of the devicesAt present, wearable sensors in textile garments andaccessories are mainly represented by embedded conventional, electronic devices, such as conducting metal wires electronic sensors, integrated circuits, LEDs and batteries.Theprinted pattern should function both as an outer electrodefor the piezoelectric yarn, and as electrical interconnections for the piezoelectric yarn, and as electrical interconnections between the textile sensors and the controller electronics Generally, textile deposition of conductive materialsespecially of conductive polymers such as PEDOTpPSS AND SWCNT,, often leads to poor durability to stretching and washingIN THIS WORK The lowest surface resistivity.both remained well within the conductive range even achieved by these groups was () and after up to () another aim of the present workafter up to () another aim of the present workwas to present a textile application solely based onorganic textile electronics The work included in this article addresses the comfortand durability aspects of wearable sensor systems represented here by a completely textile motion sensing glove.It is also advantageous to minimize theamounts of added components and confine the conductive material to the areas where it serves a functionFor many knitted items, such as T-shirts and sweaters,screen printing is by far the most common technique toapply patterns.A straightforward way to achieve prints with electrical conductivity is to add conductive material as thefunctional agent in the formulation for textile processing, was recently presented by A water-borne CPC for coating purposes, suitable us. The conjugated polymer system poly(3,4ethylenedioxythiophene):poly(styrene sulfonate ethylenedioxythiophene):poly(styrene sulfonate.PEDOT:PSS) \SWCN was added to a textile coating formulation with DMSO as a conductivity enhancer.The resulting organic textile coating was thin flexible, and had a surface resistivity between (..) anddepending on its composition.Metals are stiff materialsand electronic devices usually have a rigid design; this makes them inappropriate for textile applications wheresignificant stretching and bending commonly occur.1,2 An improved integration of smart functions into textile structures is especially relevant for the healthcaresector, where monitoring of body parameters such as ,respiration, heart activity, blood pressure and body movement are of particular interest.3 As an examplemotion sensitive gloves can be useful in combinationmotion sensitive gloves can be useful in combination with physical rehabilitation; the possibility to sense and register the wearer's movements can facilitate an objective assessment of the progress made after a specific .In order to retain the flexibility and comfort of textile with electronic properties, conductive materialsare preferably integrated in the form of standard textile components, such as fibers, yarns, printing inks, or coatings between the leads (0.35 cm) [26].10d showed graphical curves which are used todefine the operation of the developed sensor under different static Electrical characterization demonstrates the I- V The resistance of the covered cotton texture diminishes decreases with the increase expansion in the concentration of the SWCNT \PEDOT:PSS \SWCNT arrangement.Following that structure, the cotton textile sensor will work based on thechange in electrical resistance in sensor layer along with stretchThat means the sensor resistance will() increase whiletests were performed to evaluate the ()mechanical behaviour of the sensors .() showed SEM image of thestandard cotton fabric with the magnified view showing no coating on the fiber and the coated cottonfabric with pedot :pss\SWCNT, respectively The filaments are an about 10 m diameter, loosely twisted andample of free space between the microfiber bundles.A sandwich of PEDOT: PSS layer in the middle of a SWCNT layer improves the electrical qualities as appeared by the steepest bend.Differential checking calorimetry (DSC) investigation were performed on PEDOT:PSS arrangement and treated and untreated cotton textures utilizing a DSC8000 instrument.Results and discussion Textile sensor structure Scanning electron microscopy (SEM) was used to show thestructure of the fabricated sensor.Thermogravimetric (TGA) was done on SWCT\ PEDOT:PSS arrangement on treated and untreated cotton textures utilizing a TGA 1000 instrument.This is most likely because of the electrical way given by PEDOT- PSS to carbon nanotubes to frame the nonstopXRD were generated of all examples were acquired utilizing a Rigaku D/max-2500 diffractometer in customary theta/2theta geometry.Examining Electron Microscopy (JEOL JSM-6380LA) was utilized to explore the surface morphology and to decide the natural organization ,determine the elemental composition of the pure cotton .The electri particles can be observed in the form of the thin coatings and stuckrandomly onto cotton fiber surface with100% coated rate.All activities were performed under nitrogen cleanse.