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ADVANCED MAN MACHINE INTERFACES FOR THE FACTORY OF THE FUTURE

Michele CANTELLA – ATOM S.p.A.



ATOM AND ATOMLAB

With over sixty years of experience in the footwear world, the Atom Group is one of the most important players in the shoe technology sector, famous for the quality and reliability of its products, its high reputation and its innovation capacity. A tradition that dates back to 1946 when the Company was founded in Vigevano. In 2013 ATOM created ATOMLab , the research and innovation unit of the Group.



ATOM AND ATOMLAB

ATOMLab mission is to collaborate with key customers all over the world in a new way of "innovation management" partnership, acting as a "bridge" between their research teams and the R&D staff of the Group, focusing on applied research in cooperation with renown Italian and foreign universities. This presentation is based on ATOMLab's on-going research on the new generation of shoe machines and manufacturing systems.





SHOE FACTORIES OF THE PAST

Factories of the past used to rely on human labour and workers' skill; no machines to interact with: just eyes, hands and simple tools



SHOE FACTORIES TOMORROW

Perhaps shoe factories tomorrow will look like this; certainly the future will call for new ways for the workers to interact with their machines



THE CLICKING PRESS



Cutting leather has always been a matter of eyes and hands. Eyes to see and inspect and hands to move and place the cutting die where the skill of the operator suggests.

MODERN CUTTING MACHINES

Despite the technological advancements, operators still need their eyes and hands to manage the cutting process, but now they have to interact with the machine and its hardware and software systems



INTERACTION TOOLS

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Current generation dieless cutting machines still use relatively "primitive" interaction devices, legacy of very early IT paradigms

PROJECTOR (LED OR LASER) TO SHOW THE SHAPE OF THE PATTERNS TO BE CUT ONTO THE SKIN

SCREEN TO INTERACT WITH MACHINE SOFTWARE

MOUSE AND KEYBOARD TO MOVE THE

THE NEW PARADIGM



Smartphones, tablets and other modern electronic appliances have introduced radically new ways of interacting with the devices. Before Apple introduced its first iPhone no one believed (in particular Nokia) a telephone without a keyboard could ever exist and be accepted by the consumers. Facts proved how wrong these thoughts were.

TOUCH AND GESTURE



Tapping, pinching , swiping with the fingers on the touch screen have become the natural way to command our devices. Raising the arm to activate the screen of an Apple watch is now common gesture and imparting orders to Siri (or to the equivalent applications) with the voice is a comfortable , hands free approach to get things done. It is time to transfer these new interaction models to machines.

WEARABLE



Wearable is the new frontier; researchers think that 2016 will see an explosion of wearable devices. Smart electronic devices are more and more embedded in shoes, garments, bracelets, eyeglasses, goggles and helmets. The expand our senses, interpret gestures and potentiate our eyesight. We are at the dawn of the Augmented Reality era....

AUGMENTED REALITY

AUGMENTED REALITY (AR) < *noun* >: a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.



SEE BETTER , SEE MORE

In an industrial perspective, AR allows to see better the surrounding environment, and to see more of the digital data that can be associated to the environment, specific objects and shoe patterns



BE NATURAL

AR associated with other modern means to interact with a computer (such as gesture) would provide a radically new, natural way to work with a machine, transforming cutting tables in .. oversized smartphones



CANDIDATE DEVICES



S DAQRI SMART HELMET



Many vendors are already offering several models of AR devices, from simple glasses (like the unfortunate Google Glasses) to very elaborated goggles and helmets. DAQRI © and Microsoft Hololens ©, both expected in the market in the early months of 2016, are very promising devices.

THE TECHNICAL CHALLENGE



ONGOING WORK AT ATOMLAB



ATOMLab has been working on this subject for the past two years; an early pilot system based on a smartphone and a custom designed goggle is shown here

BEYOND THE CUTTING MACHINES

We can think of other applications of the same AR technology in fields such as remote machine maintenance, process control and field operations; wearable devices like the Hololens could replace displays and other equipment, presenting to the operators the necessary information with a context sensitive approach and allowing him / her to stay focused on the assigned task.



CONCLUSIONS

A few messages to be taken home:

- Man machine interaction is a crucial aspect in the design of modern efficient manufacturing equipment
- Traditional ways of interacting with the machines are the legacy of the early years of the IT era
- Augmented Reality combined with other technologies can provide a modern and effective answer to this innovation need
- A whole new breed of interesting AR, wearable devices is entering the market
- The application to cutting machines although complex is not impossible and certainly worth being investigated



Michele CANTELLA michele.cantella@atom.it

Atom S.p.a Via Morosini, 6 27029 Vigevano - PV - Italy T +39 0381 3021 Fax +39 0381 344303 www.atom.it

C.F e P.IVA n. 00180190183 - R.E.A. PV124357 - PEC: atom.amm@legalmail.it