years after his death in 1897, the dimension of electric current is measured in Volt. Also the general symbol of electric current is named after him, as in former times the letter “U” was written as “V”.



Further more in modern he was honoured with the name of a modern electric car, namely the **Toyota Alessandro Volta**, which was a concept car developed in the collaboration of the Japanese manufacturer Toyota and the Italian design company Italdesign Giugiaro.

It was officially unveiled at the 2004 Geneva Motor Show and it was a study of a hybrid electric sports car.

Toyota “Alessandro Volta

Hans Christian Ørsted (often rendered **Oersted** in English) was a Danish physicist and chemist who is most widely known for observing that electric currents induce magnetic fields, an important aspect of electromagnetism. He shaped post-Kantian philosophy and advances in science throughout the late 19th century.



Hans Christian Ørsted
(1777 – 1851)



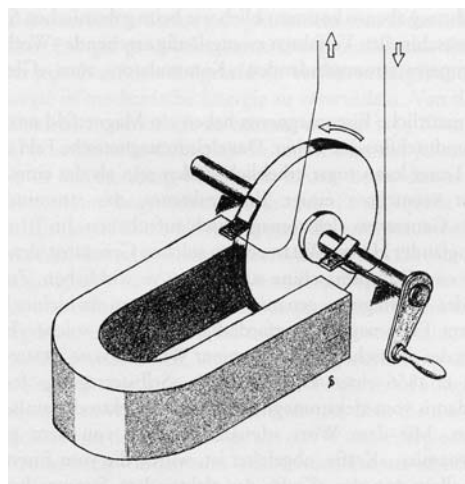
Hans Christian Ørsted monument
in Copenhagen

In 1820, Ørsted noticed a compass needle deflected from magnetic north when electric current from a battery was switched on and off. This deflection convinced him that magnetic fields radiate from all sides of a wire carrying an electric current, as do light and heat, confirming a direct relationship between electricity and magnetism. Three months later he began more intensive investigations and soon thereafter published his findings, showing that an electric current produces a magnetic field as it flows through a wire.

Michael Faraday, was an English chemist and physicist (or natural philosopher, in the terminology of the time) who contributed to the fields of electromagnetism and electrochemistry.



Michael Faraday, 1791 –1867
portrait by Thomas Phillips (1841-1842)



Michael Faraday; Schematic
test device for evidence of
transferring magnetism into

Faraday studied the magnetic field around a conductor carrying a DC electric current, and established the basis for the electromagnetic field concept in physics. He discovered electromagnetic induction, diamagnetism, and laws of electrolysis.

He established that magnetism could affect rays of light and that there was an underlying relationship between the two phenomena. His inventions of electromagnetic rotary devices formed the foundation of electric motor technology, and it was largely due to his efforts that electricity became viable for use in technology.

As a chemist, Faraday discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the bunsen burner and the system of oxidation numbers, and popularized terminology such as anode, cathode, electrode, and ion.

Faraday later used the principle to construct the electric dynamo, the ancestor of modern power generators.

The SI unit of capacitance, the **farad**, is named after him, as is the Faraday constant, Faraday's law of induction states that a magnetic field changing in time creates a proportional electromotive force.

It is said that between 1832 and 1839 (the exact year is uncertain), **Robert Anderson** of Scotland was supposed to have invented the first crude electric carriage. Unfortunately there is very little evidence and no pictures about this vehicle-

Another functioning electric motor for propulsion was designed by **Moritz Hermann von Jakobi**. Moritz Hermann Jacobi was a German physicist and engineer, but he worked mainly in Russia. His works on galvanoplastics, electric motors, and wire telegraphy were of great applied significance.

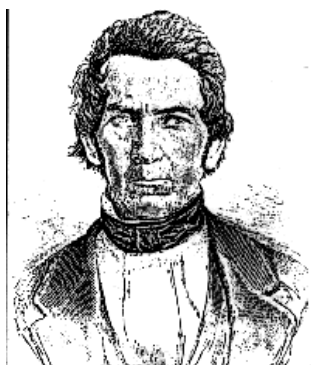
In 1839 Jacobi, with the financial assistance of Czar Nicholas, constructed a 28-ft boat propelled by an electric motor of 220 Watt with a large number of battery cells. It carried 14 passengers on the Neva River in St. Petersburg, Russia, at a speed of three miles per hour covering a distance of 7.5 km . His hopes of covering the Neva with a fleet of magnetic boats were doomed from the beginning, however, by the cost of battery-powered operation and by the fumes that such batteries emitted.



Moritz Hermann von Jakobi
(1801 – 1874)



Jacobi's first electro-motor



In 1834, **Thomas Davenport** (1802 -1851) invented a battery electric car – batteries were not rechargeable.

Thomas Davenport was an American blacksmith and inventor who invented the first DC electrical motor in 1834 and made a small model of an electrical railway in 1835. He patented a device for "*Improvements in propelling machinery by magnetism and electromagnetism*" in 1837 (his electric railway). Davenport used his DC electrical motor to power shop machinery; it was the first practical application for the electric motor. Davenport later started a workshop in New York City and published a journal on electromagnetism.



