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BRAIN CONTROLLED AIMING ROBOT

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***Abstract*:** The main purpose of doing this project is to aid the military operation. This project is developed on the idea of aiming controlled by brain.This is done using BCI device such as Brainsense Headset. The input controls are given by the brain directly. All the information is carried in the form of electrical pulses inside the brain. These electrical signals are sensors are detected using an EEG sensor. The EEG stands for Electroencephalogram. This sensor is basically an electrode which is placed on forehead or scalp. This sensor takes the raw data, processes it. All this is done using Brainsense Headset. The processed data is transmitted to the microcontroller through Bluetooth communication. Using these signals the motors are controlled for robot movement.

***Index Terms*: ARDUINO UNO Microcontroller, EEG sensors, LASER diode.**

I. INTRODUCTION

Numerous patients are alluded to a neurologist to have an electroencephalogram (EEG), which records electrical motivations from the nerves in the head. "Electro" alludes to the electrical driving forces sent starting with one nerve cell then onto the next. These motivations are the way nerves converse with one another and get data from the mind. "Encephalo" alludes to the head, and "gram" alludes to the printed record.

EEG exams are finished by putting cathodes on the scalp and seeing what the electrical motivations look like when the patient is alert, snoozing, in a room with a glimmering light or infrequently when the patient is requested that inhale profoundly again and again. At the point when the EEG is done, no power is put into or taken out of the patient. The electrical signs that the mind produces are essentially recognized and printed out on a PC screen or a bit of paper.

An EEG decides the understanding's level of readiness or awareness is normal, irregularities in particular piece of the mind, propensity to have seizures or writhing and specific sort of epilepsy. Some of the time a patient may tend to have seizures, however his or her EEG is ordinary at the specific time it is finished. That is on account of individuals with a seizure inclination may have variations from the norm that go back and forth from hour to hour or normal. In these cases, a rehash EEG or a more drawn out time of EEG observing may be valuable.

1.1 REVIEW STAGE

In the existing system, Previous system in EEG-controlled robotics has required training humans to “think” in a prescribed way that computer can recognize. For example, an operator might have to look at one of two bright light displays, each of which corresponds to a different task for the robot to execute.

The drawback of this method is that the training process and the act of modulating one’s thoughts can be time taking and difficult, particularly for people who supervise tasks in navigation require intense concentration.

1.2 FINAL STAGE

In proposed system the goal of our Mind-Controlled Robot project is to design a robot which can be controlled using brain waves.We developed the final prototype using the Brainsense headset and the Arduino microcontroller. We used a technique called EEG (electroencephalogram) to read the brain activity. We used the attention value read by the EEG headset to control the robot.

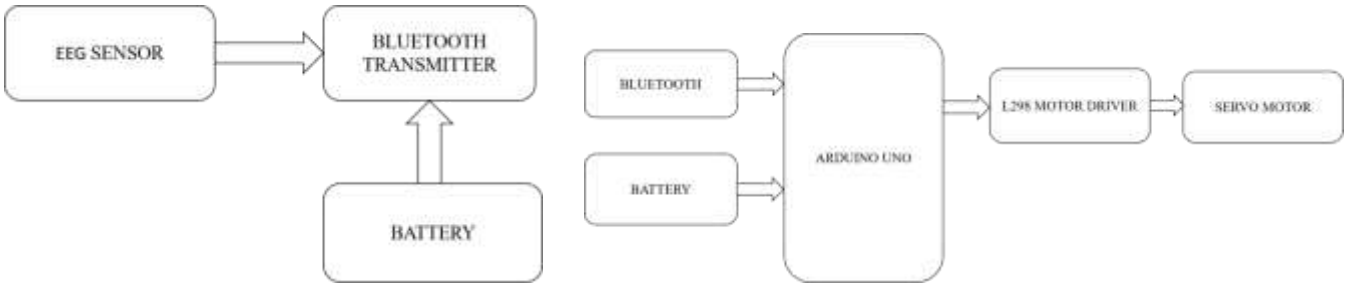

Figure 1:Block Diagram of the Project

II. PROPOSED SYSTEM

The Mind-Controlled Robot prototype was constructed using an Arduino microcontroller, the Brainsense headset, and arms. The Brainsense headset acts as transmitter and the Arduino with Bluetooth module acts as the receiver. Bluetooth is used for communication. The Brainsense headset was programmed to communicate with the Arduino. In the program the attention value was set to the motor shaft movement. The product was tested with different age groups. During the test, the test subject got into a focused state of mind, and the data range from the serial monitor was taken for the focused group of data. Then, the test subject would be unfocused for a period of time and the data range from the serial monitor was taken. Readings were taken and the results were graphed. The threshold was found to be 40 percent. The results were consistent throughout all age groups. The robot performed as programmed, and functioned well throughout all of the tests.The main reason for making this system is to aid the military operations and soldiers.

