


Design and Development of Camera Stability Device for Photographers		 Nilesh Parpalliwar Dp.nilesh@gmail.com Ph. No: +91 8007336948	
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Abstract:

Photography is an old but fascinating field of art work. An increasing number of people are trying out photography as a hobby or as a secondary means of income. In photography, the following elements come into picture such as user, camera, scene and supporting accessories. A wide range of products are available such as the Tripod and Monopod, which plays a major role in stabilizing the camera while shooting and provides better stability during a photo shoot. From the results of the research carried out, it became clear that in photography tripod was the most essential accessory after camera but it also presented a lot of problems. The present variants of tripods are cumbersome to transport and have problems with storage, carrying and handling. The Tripod's physical design and working is quite complicated, thus making it less user-friendly.

To find a suitable solution the design process started with understanding user behavior and different ways of holding a tripod head during a shoot. Multiple design iterations later a hand held head device was designed appropriately after extensive ergonomic study. Subsequently a mock up model was prepared for better understanding of form and its function.

A 1:1 scale working prototype was developed from the final concept to validate the design. Product validation was carried out by trying photography with the help of the designed product and the feedback obtained was positive and the results were satisfactory having the target users as amateur photographers (age 18-30 years, urban user).





Figure 1. 1 Event Photographer



Figure 1. 2 Photojournalist and Amateur photographer.

Figure shows the all four focused areas of photography

1.5 Aim:

The aim of the project is to design and develop user Friendly Camera stability system for DSLR, focusing on the amateur photographer's user group and reduce its setup-time. A camera tripod can make a huge difference in the sharpness and overall quality of photos. It enables photos to be taken with less light or a greater depth of field, in addition to enabling several other special features.

Table 3. 2 PDS for camera stability device

PDS for Camera Stability device (Tripod)		
Sr. No	Factors	Specifications
1	Product Name	Multi pod
2	Area of use	Photography
3	Target customer	Amateur photographer
4	Features	Quick release, less setup time
5	Material	Plastic, die cast for head Legs- extrusion Aluminium pipe Joints- Aluminium Grip- ABS
6	Maintenance	Yearly once
7	Aesthetics	Visually reliable
8	Life span	5 to 6 years
9	Cost	3000+INR
10	Ergonomics	Gripping, reach of control, comfort
11	Competitors	JOBY, Cotton carrier
12	Quality	Durable, sturdy, strong
13	Manufacturing process	Injection molding, Aluminium extrusion
14	Safety	Safeguard the camera
15	Process manufacturing	Molding, die casting, CNC machining
16	Mounting	Multi-functional, ground, shoulder mount

4.4 Concept Selection Pugh’s weightage ranking method:

Table 4. 1 Pugh’s Weighted Ranking Method

Concept Scoring		Concept 1		Concept 2		Concept 3		Concept 4	
		Rating	Score	Rating	Score	Rating	Score	Rating	Score
Usability	30%	5	1.5	2	0.6	2	0.6	2	0.6
Flexibility	40%	5	2	3	2.5	5	2.0	5	2
simplicity	10%	3	0.3	3	0.3	2	0.2	3	0.3
Reliability	10%	3	0.3	2	0.2	2	0.2	2	0.2
Aesthetics	10%	4	0.4	2	0.2	2	0.2	4	0.4
Total Score		4.5		3.5		3.2		3.1	
Ranking		1		2		3		4	
Decision		Develop		Discard		Discard		Discard	

Four concepts were created by keeping PDS in mind. Now in Weightage ranking method selected four concepts are compared and rated within themselves. Pugh’s method is adopted for selection of most feasible concept by evaluation. The parameters which are very critical for concept design were listed and parameters were given importance rating within themselves.

The concepts with maximum points were selected and rated higher. Here in above table it can be seen concept one has higher points.

