KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

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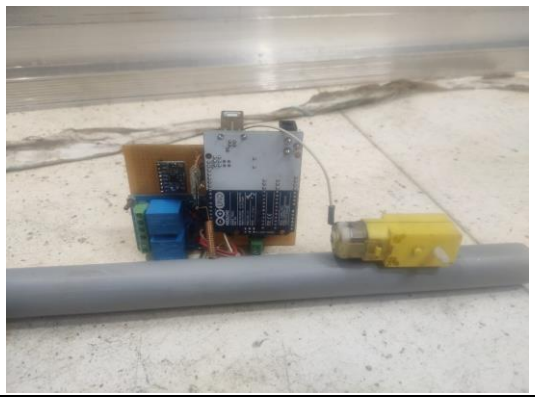
STUDENT PROJECT SYNOPSIS FOR THE

46th SERIES OF STUDENT PROJECT PROGRAMME

1.	**Name of the College: AMC Engineering college**
2.	**Project Title: Design and development of self-balanced long poles(dhoti) for agricultural harvesting**
3.	**Branch: M-tech in Machine design**
4.	**Theme (as per KSCST poster): (The project proposals shall mandatorily be from one of the broad themes / areas. Visit website www.kscst.org.in/spp.html)** **Automation or new concepts in agriculture (cultivation, raising crops, irrigation etc.)**
5.	**Name(s) of project guide(s):** **1. Name: Prof. Prof. Dr. Girish C** **Email id: drcg3105@gmail.com** **Contact No.: 9880959000** **2. Name: Prof. Mr. Madhumohan R** **Email id: madhu.mohan2526@gmail.com** **Contact No.: 7975011123**
6.	**Name of Team Member** **Name:Prajwal.KN** **USN No.:1AM21MMD04** **Email id: prajwalkn98@gmail.com** **Mobile No:9482675522** 

7.	**INTRODUCTION:** **In a total production of areca nuts 80% of it from Karnataka and 50 lack peoples are depending on the crop. A carbon fibre reinforced telescopic pole is widely used in areca nut harvesting and for spraying fungicide during the rainy season. It has become a solution for areca nut harvesting and spraying due to its lower density of about 1.6gm/cm3, resulting in a decreased weight of the product and increased specific strength of 50x compared to steel.** **It requires trained personnel for effective working because as the length of the telescopic pole increases, the slenderness of the pole also increases. Due to this, it becomes tough to concentrate on a specific target. Also, due to deflection, it exerts a large eccentric force on the bottom of the pole, and it requires a lot of effort from the operator to bring back the deflected pole tip to the target position and neutralize the eccentricity. Skilled personnel currently spend more than 50% of the total time handling the pole, and one skilled operator can harvest a maximum of 1000 areca bunches per day using the existing pole.**
8.	**Objective:** **objective is to develop a system for the same pole that decreases or controls the amount of slenderness, so the pole can be easily handled by any person, eliminating the requirement of skilled personnel. Additionally, by using this system, the productivity of harvesting the number of areca bunches can be increased to around 1500 per day..**
9.	**Methodology:** • **As the length of the pole increases, so does the slenderness due to the force acting on the tip of the pole. Currently, companies are trying to reduce slenderness by increasing the thickness of the pole. However, this approach does not eliminate the problem and results in increased weight.** • **We Placed a gyroscopic sensor at the tip of the pole to measure the amount of deflection from the initial position. By providing a required reaction force in the opposite direction of bending achieved with the help of Reaction wheel through the rotation of a DC motor, the bending force gets neutralized.** 

10.	**Expected Outcome of the project:** **We used Poly vinyl carbonate-U (PVC-U) pipe as a substitute for carrying out the experimentation and demonstration due to Budget constraints as Actual carbon fibre dhoti costs Around 60000/- to 75000/-.** **The gyro setup placed at the tip creates a reaction force to counteract the bending force acting on the pole, thereby controlling the eccentricity. This makes the pole easier to handle and helps the operator to concentrate more accurately on the target area. As a result, it can be handled by anyone and reduce the harvesting time for 100 branches will recurs 6hrs to 1hr , eliminating the requirement for skilled personnel. Additionally, this system increases productivity by enabling the harvesting of more areca bunches per day.**
11.	**Innovation in the Project:** **Actual available dhoti in the market is purely mechanical element which buckles while carrying out Harvesting and Spraying. However various companies are trying to vary thickness, lock design etc. which giving very minimal changes in the Result.** **We incorporated some electronics into the pure mechanical member which largely improved the effectiveness of the dhoti by decreasing the buckling.**
12.	**Scope for future works:** • **The Model we used for this project is PVC-U pipe instead of carbon fiber dhoti due to budget constraints, which has to be tested for actual product in the future.** • **Electronics has to be made water proof and more reliable once it is fixed into carbon fiber dhoti.** • **Currently the PVC-U dhoti can balance only in one axis, it is necessary to incorporate 2nd Axis control for the practical application.** • **As the PVC-U height we limited to 20 feet due to its low youngs modulus of about 2.7Gpa, the weight and sizing of the reaction wheel has to be Re-designed once it is incorporated to carbon fiber dhoti.** • **The consumption of Battery in actual field testing needs to be determined.**