EXPLORATORY PROJECT

(ME-291)

Automatic Bike Stand

Supervisor- Dr R.K. Gautam -Associate Professor IIT(BHU) Varanasi

Submitted by-

Kuldeep Aswal (17135050)

Kunal Kumar (17135051)

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INTRODUCTION

It is a common sight to see bike riders forgetting to slide their side-stands back in place when starting their two-wheeler. This may lead to accidents – some of which could threaten the lives of not only the rider but also of the fellow travellers. The objective of this project is to engineer a side-stand slider system that automatically rotates the side-stand back to its original horizontal position within seconds of starting the bike.

The automaticity of the entire mechanism is achieved through a microcontroller circuit, which is programmed to monitor the bike starter and relay the electrical signal to a motor. The motor, in turn, is connected to the side-stand using a shaft. The motor will convert the electrical energy to mechanical energy, which would be used to generate sufficient torque to rotate the side-stand through an angle of ninety degrees. A battery of 5 volts would supply the current in the microcontroller circuit.

COMPONENTS

1) Power Source
2) DC motor
3) Arduino UNO
4) Microcontroller
5) Side stand
6) Frame

POWER SOURCE –

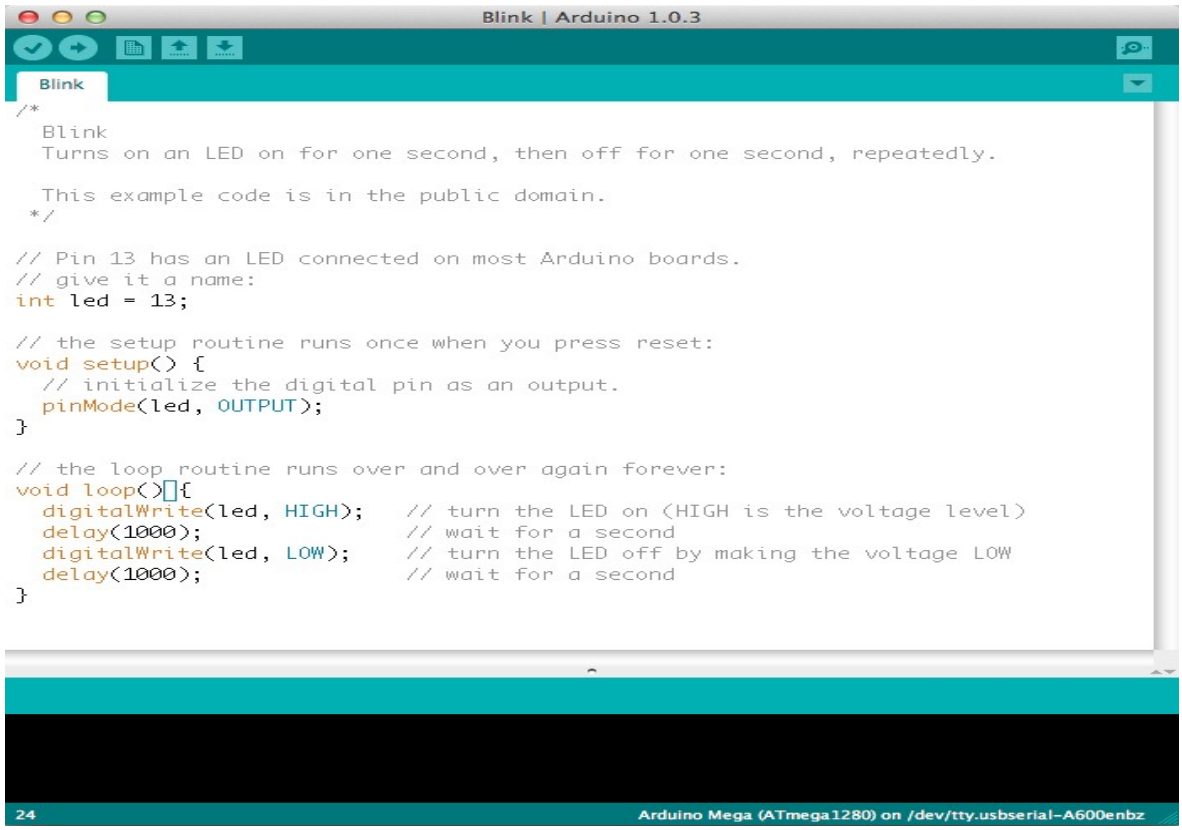
The main objective of the power source is to supply current to the motor through the Arduino at a nearly constant voltage. In the project, this power can be supplied either from a battery (dry cell) or from a laptop.