4.5 Test Prototype:

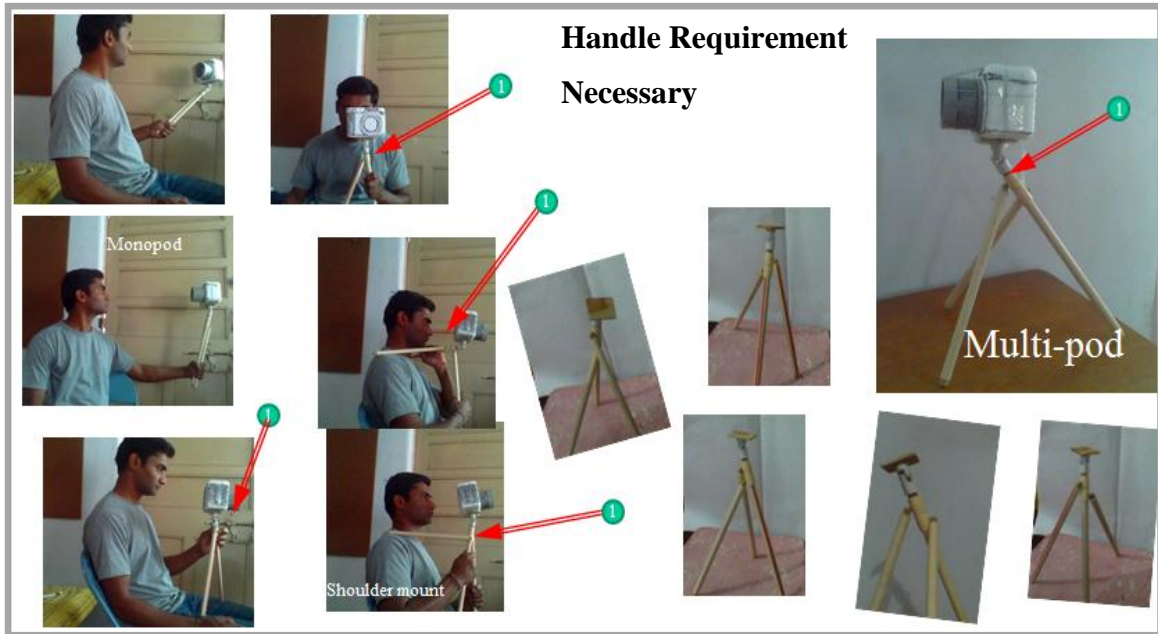


Figure 4. 10 Test prototype

A test prototype was made to give batter understanding of concept which is finalised. Prototype was physical representation of finalised sketch to collect feedback from user, for better understanding of project either going in right direction or not. After analysing test prototype it is concluded, there is need to provide a hand grip to have firm grip over tripod. So some concepts are generated for grip.

4.5.1 Result of Test Prototyping:

Test prototype was made after finalizing the concept. Shortlisted concept was in the form of sketch so for user it is difficult to understand the practical use of concept. Test prototype was developed with the use of PVC piping. Test prototype was just a physical representation of finalised sketch. A video was made which was showing, how new concept do batter work than existing one. From this video lots of feedback and suggestions were received.

6 - Final Concept Detailing

6.1 Final Concept Modification:

Final concept was generated with consideration of all parameters of design process, like mood board, user study, market study and ergonomics study. During test prototyping and its testing user suggested some modifications and things to consider while finalizing of concept. Those are visual reliability, good material, support for hands in case overhead videography or photography and safe and firm grip.

