SMART YOGA INSTRUCTOR

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Abstract - *This project describes a Posture detection system for Yoga. In daily life, yoga has become a well-known discipline around the world that keep people in good physical as well as mental health. Yoga is proven system for the human physical & mental activities. Yoga practice can cure depression, anxiety, sleeplessness. The existing method have shown the recognition of posture analysis through virtual reality and exergame. The suit has been designed and implemented through a virtual master. The proposed system states that various types of accelerometer sensors are fixed on the flexible bands which are lightweight and are used to measure the orientation of the limbs. The predefined values are loaded and those values are compared with the current values when these values gets matched then it is sent to the mobile application. Identifies whether the user is doing the posture correctly (or) not based on the given information & reduces the stress of the person.*

Key Words*: *Yoga, Posture detection system, cloud.

INTRODUCTION

This project is based on the microcontroller and it uses accelerometer sensors for measuring the orientation of the limbs and flex sensors are incorporated in the bone joints for bending accuracy. The predefined values of all the sensors for each posture is loaded and it is checked with the current values. Once the value is matched it is sent to the cloud and the user can view it in the application.

A. *Definition of the problem*:

More amount of money is wasted on yoga classes. Individual attention is not provided in places where large number of students are present. Due to the lack of individual attention the probability of doing the postures in correct way is reduced. This issue gives rise to unwanted side effects. Due to the day to day workload of an average human being he/she cannot allocate separate interval of time for doing yoga.

B. *Objective:*

- To recognize the postures more accurately.
- To make the users do the posture with high accuracy.
- To give the user more practice until they get the posture more perfectly.
- The device is easily wearable and light weight.
- Data is transferred to cloud and to mobile application which gives the further instructions.
- Yoga can be practice anywhere and at any time.

RELATED WORK

Yoga practice can reduce the depression level, anxiety level, sleeplessness and many other physical health issues. Because of the major benefits of yoga there is a demand for a self- training system. Our prototype will eliminate the need for paying money to the instructor and reduces the side effects due to the incorrect postures. With this prototype the user can practice Yoga anywhere and at any time.

PROPOSED SYSTEM:

The smart yoga instructor device makes use of various types of accelerometer sensors. The sensors are fixed to flexible bands which are light weight and are easy to wear. The bands are designed in such a way that they can be worn on the limbs. The accelerometers attached to the bands measures the orientation of the limbs while making the yoga postures. The data is sent to the Microcontroller where it is processed and then the values are uploaded in the cloud server. The mobile application fetches the values from the cloud server for displaying it. The application will compare the current values with the predefines values and provides instructions to the user.

The sensors are calibrated according to the user's physique and the predefined values of the user are measured while making the postures in a correct

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manner. The predefined values are loaded into the application. When the user makes the postures again the current values of the sensor are compared with the predefined values.

WORK PLAN:

(A) Methodology:

The Accelerometer sensors are fixed on the limbs for the orientation measurement. These values are sent directly to the cloud server. The microcontroller acts as an intermediate. Predefined values are stored in the microcontroller. those values are compared with the current values in the application.

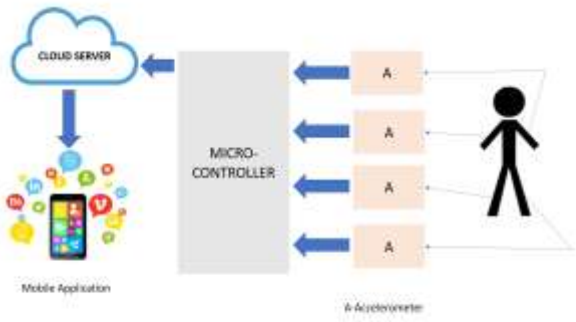

Fig -1: Block Diagram

(B) MODULE DESCRIPTION

1. ACCELEROMETER SENSORS

An accelerometer measures proper acceleration, which is the acceleration it experiences relative to freefall and is the acceleration felt by people and objects. Accelerometers have multiple applications in industry and science. Highly sensitive accelerometers are components of inertial navigation systems for aircraft and missiles. Accelerometers are used to detect and monitor vibration in rotating machinery. Accelerometers are used in tablet computers and digital cameras so that images on screens are always displayed upright.

Fig -1: Accelerometer

PIN DESCRIPTION:

This Accelerometer module is based on the popular ADXL335 three-axis analog/digital accelerometer IC, which reads off the X, Y and Z acceleration as analog /digital voltages. By measuring the amount of acceleration due to gravity, an accelerometer can figure out the angle it is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, the accelerometer can find out how fast and in what direction the device is moving.