**The I - V curve is an important characteristic for usability of any sensor.All process were performed under nitrogen cleanse.The example was warmed from 25 ?C to 600 ?C at warming rate of 5 C?/min.Fig.The example was warmed from 25 ?C to 550 ?C estimations of sheet resistance .Washability The durability to laundering of the printed samples washing procedure with detergent and line drying, in a laboratory washing machine washed samples were evaluated with electrical resistance measurementsResults and discussionDesign of the sensor glove The gloves were studied as a proof-of-concept, as illustrated in Figure 3, with the overall purpose of validating the electrical function of the textile approach.The hand configurations can be assessed by individually measuring the output resistance of the sensors.In order to characterize the printed interconnectionsseparately, samples were prepared by DROP CASTING defined areas of the interconnection material on the fabric To demonstrate the potential use of the SWCNT\PEDOT:PSS \SWCNT compositesas strain sensors in wearable devices for detection of human activities, a data glove was assembled by integrating independent SWCNT\PEDOT:PSS sensors on each joint, as shown in Fig.Assuch, the focus was to test whether the 100% polymer \cnts based textile electronics remained true to their function In order to verify this, it was considered sufficient to limit the amount of sensors to one per finger and thesensing confined to the movement of entire fingers,where the greatest strain in the glove occurs just overthe knuckles Electrical resistance as function of geometry ofinterconnections For obvious reasons, it was preferable that the printedinterconnections were as narrow as possible on the glove.Devices with SwCNT strain sensors might be used to recognize human motion and automatically translate sign language.().Abstract for reproducible material deposition initially, which implies that they would remain functional even during long-term use.In the research, the performance of the method developed would be evaluatedboth by characteristics of the fabrication sensor and accuracy in the application.The screen printing of the interconnections .was shown to be a reliable method for reproducible material deposition, resulting in an average surface resistivity value of)ohm \q(....)The influence of washing on the electrical resistance of the printed interconnections was also studied; after (...)wash cycles the average surface resistivity was still below (...)ohm/square, which was deemed sufficient for the SWCNT\PEDOT:PSS sensor.system to remain functional during long-term use.The lowest surface resistivity()achieved by these groups was Flexible transparent

SWCT\PEDOT:PSS\DMSO strain sensors are fabricated The development of an entirely using PEDOT:PSS\SWCNT -based motion sensing smart glove with possible applications, for example, in physicalrehabilitation is described.The swcnt\pedot:pss\dmso strain sensors have the advantages of a wide .sensing range, fast response, low creep, transparency, and excellent durability, and thus show great.potential in wearable devices to monitor fast and large-scale movements without affecting the appearance.Wearable technology through proper combination of e-textiles and wearable devices is one of the goodways to accomplish the functions required to monitor and recognize human motions in daily life.Electrodes and electrical interconnections were constituted by a screen printed SWCNT\conductive poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) formulation.Sensor data from the glove was also successfully used in order to demonstrate its potential applications..SWCNT\PEDOT:PSS cotton fabric on DMSO substrates.This study aims to introduce a complete combination of e-textile stretch sensor based onsingle-walled carbon nanotube (SWCNTs\pedot:pss), spandex fabric(pure cotton) withDMSO and ....system in order to recognize human motions in a realistic applications.The SWCNT\PEDOT:PSS\DMSO strain sensors present a high sensing range.In situ microscopic observation .clarifies that the surface morphology of theconductive cotton exhibits a reversible change during the stretching .and releasing processes and thus its electrical conductance is able to fully recover to the original value .after the loading-unloading cycles.used commercially available silver pastes as the conductive layer in a