6.1.1 Final Concept Detailing:



Figure 6. 1 Final concept rendering

6.1.2 Concept Generated for Visualize Joints:

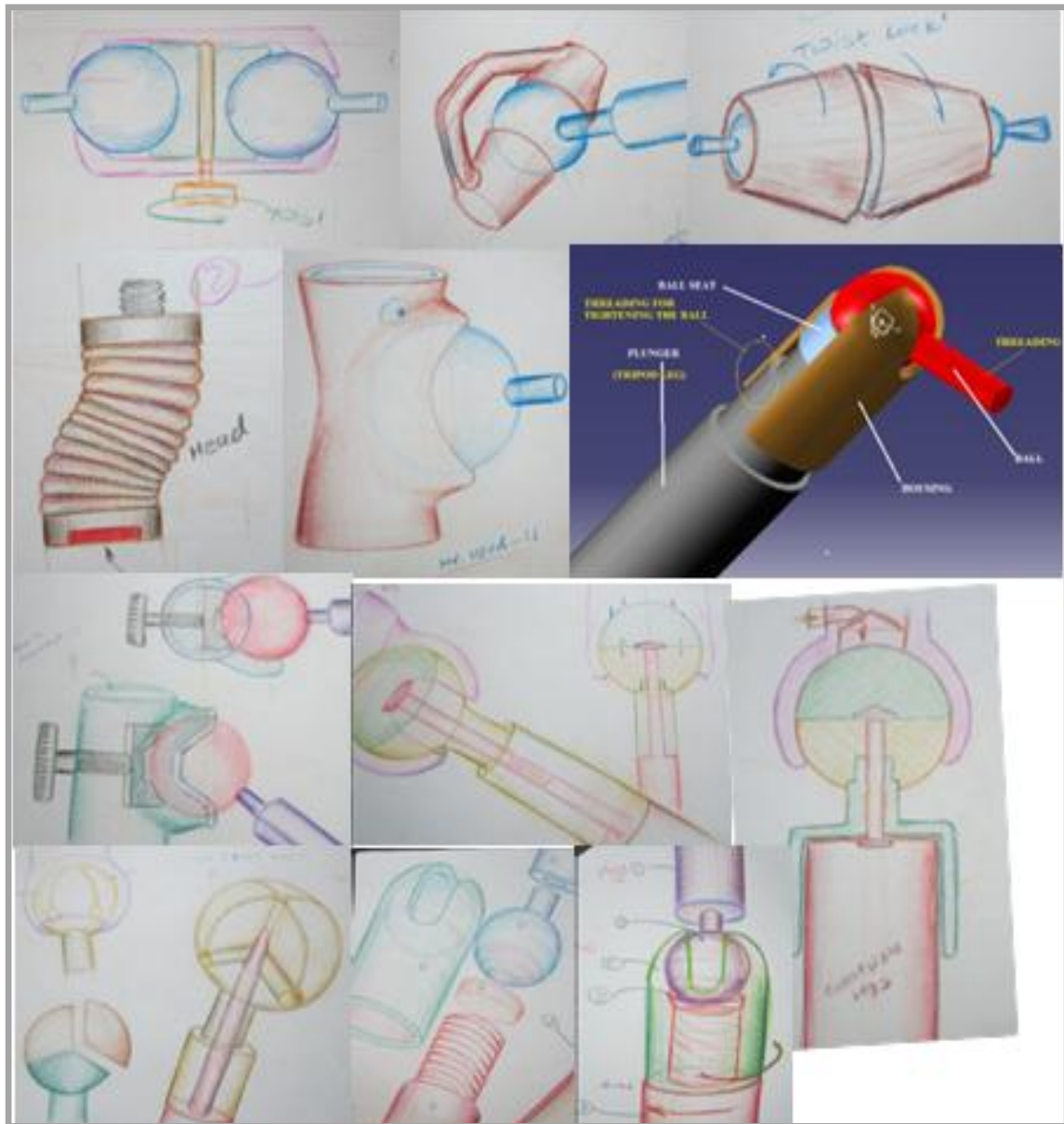


Figure 6. 2 Concept generation for visualization of joints

Concept was generated to visualise tripod joints. To reduce setup time of camera there is need to reduce the setup time by minimising number of activities during setting of camera. So single twist lock mechanism was developed to reduce setup time. This is a key feature in designing of multi pod.

