# TREE CLIMBING ROBOT (treebot!!)

**Team "*AUTONOMOUS*"**


**Our team**

1) **Utkarsh Saraswat 150020087**
2) **Maharshi Debnath 150020093**
3) **Aditya Devalla 150020096**
4) **Prem Patel 150020053**


## INTRODUCTION:

**Robotics is one of the most emergent fields of interest today. We are quite familiar with robots which can walk, run on ground. Even we have seen robots which can swim and fly. Here comes the robot which can climb trees!! Our project is a model representation of a Tree climbing robot which can be called a TREEBOT. Its features can be extended from plucking fruits to cutting branches.**

## MOTIVATION:

**Collecting fruits from trees is day to day activity of farms and plantations. We wanted to build a Remote controlled robot which will have the ability to climb on trees. A treebot can be proved highly beneficial in many ways.**

1) **We will have easier, faster, convenient and safe method to pluck off fruits.**
2) **It will reduce labour cost plus using this robot will also ensure human safety as climbing on tall trees can be sometimes risky.**
3) **Not only farmers but wood cutters can make use of it.**
4) **Other than commercial purposes, this robot is also applicable for personal uses. It will be really helpful to those people who have a big tree in their lawn but they cannot climb on it to collect its fruit.**
5) **Wanna spy on someone or make a beautiful video clip of a bird, make use out of this robot by attaching a camera on it.**
6) **Moreover it can access to parts of trees which are out of reach for human. It can even climb easily on thorny trees, trees th large diameter of trunk and/or irregularly rough surfaces.**

**The real motivation we got from the video link below:-**https://www.youtube.com/watch?v=h5M_YJdrRyw

## REFERENCE:

**We referred the following links for developing our project……**


**http://www.instructables.com/id/Tree-Climbing-Robot/**

**https://www.cpr.cuhk.edu.hk/resources/press/pdf/4dedf3be088fb.pdf**

**http://www.roboticsbible.com/mechanical-gripper-mechanisms.html**

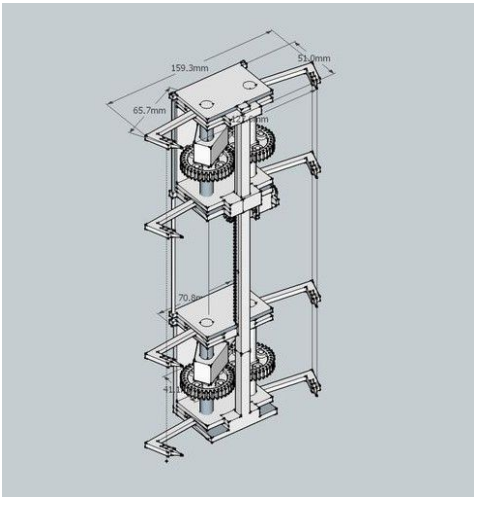
http://www.wikihow.com/Build-a-Remote-Controlled-Robot
http://www.wikihow.com/Build-a-Robot-Car

| EQUIPMENT REQUIRED: | Estimated cost |
|---|---|
| · Arduino uno- 1250 | 530 |
| · Integrated monolithic circuit- | 3*374 |
| · Perfboard- | 150-180 |
| · 9V battery to power Arduino | 195 |
| · approx 12V LiPo battery. | 530 |
| · 4X micro servo motors | 4*375 |
| · DPDT toggle switch | 200 |
| · 75 MHz transmitter and receiver | 487 |
| · Universal aluminium mounting hub | 4*700 |
| · Gears system | 100* |
| · Heat shrink tubings | 100 |
| · Acrylic, fiber material | 239-480 |
| · Steel/aluminium parts for limbs and skeleton | 500 |
| · Nuts, nails and bolts | 50 |
| · Wirings | 50 |
| · Rubber/leather for coating inner portion of limbs | 50 |
| · Mini rotating saw | |
| · Drilling machine | |

**Total=9118-9387 INR**

## CONSTRUCTION AND WORKING:

This robot consists of 4 pairs of limbs and a chassis with all electrical equipments attached on it. It will climb on the tree in a way similar to a caterpillar or earth worm. Our treebot is divided into an upper and a lower portion. Each portion has two pairs of limbs. The robot will move as it's upper portion will grip the trunk of tree, followed by uplifting of the lower portion. Then lower portion will grip the trunk uplifting it's upper portion. Each time a portion grips the trunk, the other portion will lose it's grip. Continuing this cycle will make the robot to climb. On just reversing this order, the robot will move downwards and in this way robot will be able to move in both direction. The gripping will be based on torque provided by servo motor. For making grip strong, simple piston based gripper with four fingers.




Just to give an idea of our robot…

## TIMELINE:

1. **Week1- One group will start learning Arduino basics and RC systems while the other group will work on the mechanical aspects of the robot's functioning and develop development of its design. Parts to be covered in mechanical study include minimizing the weight of the robot, making its grip strong, resistance to minor wounds and flexibility of motion. In the same week we will purchase all the required equipments.**

2. **Week2- We will make mechanically accurate robot that is we will focus on gripping and lifting mechanism. Limbs may be layered with rubber or leather in order to make stronger grip with trees. All separate part of the robot will be integrated to one. The mechanical part has to be completed in this week.**

3. **Week3- Now we are done with mechanical part we will work on electrical and logical system. We will make RC system and will write Arduino code. Arduino chip along with other electrical components has to be fixed on chassis and all the wirings connections should be made. In same two weeks we will test this robot in various conditions.**

4. **Week4 to Week5- Finally we will work on improvisation. Possible extensions of features of this robot are fruit plucking/cutting system and provide extra flexibility in its motion. A simple treebot can climb upward and downward very well, but we will work on extending it's motion to three dimensions. Fruit plucking/cutting feature will be not very different from gripping mechanism… but for that our treebot must has to bear some extra weight.**

## COST ESTIMATE:

**Considering expenses of all possible instruments estimated cost in Rs 8000-10,000.**

## POSSIBLE RISKS AND THEIR MANAGEMENT:

**The biggest risk that can be faced is loosening of grip while climbing… Though we will make the gripping mechanism strong enough to hold the robot in every situation, we will also be ready face risk. One way to ensure the robot's safety while testing is to tie it with an elastic rope of sufficient length whose other end is fixed on a tree, so that if the robot fails to hold its grip and we guys fail to catch it, it does not fall on ground but keeps hanging in the air. We will also not let robot to climb very high heights while experimenting with it.**