

ABSTRACT

The idea as mentioned is to make a self balancing bike, which would initially be Manually controlled (Autonomous would be developed if time permits). We may use gyro sensors and some sharp IR sensors which give us the signal to perform further functions. We plan to use an Aurdino or a AVR board and the coding would be done accordingly. The bot should be made in such a way that the Center of Mass is minimum, which would help in balancing it. For the chassis we are planning to use aluminium which makes the bike lighter in weight and rigid in structure. For motors, we plan to use a 200RPM geared motor attached to the rear wheel and a servo attached to the front wheel for direction control.

Implementation Steps :

Week 1: Week one would basically be getting all the required parts and mechanical part of the bike will be done the most. Completion of Mechanical calculations and making a draft of the code algorithm are planned to be done. The required Mechanical parts of the bike is planned to be purchased and the rest would be done based on the requirement.

Week 2: Week two would be assembling the mechanical parts and the motors in the right place and the operate it with a balancing wheel attached to it. Parallely we would be learning AVR in the initial days of the week and that would help us to develop the code. Then later in the week we would construct the schematic of the circuit and if possible try to simulate it.

Week 3: Week three would be implementing the circuit and test run the circuit board for testing purpose. If it is radio controlled (initially) a transmitter reciever circuit would also be also necessary.

Week 4 & 5 : The major part left out for these two weeks is coding, which would be accomplished and we plan to have a few trial runs of the bike and follow this procedure untill the coordination between the software and hardware is up to our expectations.

Week 6: In this final week we plan to have all the parts and components of the bike to be fixed enduringly. And the time left would be utilised for further modifications.

Components Required :

- 1) Aurdino or AVR board - 800 INR
- 2) motors and servo (all) - 2000 INR
- 3) IC's and other components - 500 INR
- 4) Gyroscope sensor or IR sensors - 1500 INR
- 5) Battery - 1000 INR
- 6) Mechanical Parts - 1500 INR

Total : 7,000 INR

What we would learn:

Obviously we would learn many-many things ,some mentionable things would be

- 1) AVR programming
- 2) Solid works
- 3) Working with circuits
- 4) Debugging
- 5) A lot more.....

CONCEPT :

- The plan is to have the Center Of Mass of the bike to a minimum so that it would stay balanced while operating and help it to traverse through curvy and inclined paths.
- For balancing as we mentioned, would be using a gyro sensor and an accurate IR sensor.
- The first thing what we do to balance a normal bike is control its handle and proper speed, here what I am thinking is probably to move the handle I.e. the front wheel according to the signal and I think this would definitely not suffice , I got an idea to transfer weight using motors again , here the weight would be few heavy ball bearings. These ball bearings would act as counter weights to perform the balancing act.
- The Gyro would give the feedback of the readings of all the 3 axis, i.e the Pitch, Yaw and Roll. Based on these readings we would write the code accordingly to shift the ball bearings to balance the bike at all possible conditions. The IR sensor would detect the slant distance between the center of the bike and the surface. If the left IR sensor is enabled then we would steer the bike to the right and parallelly shifting the weight to right as per the feedback from the gyro.
- The motors would be controlled by PWM (Pulse Width Modulation) and the feedback the sensors which helps us to maintain the speed of the bike accordingly to maintain the balance.
- For future modifications, we would plan a take off gear (similar to the one an aeroplane uses to build initial momentum before actual take off) which helps the bike be balanced before it gains its basic speed to be self balanced.

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