6.2 Dimensional Detailing:

6.2.1 Dimension of Cup and Bolt:

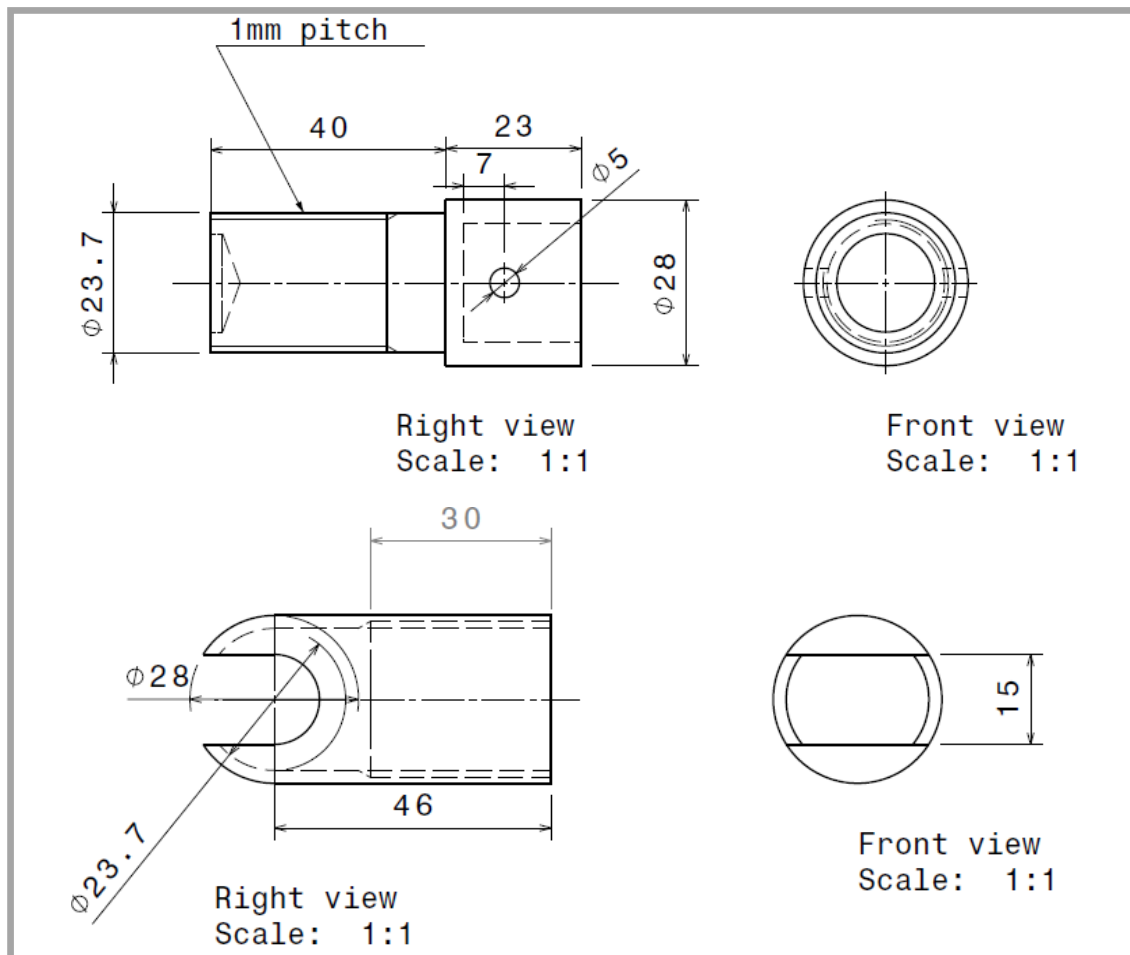


Figure 6. 3 Dimension details of joint

6.2.2 Ball Joint:

Ball joint shown in figure number 6.3 is the key element of this product. This ball joint was developed with the help of ball joint mechanism. This newly developed joint was introduced to reduce camera setup time. This joint is fitted in between tripod head and legs. This joint allows tripod to move in any angle and photographer can make any combination while photo shoot.