printed multi-layer structure.A limiting factor for their longevity could be excessive washing although the resistance after was is expected to be sufficient()for the suggested glove application even afterwashing cycles, depending on the system used to record the piezoelectric signal.The importance of comfort for the wearer the glove in normal.The glove is pure cotton fabric and manufactured using materialsand methods suitable for standard textile industry processes.first we use drop casting method for coting fiber to function as a sensor.element.The sheet resistance was determined from the equation $R_s=R(w/d)$ where w is the width of the example (2.5 cm) and d is the separation conductive system on the microfiber surface.The composite (swcnt\pedot:pss\swcnt)2 multilayer gave the most noteworthy conductivity SWCNT that is fused into PEDOT:PSS is advanced to get a low Sheet Resistance of Conductive Cotton Fabrics.The sheet obstruction of the DETE test diminishes () as the fixation increments from () Theses changes in the estimations of sheet opposition are credited to the auxiliary dopant (DMSO) instigating morphological changes, for example, expanding PEDOT-rich grains and producing a more slender PSS hindrance by specifically expelling PSS from the PEDOT:PSS film prompting better charge transport pathways and associations between PEDOT-rich grains.This might be ascribed to the SWCNT\ PEDOT:PSS \SWCNT forming layers on the strands and filling the space between them the fabric .The effectiveness of cotton as a conductive texture might be estimated by the measure of SWCNT\ PEDOT:PSS\SWCT important to deliver givenFurthermore, DMSO can likewise go about as a plasticizer reorienting PEDOT as well as PSS fastens at high temperatures to shape a profoundly conductive permeation organize by improving associations between directing PEDOT chains[25] .Including a little measure of PEDOT:PSS makes the cotton change to a leading state because of the arrangement of associated PEDOT:PSS chains on the cotton fabric .ectrical qualities

(Table 5.3)[Fig 5.6] delineates two particular locales.In district 1, the (logarithm of) sheet obstruction diminishes as the grouping of PEDOT:PSS increments.In district 2, the high fixation area, the sheet resistance of the cotton tests is diminished strongly when concentration of dopant is increased the centralization of dopant is expanded to its immersion level.The sheet resistance of conductive cotton textures was examined for pure cotton as appeared in Figure X. All examples have territory 1 x 1inch ,the pure cotton is thickest.As appeared in Figure X, The pure conductive cotton shows a comparable pattern as an element of fixation.The reason may be that high electron versatility and electrical conductivity along the carbon nanotubes give more efficient electron exchange.Estimations were performed at room temperature utilizing the four-line test technique.Durability The dynamic durability is the stable electrical functionality and mechanical integrity of sensor Response and recovery time Response time (RST) and recovery time (RCT) are two of theimportant parameters for evaluating performance in the dynamic application.The yarn was heat-set in an oven at 100 C for 60min.The gloves were prepared in an order that would enable , the sensors were positioned to stretch in response to finger bending The patterns were designed, to give initial information regarding the influence ofamount of yarn and sensor placement on theamount of yarn and sensor placement on theresponse: specifically whether the yarn shouldwhether a pattern with a maximized total length of the yarn, as in (iii), would producea stronger responseElectronics The sensor glove output was connected by crocodile clips to a small amplifier circuit, , viaa microcontroller board The () board, and was programmed with the Arduino.Printed interconnectionsFor the printed electrodes and interconnections, the conductive material was PEDOT:PSS\SWCNT Sample preparation sensors as cylinder ..Self-recovery process of SWCNTs\pedot:pss ensures recovery of the electrical property of the stretch sensor and avoids the degradation of the device performance during the large deformation.Human motion recognition The application capability of the textile stretch sensor wouldbe evaluated by the experimental on movement of human hand fingers motions suchas pick up stuff , catch hand and others .The RST exists in the sensors is mainly affected by the viscoelastic nature of cotton fabric.the SWCNT\pedot:pss coatings with cotton fibers.This process can create a strong connection between SWCNTs \pedot:pss and cotton fibers.To address this limitation, the vacuum dryingin the sensor fabrication.12 showed