GLOVE TALK

A SIGN TO SPEECH CONVERTER GLOVE FOR THE SPEECH IMPAIRED

ABOUT GLOVETALK

THE GLOVETALK IS A DEVICE THAT CONVERTS SIGN LANGUAGE TO SPEECH.

THIS PROJECT IS SPECIALLY DESIGNED FOR THE SPEECH IMPAIRED AND AIMS TO PROVIDE THEM A BETTER WAY TO COMMUNICATE WITH THE OUTSIDE WORLD.

THE SIGN LANGUAGE IS A SPECIAL LANGUAGE WHICH USES HAND AND BODY MOVEMENTS TO CONVEY THE SPEAKER'S THOUGHTS TO OTHERS.

FOR THE PROJECT WE ARE USING THE AMERICAN SIGN LANGUAGE (ASL) WHICH IS WIDELY USED THROUGHOUT THE WORLD.

THE GLOVETALK USES SENSORS TO RECOGNISE HAND MOVEMENTS AND CONVERT IT INTO SPEECH.

WORKING
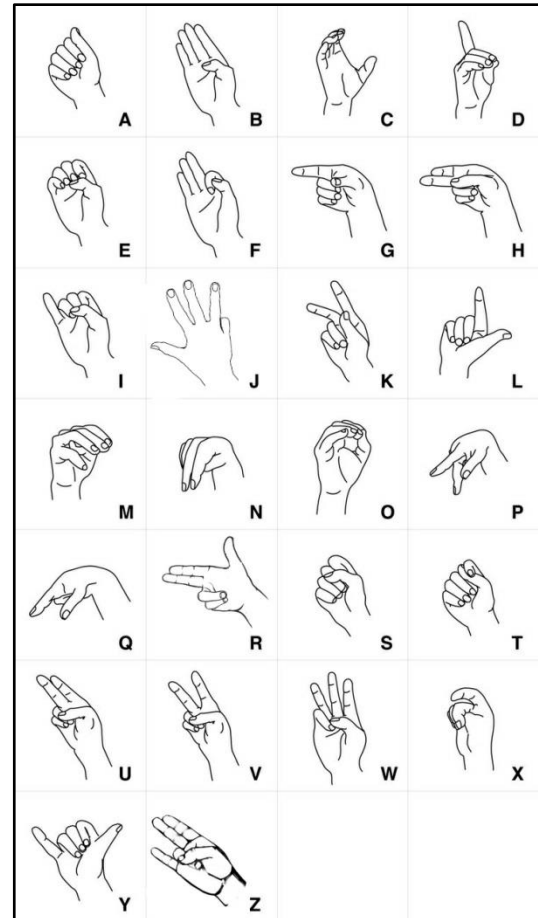
THE GLOVE USES DIFFERENT SENSORS TO RECORD HAND GESTURES. THE RECORDED DATA IS THEN SENT TO THE M.C.U. OR THE MICROCONTROLLER UNIT. THE M.C.U. THEN CONVERTS THE DATA TO ITS CORRESPONDING ALPHABET AND SENDS THIS DATA TO A SMARTPHONE VIA BLUETOOTH

THE GLOVE HAS A SPECIAL SENSOR CALLED FLEX SENSOR. THE FLEX SENSOR IS A SENSOR THAT CAN CALCULATE HOW MUCH THE FINGER HAS BEEN BENT.
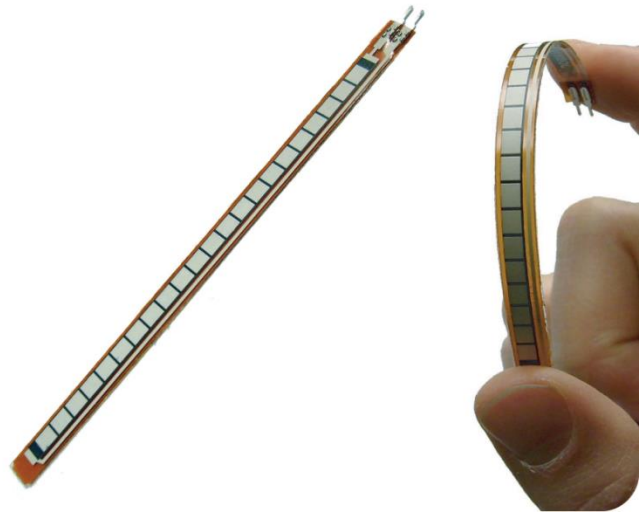
WHEN FLEX SENSOR BENDS, IT CHANGES ITS RESISTANCE. THESE SENSORS ARE PLACED ALONG THE FINGERS. WHEN THE FINGERS BEND, THE SENSORS BEND ALONG WITH THEM . THE RESISTANCE VALUES ARE SENT TO THE M.C.U. WHERE THE CHANGE IN RESISTANCE IS CALCULATED AND IS CONVERTED TO BEND DEGREES.

EACH LETTER IN THE ASL HAS DIFFERENT BEND VALUES FOR EVERY FINGER. WHEN ALL THE BEND VALUES MATCH WITH THE CURRENT DATA THE CORRESPONDING LETTER IS PRINTED.

