Critical review on the utilization of robotic-system point-to-point-based position actuators and laser sensors with artificial intelligence mediator in an archetypal mechatronics network for medical dermatology applications

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***Abstract*---**In this article, a comprehensive overview of the classic designing of mechatronics- based robotics components like sensors and effectors in a network to solve the problems related to t h e m e d i c a l skin of the human body with the help of an Artificial Intelligence has been carried out. Area-based artificial agent is the easiest way to deal with the skin-related diseases. In this artificial agent, we are having autonomy and flexibility to work on the area.

Introduction

Now a days there are a huge diseases present in the environment in various metro-politian cities. Human body is a type of network of sensors like eye, nose, skin, ears & tongue. To deal with problems related with these sensors we have to apply some network layers or artificial intelligent agents. We know that we can implement different artificial intelligent agent for different sensor. In environment, there are many skin related diseases presents because of humidity. The most common problem is present related with the skin is rings.

To treat these problems we are implementing the artificial intelligent agent, which gives you the flexibility and autonomy to deal with skin diseases. We can implement the area based artificial intelligent agent. To have this area based artificial intelligent agent we will use the classic network with the help of laser. Here using the artificial intelligent agent, we can cover the area or point to point location.

Human-body sensors

To deal with problems related with skin [1] we need to just have the study about the sensors of human body. We know Eye, ears, nose, throat & skin are the sensors of human body. We are going to concentrate on the skin sensor and the problems related with skin diseases like rings. Because of humid atmosphere in metropolitan cities, people are facing the diseases like rings where the sweat persists. Because of sweat persistence for long time micro fungal is formed and that will lead to rings and it will grow rapidly on skin and after that in blood cells. Global warming and pollution are the reasons to form the skin diseases like rings. Unhealthy food and life style of metro cities are also the countable reason to skin related problems. These skin diseases can avoid but these diseases are grows so fast in body and blood cells that any human being should take care about all necessary preventions with atmospheric changes. In some cases, we need to treat some skin related problems by artificial intelligent agents like acne and pigmentation.

Here we want to solve the problem related with skin because of micro fungal, which leads to rings. Artificial intelligent agents will work with effectors to react on sensors. There are certain disadvantages related with this method are area tissues will be damage because of temperature and current passing through the human body. Different human sensors and skin is also delicate sensor of human body, before applying the artificial intelligent agent on human sensor using the effectors some tests need to perform on human body. Human body can resists the temperature or currents up to certain range. The metal of good conductor is used for passing the rays by laser.

Classic mecha-electronics network

Laser is electronics component, which is used as a reactor. The current controlling components like diode and resistors are used in network. Using laser we can implement the area based or point-to-point position effectors. We need to percept the environment and need to calculate the current passing through the laser using effectors. Different components used to form the classic electronics network are resistors, capacitors & power sources. We need to match the frequency and current passing through the network.

Resistor

The resistor is a component used in the classic electronics network. Resistor is a component, which controls the resistance in the closed circuits.

Capacitor

Capacitor is a component, which stores the charge on plate proportional to the voltage across it.

$c = \frac{q}{v}$ Equation (1)
The capacitance C is in Farads

Laser

Laser is a component used for the precise photo thermal application. Photolithography is the one of the application of Laser. Laser offers more possibilities in selective heat treatments.

Power Supply

Power supply will provide the regulated DC supply to the whole assembly. Network is shown below in figure 1 is to limit the current which passes through laser. The AC potential generated by the resistive network should tolerable by the skin of human body and skin as skin is very delicate part of human body. Using current limiting resistive network to generate the AC potential which is tolerable to the human body using resistor network is possible by providing a 10 V peak to peak DC supply with 20 Hz sinusoidal signal was applied across a 1 MΩ current limiting resistor using a waveform generator which will give a 6.5-6.9µA root- mean-square AC current across the output of the circuit.
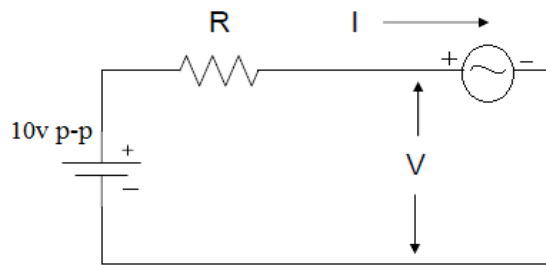
Fig.1. Network used to limit the current [1-3]