III. COMPONENTS REQUIRED

3.1 LASER DIODE

A laser diode is a semiconductor device similar to a light-emitting diode in which a diode pumped directly with electrical current can create lasing conditions at the diode's junction. Laser diodes can directly convert electrical energy into light.

Figure 2: LASER Diode

3.2 SERVO MOTOR

Servo motor works on PWM (Pulse width modulation) principle, means its angle of rotation is controlled by the duration of applied pulse to its Control PIN. Basically, servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. It is tiny and lightweight with high output power. This servo can rotate approximately 180 degrees (90 in each direction) and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. It comes with a 3 horns (arms) and hardware.

Figure 3: Servo Motor

3.3 BLUETOOTH MODULE

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices and building personal area networks (PANs). Bluetooth networking transmits data via low-power radio waves. It communicates on a frequency of 2.45 gigahertz (actually between 2.402 GHz and 2.480 GHz, to be exact). This frequency band has been set aside by international agreement for the use of industrial, scientific and medical devices (ISM). By comparison, the most powerful cell phones can transmit a signal of 3 watts. The low power limits the range of a Bluetooth device to about 10 meters (32 feet), cutting the chances of interference between your computer system and your portable telephone or television.

Figure 4: Bluetooth Module

3.4 BRAINSENSE HEADSET

The Headset consists of a EEG sensor. EEG stands for electroencephalogram, a test commonly used to detect electrical activity in the brain. Detecting, recording, and interpreting “brain waves” began in the late 1800s with the discovery and exploration of electrical patterns in the brains of mammals, and the technology has evolved to enable applications ranging from the medical detection of neurological disorders to playing games controlled entirely by the mind.

Figure 5: Brainsense Headset

3.5 ARDUINO UNO MICRO-CONTROLLER

The Arduino/genuino uno is a microcontroller board based on the atmega328p (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a usb connection, a power jack, an icsp header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a usb cable or power it with a ac-to-dc adapter or battery to get started.. You can tinker with your uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Table 3.1

Micro controller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Figure 6: Arduino Board

IV. RESULTS AND DISCUSSION

4.1 RESULTS

The below image shows the completed product of this project. The Aiming Robot is seen with all the components placed on a board. Set of Arms are also seen mounted on the Board. The side of the board where the arm is mounted is the Front side of the Robot. To the arm a LASER Diode is fixed to point/aim.

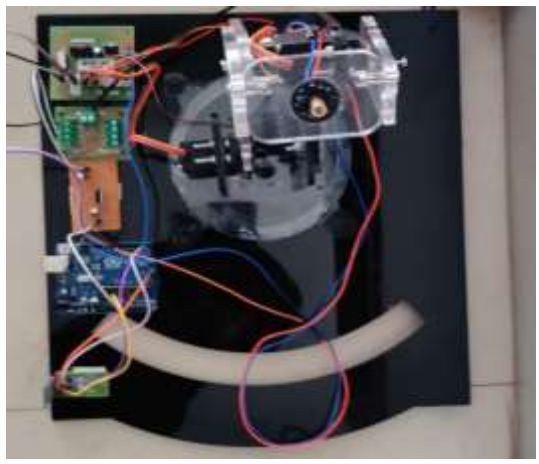

Figure 7: Final Output

4.2 FUTURE SCOPE

The future scope of the work is to implement the IoT device which ensures the complete data regarding the person using the headset and also enabling the complete control of devices using the Brainsense. The aiming control can be made easy using this project which helps for many military applications.

4.3 CONCLUSION

This system was developed to The Mind-Controlled Robot prototype was constructed using an Arduino microcontroller, the Brainsense headset, and arms. The Brainsense headset acts as transmitter and the Arduino with Bluetooth module acts as the receiver. Bluetooth is used for communication. The Brainsense headset was programmed to communicate with the Arduino. In the program the attention value was set to the motor shaft movement which moves the robot.

4.4 SOFTWARE USED

- ARDUINO IDE
- KIEL SOFTWARE

V. REFERENCES

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