Pin No	Pin Name	I/O	Details
1.	VCC	Power IN	Positive Power supply,5V Regulated Power
2.	GND	Power GND	Ground
3.	X	O/P	X channel output
4.	Y	O/P	Y channel output
5.	Z	O/P	Z channel output
6.	ST	I/P	Self test

Table -1: pin configuration

2.NODEMCU:

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi- Fi SoC from Espress if Systems, and hardware which was based on the ESP-12 module. NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines " node " and "MCU" (micro-controller unit). The term "NodeMCU" strictly speaking refers to the firmware Both the firmware and prototyping board designs are open source.

Fig 2 -: NodeMCU

3.WIFI MODULE:

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi net- work and make simple TCP/IP connections. Devices that can use Wi-Fi technologies include desktops and laptops, smart phones and tablets, smart TVs, printers, digital audio players, digital cameras, cars and drones.

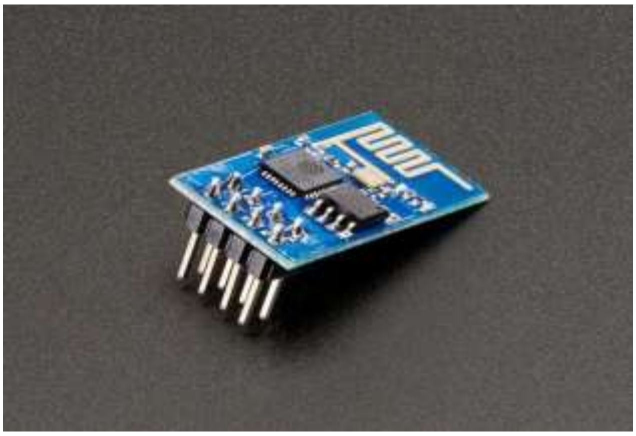

Fig -3: WIFI MODULE

PIN DESCRIPTION:

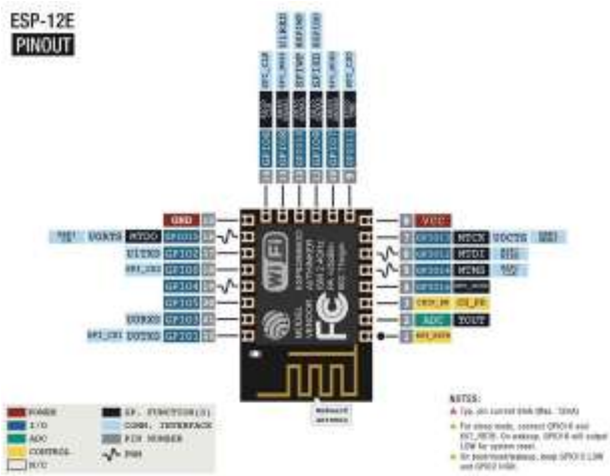

Fig -4: PIN CONFIGRATION

1. *FEATURES:*

- Memory:
    - 32 KiB instruction RAM
    - 32 KiB instruction cache RAM
    - 80 KiB user-data RAM
    - 16 KiB ETS system-data RAM
- External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included)
- IEEE 802.11 b/g/n Wi-Fi
    - Integrated TR switch, balun, LNA, power amplifier and matching network
    - WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI
- I²C (software implementation)
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
  10-bit ADC

2. I2C PROTOCOL:

I2C (Inter-Integrated Circuit) is serial bus interface connection protocol. It is also called as TWI (two wire interface) since it uses only two wires for communication. Those two wires are SDA (serial data) and SCL (serial clock). I2C is acknowledgment-based communication protocol i.e. transmitter checks for an acknowledgment from the receiver after transmitting data to know whether data is received by receiver successfully.

I2Cworks in two modes namely,

- Master mode
- Slave mode

SDA (serial data) wire is used for data exchange in between master and slave device. SCL (serial clock) is used for the synchronous clock in between master and slave device. Master device initiates communication with a slave device. Master device requires slave device address to initiate conversation with a slave device. Slave device responds to master device when it is addressed by a master device.