one sample data shape of different motions in 2 min of the experimental.The RCT isaffected by the friction force and the reconnected ability between.The high RST causes the bias in the finalresults.During the experiment, the participant was asked to wear thesmart glove while moving and doing manual hand work Fig.The developed model was evaluated through 50 motion samples (6 samples for each motion) to verify the robustness of the system.Reducing the responsetime and the hysteresis error on the project.the response time for conductive glove was() ..Electrical resistance measurements,were performed using a multimeter () in a four-wire resistance mode and a four-point probeFigure 2.The thermal execution of the cotton textures was confirmed utilizing DSC analyses.The aro-matic C=C characteristic retention band at 350 cm−1 demonstrates that the pedot:pss could be conjugated with the fragrant rings in the SWCNTs[16].The pinnacle temperature of Nano composites (swcnt)with pedot:pss, 10 wt%: 448 C and 30 wt%: 451 C) , and thermally stable up to 400 as appeared in [Fig5.13A] containing 30 wt% of SWCNTs \peot:pss is noted at 100 C and the example containing 10 wt% of SWCNTs does not indicate much show much variation from the control test sample .The strongest signal was seen at 150 cm−1, which relates to the tension absorption of the C=O group demonstrate a wide absorption assimilation in the scope of 130– 250cm−1 covering with C– H retention groups.The writing reports that PEDOT:PSS does not have an well-defined glass transition temperature owing to the presence of a strong ionic cooperation between the PEDOT and the PSS [15].The DSC thermogram showed endothermic pinnacles comparing to the melting point of the treated and untreated cotton textures (see, Table and) and[Figure and] The melting points of untreated cottons were 346.8 oC,for the pure cotton .Thermal characterization by TGA and DSC gives data on progress of the thermal property due todue to the addition of SWCNTs with PEDOT:PSS as sandwich.This improvement in the thermal stability could be credited to the arrangement of hydrogen holding between the PEDOT:PSS chains,swcnt and the cotton textures.The thermal stability of PEDOT:PSS is reached out to the range 337–373 oC when it is utilized in impregnated cotton textures.On the other hand, PEDOT:PSS itself is thermally precarious at temperature over 100 oC because of the loss of water.The TGA plot demonstrates the beginning debasement temperature over 240 C and the pinnacle temperature above 409C as for thedegradation of PEDOT:PSS sample.Indeed, even a follow of a trace loading of SWCNTs in upgraded their thermal steadiness, compared to the peak temperature of the control sample (409 C).for reproducible material deposition initially, which implies that they would remain functional even during long-term use.transparent with a transmittance of 80% at 550 nm. In situmicroscopic observations reveal the reversible morphology evolution of the SWCNT\PEDOT:PSS cotton in high concentration for processes.The lowest surface resistivity()achieved by these groups was Flexible transparent SWCT\PEDOT:PSS\DMSO strain sensors are fabricated by a facile, low-cost, and scalable fabricating process, whichhave a broad The response time of the SACNT/PDMS sensors is less than 20 ms. The SWCNT\PEDOT:PSS\DMSO strain sensors also exhibit highdurability with a stable electrical response after 5000 cycles atstrain.The transparent SWCNT\PEDOT:PSS \DMSO strain sensors withlow creep, fast response, a broad sensing range, and excellentstability may find wide applications in wearable devicesrobotics, and health careThis study developed a smart glove of the wearableapplication based on swcnt\pedot:pss\dmso cotton textile sensorsystem to analysis sensing signals on a real productMoreover, the SWCNT\PEDOT:PSS strain sensors are400%.used commercially available silver pastes as the conductive layer in a printed multi-layer structure.The metallic conduct saw in this investigation might be because of the high consenteration of polymer AND SWCNT implanted in the pure cotton sample .The stability OF Temperature of the conductive cotton fabric a t ()Wt% was also investigated over a period of four months and found to be stable Electrical Stability of Sheet Resistance Electrical stability of the conductive pure cotton example (wt.