6.2.3 Digital Representation of Hand Grip:

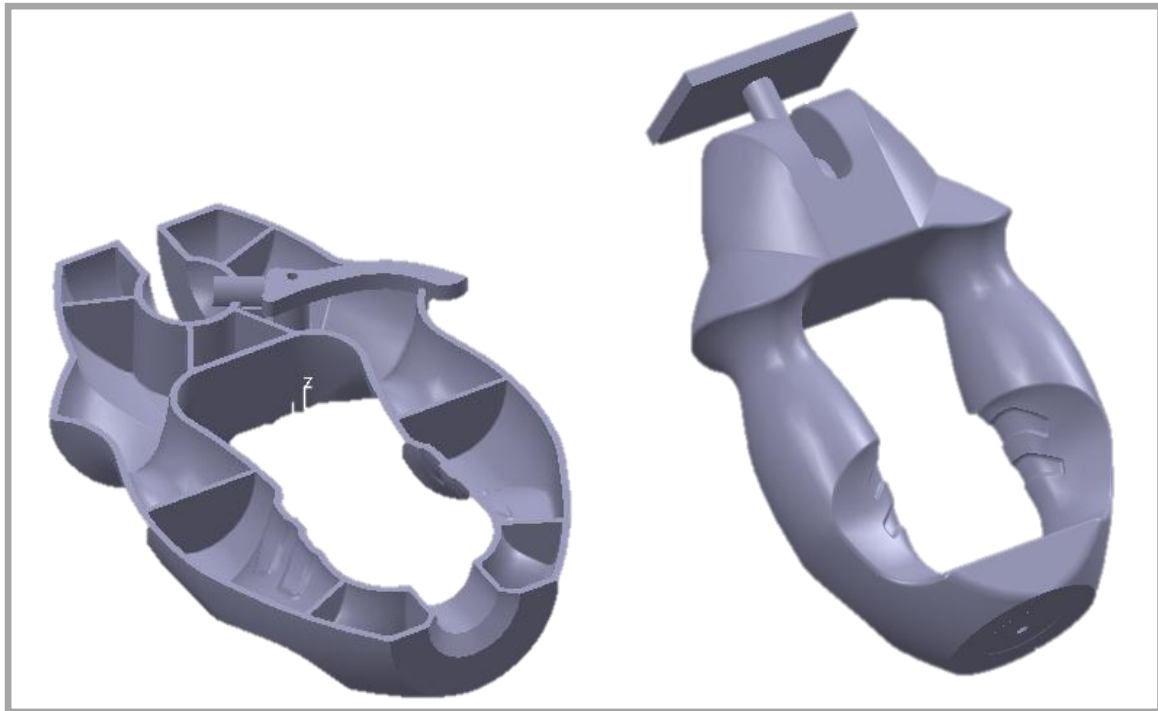


Figure 6. 4 3D modelling of hand grip

All CAD drawings are created in CATIA V5 R20, ball joint are manufactured with accurate dimensioning. Hand grip is hand carved out of MDF material with visual symmetry. 3D model was prepared for injection moulding.