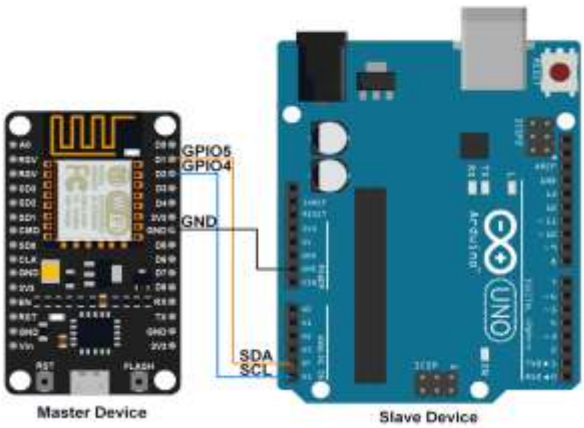

Fig -4: I2C PROTOCOL

EXPERIMENTAL SETUP:

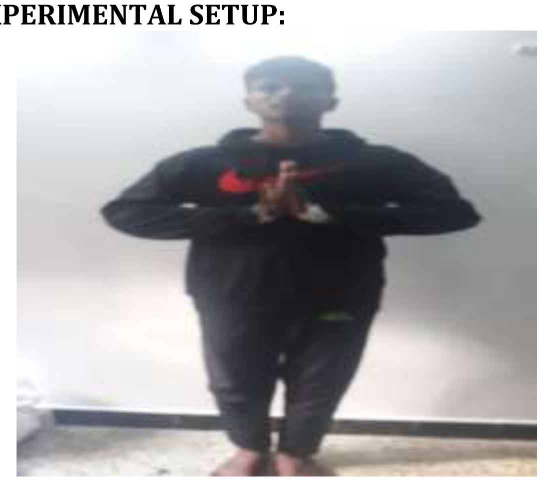

Fig -5: I2C PROTOCOL

Fig -6: I2C PROTOCOL

Fig-7:I2C PROTOCOL

Fig-8:I2C PROTOCOL

Fig-9:I2C PROTOCOL

Fig-10:I2C PROTOCOL

Fig-11:I2C PROTOCOL

Height	Module	Posture 1	Posture 2	Posture 3
5.5 INCH	Sensor 1	0.78-0.81	0.52-0.57	0.48-0.505
	Sensor 2	0.78-0.81	0.52-0.57	0.48-0.505
	Sensor 3	-0.435- -0.5	-0.62- -0.67	-0.623- -0.647
	Sensor 4	0.435- -0.5	-0.62- -0.67	-0.623- -0.647
4.9 INCH	Sensor 1	0.72-0.752	0.46-0.49	0.42-0.467
	Sensor 2	0.72-0.752	0.46-0.49	0.42-0.467
	Sensor 3	-0.37- -0.41	-0.54--0.575	-0.58- -0.613
	Sensor 4	-0.37- -0.41	-0.54--0.575	-0.58- -0.613
6 INCH	Sensor 1	0.83-0.85	0.57-0.63	0.502-0.535
	Sensor 2	0.83-0.85	0.57-0.63	0.502-0.535
	Sensor 3	-0.5- -0.55	-0.65--0.74	-0.653- -0.737
	Sensor 4	-0.5- -0.55	-0.65--0.74	-0.653- -0.737
5.2 INCH	Sensor 1	0.76-0.79	0.50-0.557	0.468-0.5
	Sensor 2	0.76-0.79	0.50-0.557	0.468-0.5
	Sensor 3	-0.415- -0.46	-0.60--0.64	-0.603- -0.627
	Sensor 4	-0.415- -0.46	-0.60--0.64	-0.603- -0.627

Table -2: Height Datasets

RESULT:

APPLICATION IMAGES:

Fig-12:I2C PROTOCOL

4.1.3. CLOUD TESTING

The developed device will transfer the data to cloud. The data will be calibrated and the validated result will be displayed in the top of page about the posture. The data can also be stored in cloud for future use.