Artificial Intelligent Agent

The Artificial Intelligent Agent is working in different layers which are functioned to provide autonomy, flexibility and to works on particular area with two different motions one is continuous path and another is discrete path. When we are dealing with bigger area then we are following continuous path and for some examples where area is not wide and not continuous then we are using discrete path. These are about motion methods. Now we are concentrating on types of artificial intelligent agents which are based on area, motion and application based agents examples are humans & robots. Here we are used the area based artificial intelligent agent. The intelligent agent works on the fundamentals acting, sensing & understanding.

Area Based Artificial Intelligent Agent

Area based Artificial Intelligent Agent will act on selected area by actuator or effectors. In this kind of selector, the area is selected by human intervention or by sensor. After selection of area, artificial intelligent agent will act on selected area. This is a kind of rational process of intelligent agent. Here in this method the action of the effectors will work on particular area only. The percept is another aspect on that basis we have to choose the effective area. Considering percepts sensor need to work on area, which has been selected? The conditions present in the agent with respect to area need to consider. The conditions need to satisfy to take action by the actuator on the selected area. Area, which is satisfying the conditions, has to expose by the actuators or effectors. There is cool head present with effectors to gentler the collision of high-energy output with the effective area. Area based artificial agent is the easiest way to deal with the skin related diseases. In this artificial agent, we are having autonomy and flexibility to work on area. The block diagram of area based agent and environment is shown in fig. 2. In area, based artificial intelligent agent there are two ways to perform the action on selected area one is point-to-point motion and another is continuous path motion. In case of skin related problems the motion which can implement is the point to point method as area is very less if thinking with respect to human body. If area is wide and the human body can tolerate the continuous contact of actuator or connectors then we can implement the continuous motion. The goal is the targeted area where the actuator or effectors need to work. Effectors are end link of device and designed to interact with the environment. The exact nature

of end effectors needs to design as per the application. The goal, which is targeted by artificial agent by considering all precepts and conditions, need to mark for further actions. Data input from sensor goes to agent, and agent will act on the input and command goes to end effectors. After setting the goal check, the goal marked properly or need to correct the goal. We can choose the number of goals at a time by considering the precepts and conditions of agents. There is requirement of cool head as when the high-energy output is generated by laser nozzle first we need to cool down the selective area as high temperature is generated with high energy. Here cool head is contacted with selective area with very low temperature is made up of copper metal.
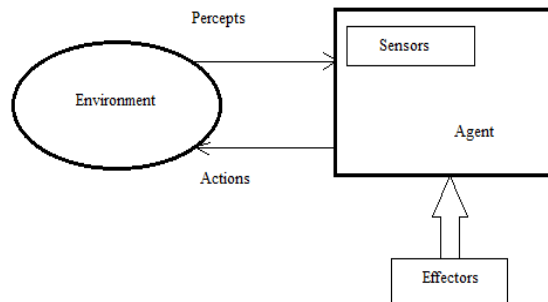

Fig.2. Block diagram of area based agent and environment [1-3].