THE DATA IS SENT BY THE M.C.U. TO THE SMARTPHONE VIA BLUETOOTH USING A BLUETOOTH MODULE. IN THE SMARTPHONE AN APPLICATION WILL RECEIVE THE DATA AND CONVERT IT TO SPEECH. THIS APPLICATION WAS MADE BY US USING MIT APP INVENTOR.

MICROCONTROLLER UNIT

THE MICROCONTROLLER UNIT OR M.C.U. IS AN INTEGRATED CIRCUIT CHIP THAT CAN BE PROGRAMMED TO DO A SPECIFIC TASK. HERE IT HAS BEEN PROGRAMMED TO RECEIVE THE DATA FROM THE SENSORS AND SEND THE CALCULATED DATA TO THE SMARTPHONE.

THE ARDUINO UNO IS A BOARD WHICH CONTAINS THE M.C.U.

ARDUINO BOARD DESIGNS USE A VARIETY OF MICROPROCESSORS AND CONTROLLERS. THE BOARDS ARE EQUIPPED WITH SETS OF DIGITAL AND

ANALOG INPUT/OUTPUT (I/O) PINS THAT MAY BE INTERFACED TO VARIOUS EXPANSION BOARDS (SHIELDS) AND OTHER CIRCUITS. THE BOARDS FEATURE SERIAL COMMUNICATIONS INTERFACES, INCLUDING UNIVERSAL SERIAL BUS (USB) ON SOME MODELS, WHICH ARE ALSO USED FOR LOADING PROGRAMS FROM PERSONAL COMPUTERS. THE MICROCONTROLLERS ARE TYPICALLY PROGRAMMED USING A DIALECT OF FEATURES FROM THE PROGRAMMING LANGUAGES C AND C++. IN ADDITION TO USING TRADITIONAL COMPILER TOOLCHAINS, THE ARDUINO PROJECT PROVIDES AN INTEGRATED DEVELOPMENT ENVIRONMENT (IDE) BASED ON THE PROCESSING LANGUAGE PROJECT.

THE ATMEGA328 MICROCONTROLLER IS THE MCU USED IN ARDUINO UNO R3 AS A MAIN CONTROLLER. ATMEGA328 IS AN MCU FROM THE AVR FAMILY; IT IS AN 8-BIT DEVICE, WHICH MEANS THAT ITS DATA-BUS ARCHITECTURE AND INTERNAL REGISTERS ARE DESIGNED TO HANDLE 8 PARALLEL DATA SIGNALS.

ATMEGA328 HAS THREE TYPES OF MEMORY:

FLASH MEMORY: 32KB NONVOLATILE MEMORY. THIS IS USED FOR STORING APPLICATION, WHICH EXPLAINS WHY YOU

DON'T NEED TO UPLOAD YOUR APPLICATION EVERY TIME YOU UNPLUG ARDUINO FROM ITS POWER SOURCE.

SRAM MEMORY: 2KB VOLATILE MEMORY. THIS IS USED FOR STORING VARIABLES USED BY THE APPLICATION WHILE IT'S RUNNING.

EEPROM MEMORY: 1KB NONVOLATILE MEMORY. THIS CAN BE USED TO STORE DATA THAT MUST BE AVAILABLE EVEN AFTER THE BOARD IS POWERED DOWN AND THEN POWERED UP AGAIN.

FLEX SENSORS

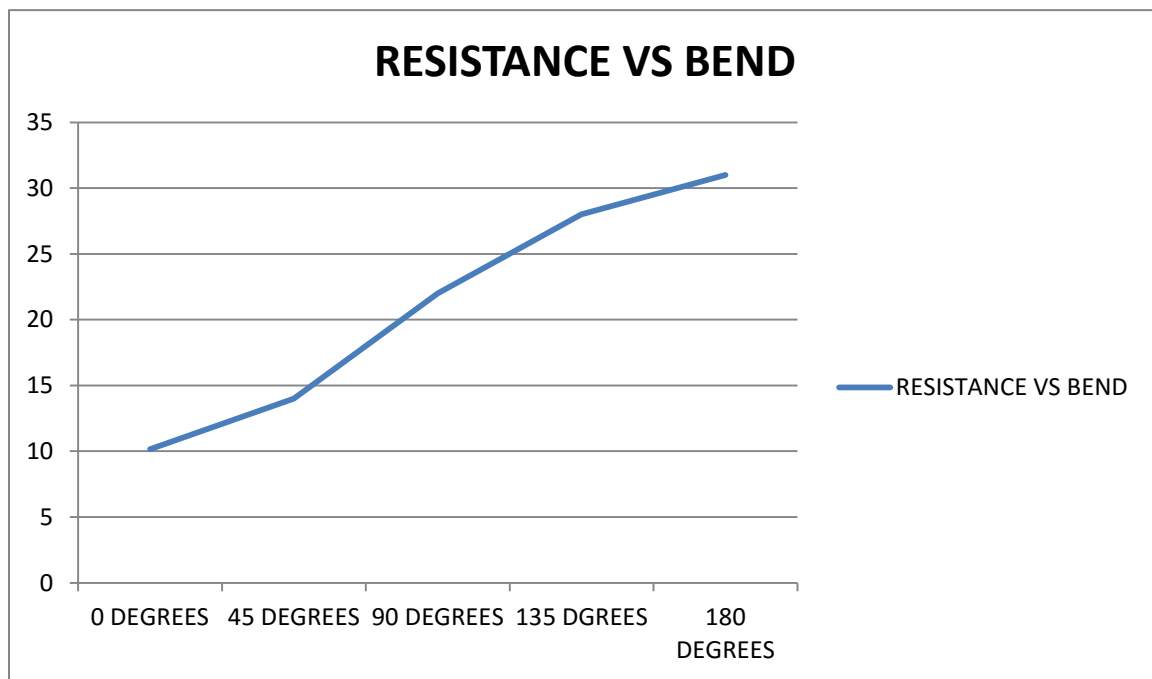A FLEX SENSOR OR BEND SENSOR IS A SENSOR THAT MEASURES THE AMOUNT OF DEFLECTION OR BENDING.