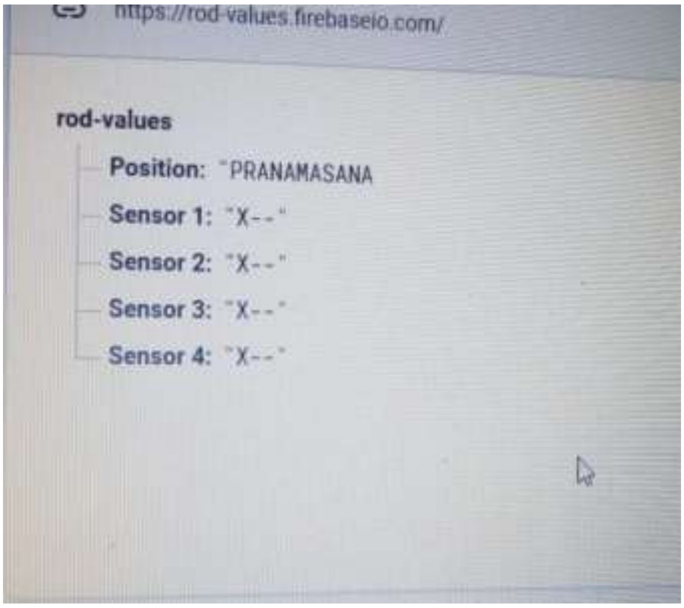

Fig-13: Cloud Image I

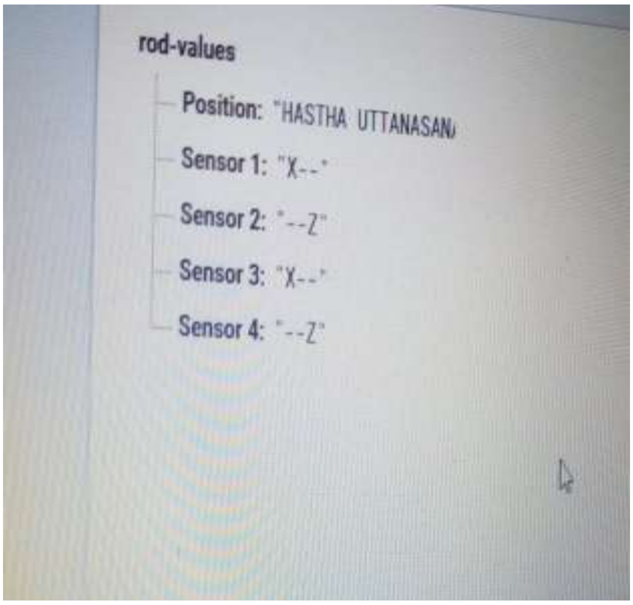

Fig-14: Cloud Image II

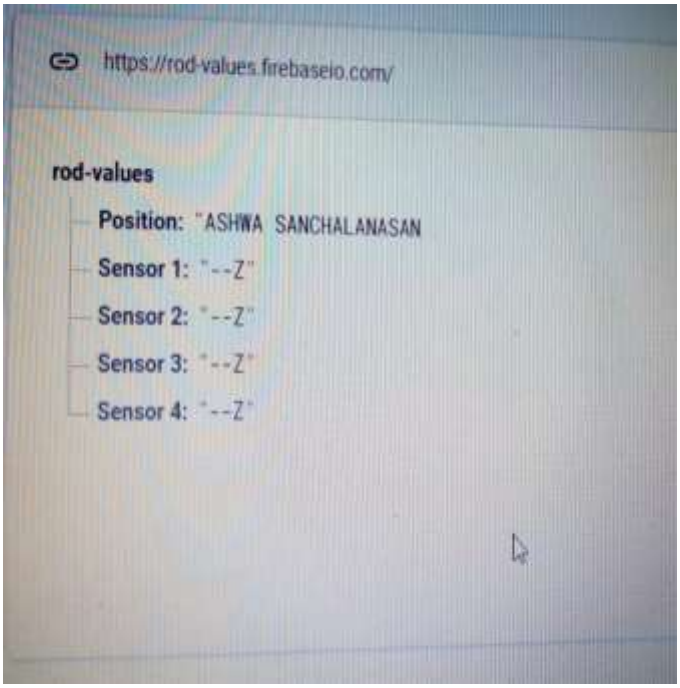

Fig-15: Cloud Image III

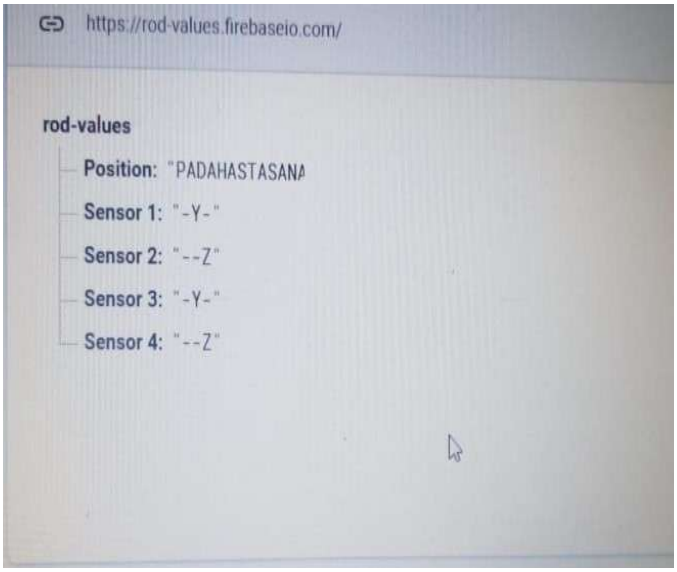

Fig-16: Cloud Image IV

CONCLUSION

This research investigates and identifies whether the user is doing the posture correctly or not based on the given information. In this project we develop a suit type model for the user while doing yoga. That helps the user to do the yoga anywhere and anytime. Provides a cloud base real time values for each and every posture. This method provides easy accessibility/controllability for the users

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