%),was assessed by observing the sheet resistance at room temperature over a time of three months as appeared in [Fig] test indicated great electrical stability security in light of the fact that their estimations of sheet resistance remained generally steady amid this timeframe The thermal behavior of the treated,untreated pure cotton and SWCN \ PEDOT:PSS The thermal conduct of the control sample and SWCN \ PEDOT:PSS treated cottons was examined utilizing thermal gravimetric analysis (TGA) and differential scanning calorimetry (DSC).This improvement in the thermal stability could be ascribed to the arrangement of formation of hydrogen bonding between the PEDOT:PSS \SWCNT chains and the cotton textures.The thermal steadiness of SWCNT\ PEDOT:PSS is stretched out to the range 400-480 oC when it is utilized in impregnated cotton textures.The TGA thermograms of the untreated cottons demonstrate that thepure cotton example are thermally steady for temperature underneath 346oC .presented.The glove was produced using drop casting method and materials suitable for industrial textile manufacturing processes The rapid development of biomedical and wearable devices has recently resulted in a great demand for stretchable electronic materials, such as conductors, transistors, supercapacitorsactuators, or flexible strain sensors, owing to the mechanical property mismatch between the soft and curved nature of the human body and traditional rigid electronic materials.1-7 Many sensing materials and structures have been developed as flexible strain sensors.SWCNT\PEDOT:PSS were considered as ideal materials for flexible strain sensors owingto the formation of an elastic and conductive network, high conductivity, and excellent mechanical robustness.30-33Herein, highly flexible and transparent PEDOT:PSS\SWCNT\DMSO strain sensors were fabricated by directly stacking SWCNT\PEDOT:PSS COTTON FABRIC on DMSO substrates.Synthesis and deposition of SWCNT/PEDOT:PSS/SWCNT composite cot SWCNT/PEDOT:PSS/SWCNT composite cotton texture is set up by coating technique as portrayed[FIG5.1] Composites of poly(3,4-ethylenedioxythiophene): poly(styrene sulfonate) (PEDOT:PSS) and single-wall carbon nanotube (SWCNT) were set up by blending of PEDOT:PSS and SWCNT that blend with deionized water (DI) for 45min by by tip sonicator at various weight proportions and .5ml DMSO was included for 30 min at room temperature, The Cotton texture was dunked into the SWCNTs arrangement utilizing Drop casting technique for 35MIN and drying at temperature 100?C FOR 60MIN.carbon nanotube (SWCNT)/Poly (3,4 ethylenedioxythiophene)poly(4-styrenesulfonate) (PEDOT:PSS)/SWCNT composite texture are set up by covering system.The stacking rate of SWCNTs in the host polymer is upgraded to improve the conductivity of the polymer without compromising the transparency of PEDOT:PSS.Electrical resistances of the pure cotton were determined from I-V bends at temperature 25C .Piezoelectric effect The gloves were worn by a test subject and the conductivetracks were connected to an oscilloscope tracks were connected to an oscilloscope.This gave a rough estimate of the electrical performance of the different sample gloves The same gloves were tested repeated times during the same measurement and the tests were repeated several weeks after the first measurements, all giving similar results Temperature Dependence The temperature reliance of pure cotton was estimated from(25 to 100) 0C at focusespure cottons () wt.% as appeared in [Fig] pure cotton showed a comparable trend; This conduct might be ascribed that to the formation of charge localization because of the making of creation issue in the structure of SWCNT\PEDOT:PSS causing shortening of its conjugation length.The DSC thermogram showed endothermic pinnacles comparing to the melting point of the treated and untreated pure cotton textures swcnt\pedot:pss composites with 10 and 30 wt% loadings are thought about in [Fig5.13B] The control was 92 C, while the example containing 30 wt% of SWCNTs\pedot:pss is noted at 100 C and the example containing 10 wt% of SWCNTs\PEDOT:PSS does not demonstrate much variety from the control test.Important aspects of the glove were the textile production methods utilizing all-polymeric \SWCNT, safe and readily available functionalmaterials as well as the possibility of the glove remainingcomfortable and durable throughout use interconnections was shown to be a reliable method .characterization Method So asto research the electrical properties of the conductive cotton textures, a gold four-line test method was utilized as per the writing.Conclusions This paper has presented a study of a motion sensing entirely polymer \SWCNT-based glove with possible applications in physical rehabilitation.The screen-printing of conductive PEDOT:PSS \swcnt .Table X demonstrates that the pure cotton test showed the most minimal estimations of low sheet resistance of .004211?/?STest methods Interconnection resistance.The for cotton did not have melting ..peak with any of these examples up to 250 C[17].with .33.021wt.%) of dopant