USUALLY, THE SENSOR IS STUCK TO THE SURFACE, AND RESISTANCE OF SENSOR ELEMENT IS VARIED BY BENDING THE
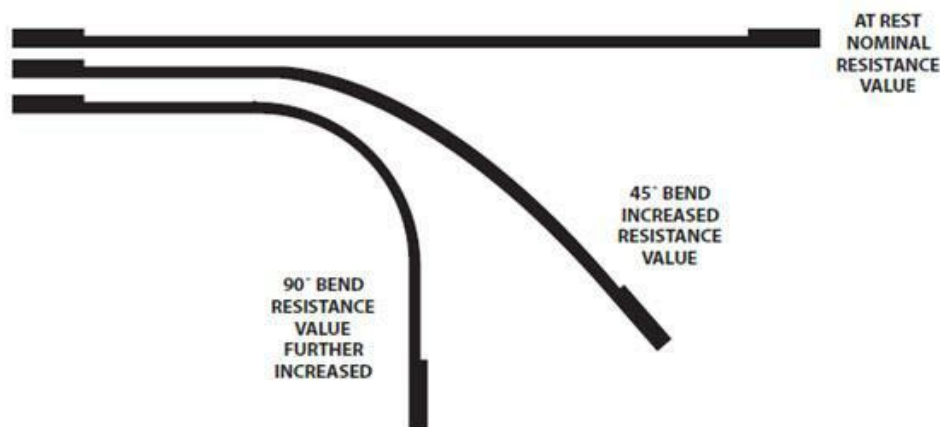
SURFACE. SINCE THE RESISTANCE IS DIRECTLY PROPORTIONAL TO THE AMOUNT OF BEND IT IS USED AS GONIOMETER, AND OFTEN CALLED FLEXIBLE POTENTIOMETER.

THE GRAPH SHOWS RELATION BETWEEN BEND AND RESISTANCE

RESISTANCE VS BEND

Graph x-axis: 0 DEGREES, 45 DEGREES, 90 DEGREES, 135 DGREES, 180 DEGREES
Graph y-axis: 0, 5, 10, 15, 20, 25, 30, 35
Legend: RESISTANCE VS BEND

WHEN INPUTTING DATA FOR EACH LETTER, WE NOTICED THAT THE VALUES FOR SOME LETTER WERE COMING OUT TO BE THE SAME. TO SOLVE

U

V
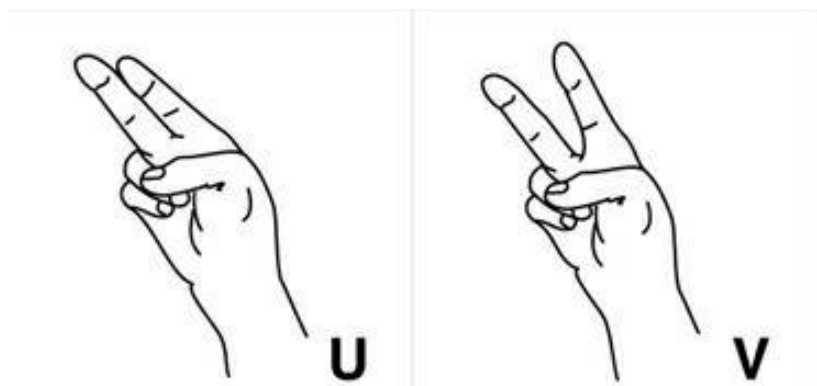
THE PROBLEM WE MADE ANOTHER TYPE OF SENSOR, CONTACT SENSORS. THESE SENSORS ARE PLACED ON THE FINGERTIPS OF SOME FINGERS. WHEN THE FINGERS COME IN CONTACT THE SENSOR SENDS A BOOLEAN VALUE TO THE M.C.U.

CONTACT SENSOR CIRCUIT   QR CODE TO DOWNLOAD
ANDROID APP

R1
220 Ω

R2
220 Ω

V1
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