Principle

To deal with diseases related to skin is very complex as skin cannot tolerate high temperature and another thing is light intensity should be match with skin. These same above are important issues related with the skin of human body. Precise microsurgery technique [2] is the way by which skin related problems can be solved. Selective photo thermal effect using the main component of this classic network is laser. The lasers are differentiating based on the kind of lasing medium they use solid state, gas, excimer, dye or semiconductor. The characteristics here used by laser are the duration of laser emission. There are two characteristics of laser emission are continuous wave emission and pulsed laser. The normal mode operation is in pulse duration is of a few hundred microseconds to a few milliseconds. This normal mode operation is also referred as long pulse. We know the theory [3] that in room temperature there are many molecules in rotational state can select for selective photo thermal effect. A fundamental theory is present in selection of photo thermal sample. The spacing of adjacent absorption lines must be wider than Doppler width of the line for one photon state selection. Distribution of colors decides the line width, which further forms a group of molecules absorbs as a result of the distribution of molecule speeds. When molecule travels in atmosphere shift is present at instance in the absorption, towards laser beam is $f-f_0 = f_0 (\mu/c)$, where c is the speed of light, and f_0 and f are frequencies of laser light. According to Maxwell-Boltzmann distribution of velocities will lead to the absorption, line becomes a Gaussian Function is represented by F (f) which is mentioned as below:

$$F(f) = exp^{\frac{-mc^2(f-f_0)^2}{2RTf_0^2}} \quad Equation\ (2)$$

laser is the precise technique to solve the skin related diseases.

This is very safe and effective technique with the artificia intelligent agent. In selective photo thermal effect, we can select the specific area and can target the area. Photo thermal effect is process done by laser as laser gives you precision in technique. Laser gives you proper wavelength & the length of its pulse. By controlling the laser, pulse time gives energy busts for short duration. With this method can generate enough power to affect the selected area of the body. The energy, which is generated by laser, can be absorbed by molecule present on the selective area. The figure 3 below shows the laser nozzle of 15 by 15 lasers with effective area & selective area with high-energy output.
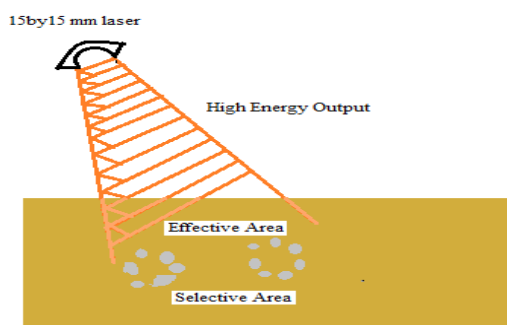

Fig.3. Laser nozzle of 15by15 laser with effective area & selective area with high-energy output [1-3]

Laser-classic network

A molecular beam at room temperature in the high-pressure reservoir with typically P_O=0.5-10atm travel in random direction with a Maxwell-Boltzmann distribution of speeds. The z direction defines the vibration rate, y direction defines rotational rate and x direction defines translational relaxation rate. All relaxation rate are differs as cooling of the various internal energies stops at different distances from the nozzle and therefore at different temperature. Therefore, the cooling for the various degrees of freedom is possible. The translation temperature, which is defined in terms of the width of the velocity distribution, decreases with the distance from the nozzle. As the temperature drops collisions become gentler and internal energy of the molecules flows to the translational modes. It will get cooler eventually. The directions in which the gas expands is x and y direction. The molecular beam flows in Z direction.
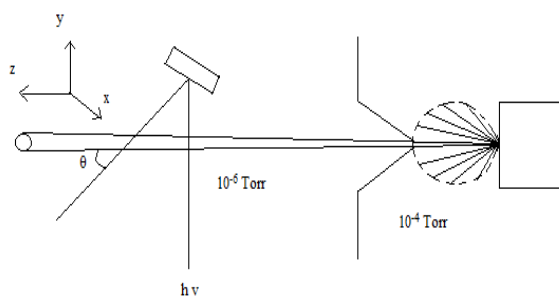
Fig.4. Molecular beam at room temperature travel in random direction with a Maxwell-Boltzmann distribution of speeds [1-3]