Davenport's shop, c. 1890



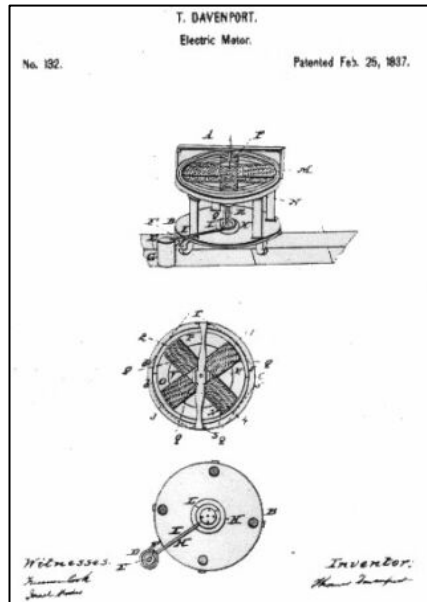
Davenport's shop is a museum now

The self-educated blacksmith, having now impressed the most prominent men of learning in the country, returned to the patent office with letters and a working model. His troubles were not yet over, however. The model was destroyed by fire before it was examined. He built another and tried again.

At last, the first patent on any electric machine was issued to Thomas Davenport for his electric motor on February 25, 1837.



Davenport's model of an electric train (above)



A page with the drawings from the Davenport' patent of February 25, 1837. (right)



Raymond Louis Gaston Planté was a French physicist who in 1859 invented the first accumulator or electric storage battery. It was a wet cell with two lead plates immersed in sulphuric acid, the electrolyte.

Planté was born on April 22, 1834, in Orthez, France. In 1854, he began work as an assistant lecturer in physics at the

Conservatory of Arts and Crafts in Paris, and in 1860, rose to the post of Professor of Physics at the Polytechnic Association for the Development of Popular Instruction.

Raymond Louis Gaston Planté
(1834-1889)



He also had a quite different field of activity as a paleontologist. In 1855, he discovered the first fossils of the prehistoric flightless bird “*Gastornis parisiensis*” (named after his first name Gaston) near Paris.

“*Gastornis parisiensis*” skeleton

The industrial use of his revolutionary invention started decades later.



Werner von Siemens
(1816–1892)



Siemens telegraph

Ernst Werner von Siemens (known as **Werner von Siemens**) was a German inventor and industrialist. Siemens' name has been adopted as the SI unit of electrical conductance, the siemens.

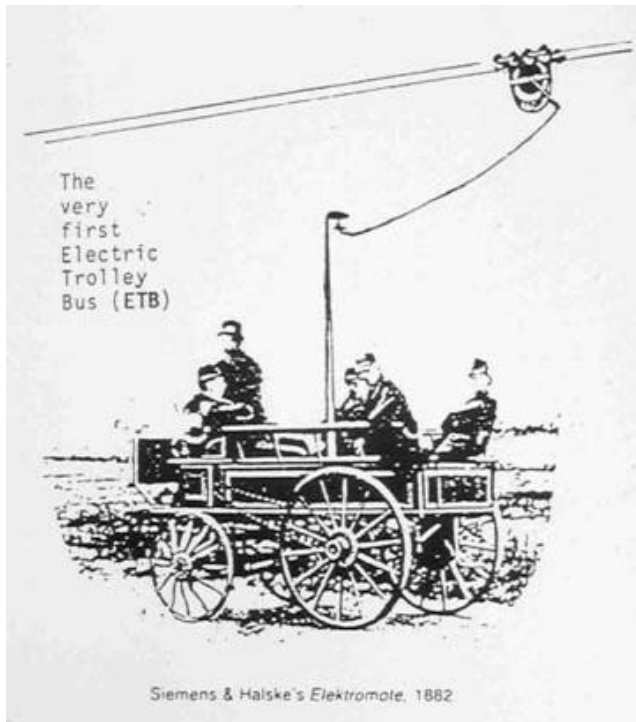
Siemens left school without finishing his education, but joined the army to undertake training in engineering. Upon returning home from war, he put his mind to other uses. He is known world-wide for his advances in various technologies, and chose to work on perfecting technologies that had already been established. Siemens invented a telegraph that used a needle to point to the right letter, instead of using Morse code.

Based on this invention, he founded the company *Telegraphen-Bauanstalt von Siemens & Halske* in 1847, with the company taking occupation of its workshop in the same year.



Siemens: The very first electric locomotive

Apart from the pointer telegraph, Siemens made several contributions to the development of electrical engineering and is, therefore, known as the founding father of this discipline in Germany. He built the world's first electric elevator in 1880. His company produced the tubes with which Wilhelm Conrad Röntgen investigated x-rays. He claimed invention of the dynamo although others invented it earlier. On 14 December 1877, he received German patent No. 2355 for an electromechanical "dynamic" or moving-coil transducer.



Siemens: The very first electric trolley bus

Siemens realized his invention using it in an electric locomotive, towing trailers with visitors at an industrial trade exhibition in Berlin 1879. The electric motor had a power of 3 HP and a speed of 7 km/h. The electric current came through the two tracks.

This system with 110 V was too dangerous as horses could touch the two tracks at the same with their horse shoes. The solution was to put two wires above the vehicle and thus Siemens was also the father of the trolleybus which he initially tried and tested with his "Elektromote" in 1882. This system is in use today.

Following his industrial career, he was ennobled in 1888, becoming **Werner von Siemens**. He retired from his company in 1890 and died in 1892 in Berlin.

With his revolutionary development of the electric motor, he paved the way for the electric car.

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