7.1.2 Model Making in MDF:

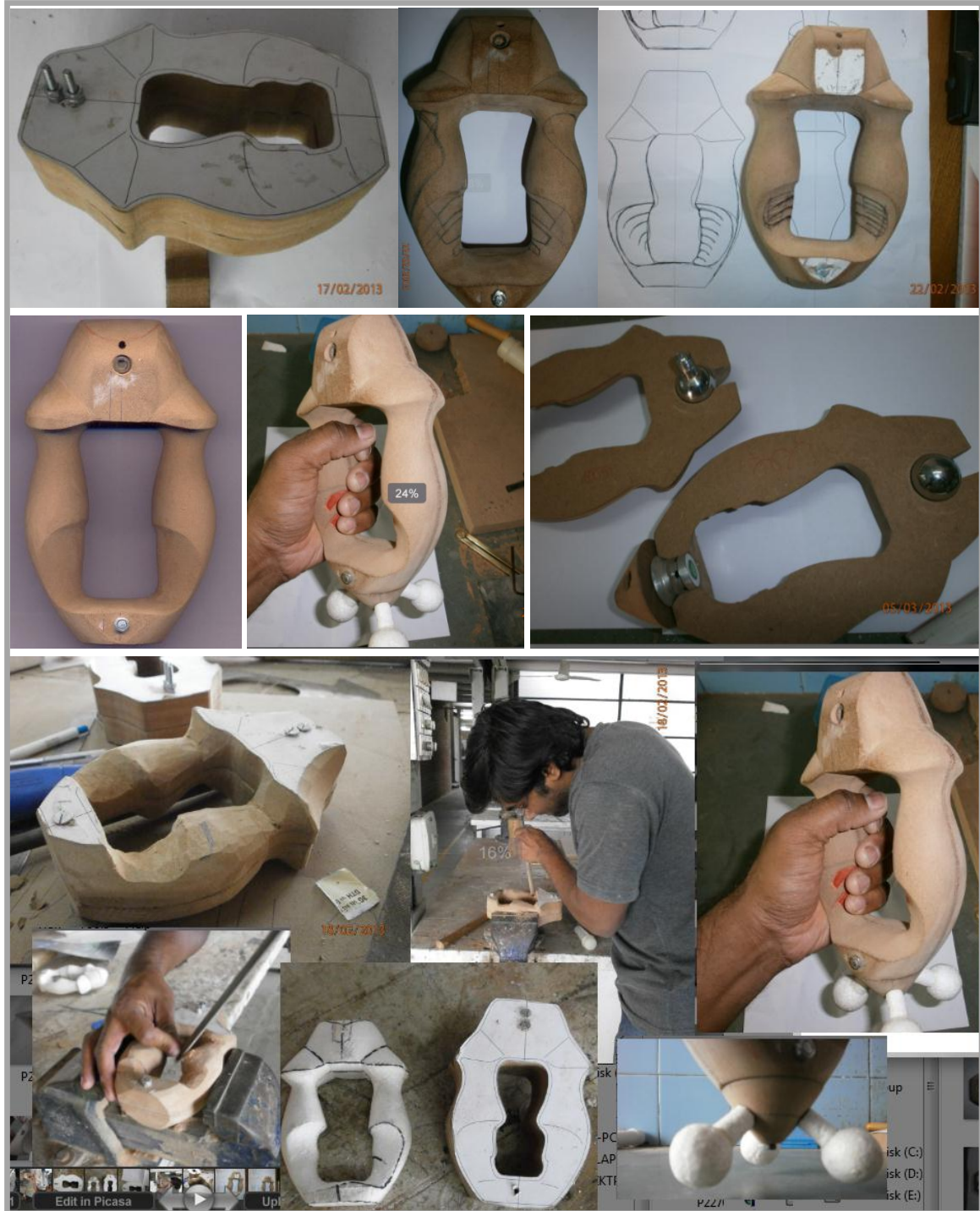


Figure 7. 2 Model making in MDF

8 - Conclusion

8.1 Summary:

Concepts were developed based on PDS generated and the final concept was selected by weighted ranking method. Study models were prepared at every stage to obtain user feedback and ensure that the design process was moving in the right path. To achieve this result, different materials like thermocol, MDF Board and synthetic clay were used.

A 1:1 working prototype was developed concentrating on reduction in setup time. To achieve this, a totally new joint was introduced in the tripod leg that reduced the number of operations required to setup the tripod.

The logic behind this concept was to provide full freedom to the photographer while shooting. This product eliminated constraints and limitations for the user. The existing tripod legs with highly engineered flexible joints and precisely manufactured components were adopted for final product.

8.2 Conclusion:

The project research focused on the field of photography and its accessories. During the research process, interacting with photographers gave a better view and cleared most of the doubts regarding photography. Further during the research stage, product study, market study and user behaviour study was also done. The market study included survey of the various competitor brands, pricing and quality.

8.3 Recommendation for Future Work:

1. Introduction of an improved quick release mechanism that would help in reducing the setup time.
2. Design and development to be carried out for locking mechanism and ball head for fixing the camera.
3. Introduction of an improved quick release mechanism that would help in reducing setup time.