The molecules are passes from the high-pressure region into the vacuum with a narrow speed distribution. The angular distribution can be approximated by a cos θ function in which θ is the velocity angle relative to the beam direction. Maxwell velocity distribution exhibits a maximum at some non-zero value of velocities. Width of the velocity distribution gives the translational temperature. The translational temperature decreases with the distance from the nozzle. As the temperature drops, collisions become gentler and internal energy of the molecules flows to the translational modes. The translational temperature continues to cool as long as collisions are possible. Eventually as the gas expands in the x & y directions, the density is reduced so that collisions effectively stop and cooling of the internal degrees of freedom stop. Because vibrational, rotational and translational relaxation rates differ, cooling of the various internal energies stops at different distances from the nozzle and therefore at different temperatures. It is thus important to distinguish the cooling for the various degrees of freedom. The wavelength λ in meters can be calculated with the equation as velocity of the wave v is in meters/sec and the frequency of the wave f is in waves/sec. Therefore, the wavelength is given below:

$$\lambda = \frac{v}{f} \quad \text{Equation (3)}$$

Here λ is the wavelength in meters considering 15 meters as wavelength and calculating frequency of the wave f with 3000 waves/min:

$$f \; = \; 3000/min \; \times \; 1\,min/60\,sec \; = \; 50\,waves/sec$$

Therefore, molecular velocity can be calculated using equation given below:

v = λ × f ——————— Equation (4)

v = 750 meters/sec

For implementing laser classic network of artificial intelligent the molecular velocity of the wave by passing through a medium is at 750 m/s requires wavelength of 15 meters and with frequency 50 waves/sec.
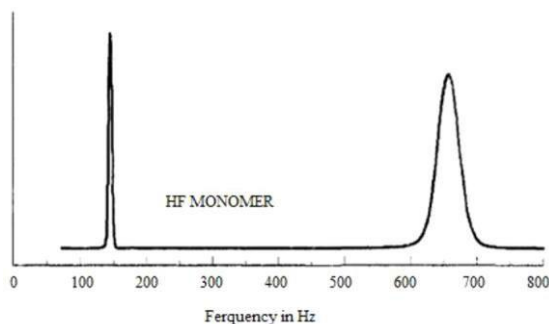
Fig.5. Frequency response for IR absorption of 6% HF in a beam obtained with a laser arrangement [1-3]

There is one way of measuring the two translational temperature as well as molecular beam velocity is by Doppler shift measurements in which an absorbing laser beam is passed through the two different angles. The figure 4 shows the arrangement of laser beam. Fig. 5 shows the frequency response for IR absorption of 6% HF in a beam obtained with a laser arrangement. IR absorption is the popular method of analysis. This analysis is useful in laser application. The figure 6 shows the effective panel of classic network to provide solution on skin diseases using artificial intelligent agent with above specification.
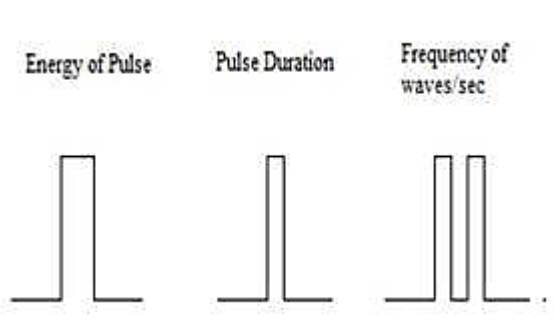

Fig.6. Effective panel of artificial intelligent agent [1-3]

Conclusions

The implementation of an effective method using the Classic Network of Robotics Sensors and Effectors in the Field of Artificial Intelligent is using the area based artificial agent with the laser sensor with the molecular velocity of the wave by passing through a medium is at 750 m/s requires a wavelength of 15 meters and with frequency 50 waves/sec. In this panel first pulse shows the energy pulse of the laser beam, the second wave shows the pulse duration of the wave and the last is the frequency of waves/sec. Thus, the problem is related to the skin because micro fungal, which lead to rings has been eradicated to a fierce extent. As Artificial intelligent agents have efficiently worked with effectors to react on sensors.

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