D.C. SERVO MOTOR –

DC motor is designed for speed operations. The DC motor does not oscillate back and forth; it rotates continuously in one direction like most others motors. The type of motor used in our project is called a servo motor and has an advantage of having lots of torque. The DC motor works on 12 volt D.C. battery.

Coding the Aurdino

- The c++ coding of aurdino has been done basic syntax has shown in next page it consists two main modules setup() and loop().Setup() initiates the program and loop() repeats it by using time as the measurand.
- The standard GNU/GCC compiler is replaced by avr-g++, which is suitable for microcontrollers.


Blink | Arduino 1.0.3
Blink
/*
Blink
Turns on an LED on for one second, then off for one second, repeatedly.
This example code is in the public domain.
*/
// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led = 13;
// the setup routine runs once when you press reset:
void setup() {
// initialize the digital pin as an output.
pinMode(led, OUTPUT);
}
// the loop routine runs over and over again forever:
void loop(){
digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level)
delay(1000); // wait for a second
digitalWrite(led, LOW); // turn the LED off by making the voltage LOW
delay(1000); // wait for a second
}
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Arduino Mega (ATmega1280) on /dev/tty.usbserial-A600enbz

POWERING THE MOTOR –
Voltage- the standard voltage requirement for the motor is 12 Volt DC. The electrical system in a running automobile usually puts out between 13 and 13.5 volts, so it's safe to say the motor can handle up to 13.5 volts with no problem.

CURRENT –
The minimum required current for the motor is 1.6 amps 70 rpm, 0.9 amps at 41 rpm. These current ratings are for the motor spinning with no load. As we add mechanical load, these numbers can increase dramatically, doubling or even tripling under a heavy load. This factor must be taken into account when selecting a power supply. Since the motor will only use what it needs when it comes to current, it's best to provide a source with a higher current rating than you think you might need.

MICROCONTROLLER –
A microcontroller (sometimes abbreviated μC, uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Micro-controllers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications. Micro-controllers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to control even more devices and processes digitally. Mixed-signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems.
The microcontroller used in the project is embedded in the Arduino UNO and does the job of regulating current going into the motor.

CONSTRUCTION AND ASSEMBLY

Firstly we made a general layout of the side stand frame according to the required dimensions. For making a frame, we used wood, and with the

help of manufacturing processes like carpentry, drilling and filing, we prepared a frame to support the bike stand and Arduino.
Then, all the component of side stand were assembled properly. The presented mechanism consists of a D.C motor powered by a laptop, connected to the side stand. The motor is actuated by the sensor mounted on the frame through the microcontroller. When the vehicle starts, current is supplied to the circuit, sending a signal to the microcontroller to actuate the motor causing them to move in a disengaged position. After the motor has rotated through an angle of ninety degrees, the microcontroller circuit embedded on the Arduino stops the motor.

APPLICATION

Automatic bike stand can be used in all types of two-wheelers such as geared, non-geared or hand geared two-wheelers.

ADVANTAGES

1) Simple mechanism is used to automatize the bike stand.
2) It is simple in installation.
3) Low cost and hence economically viable.
4) It does not require any special design.

CONCLUSION

We observe that from the design and analysis D.C motor and another component like as microcontroller (Arduino), the regulating system occupies less space and this space is easily available in the mechanical frame of the motorcycle. After analysis of torque, the required torque to raise the side stand is 11.6 N-m. So after calculation of torque, we determined the power required to raise the side stand which is 26.18 watt. So we design automatic side stand for maximum frictional torque. Hence we used 12V DC geared motor which draws 2.5 amp current and 30W power.