WEBCAS (WEBCAM BASED CLASSROOM ATTENDANCE SYSTEM)

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OBJECTIVES OF THE PROJECT

- To take attendance of a class with known strength and dimensions using webcams and to develop a hardware software interface for the same

DESIGN METHODOLGY

- The project involved taking pictures of a classroom using webcams and analyzing them. The image processing software used for this purpose was OpenCV.

ABOUT OPEN CV

- (**OPEN** Source **C**omputer **V**ision) is a library of real-time computer vision routines from Intel. It was first released in 2000, and is used in applications such as object, face and gesture recognition, lip reading and motion tracking.

METHOD USED…

- We decided to divide the classroom into two distinct parts, with one webcam being allotted for each part.

DIAGRAM 1
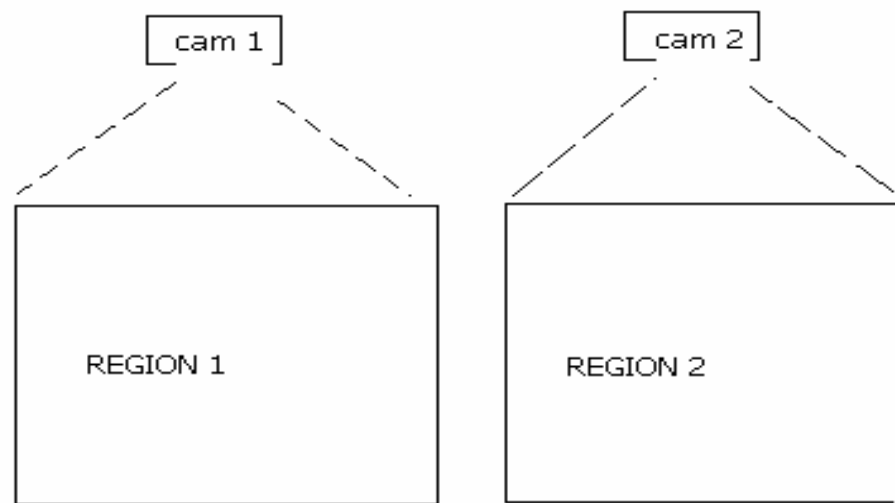
METHOD (CONTD)

- To take attendance the photographs taken were first converted to grayscale.

- Masks were then generated of each student in the classroom.

- On multiplying the mask with the original grayscale image, an individual student's photograph was recovered.

METHOD (CONTD)
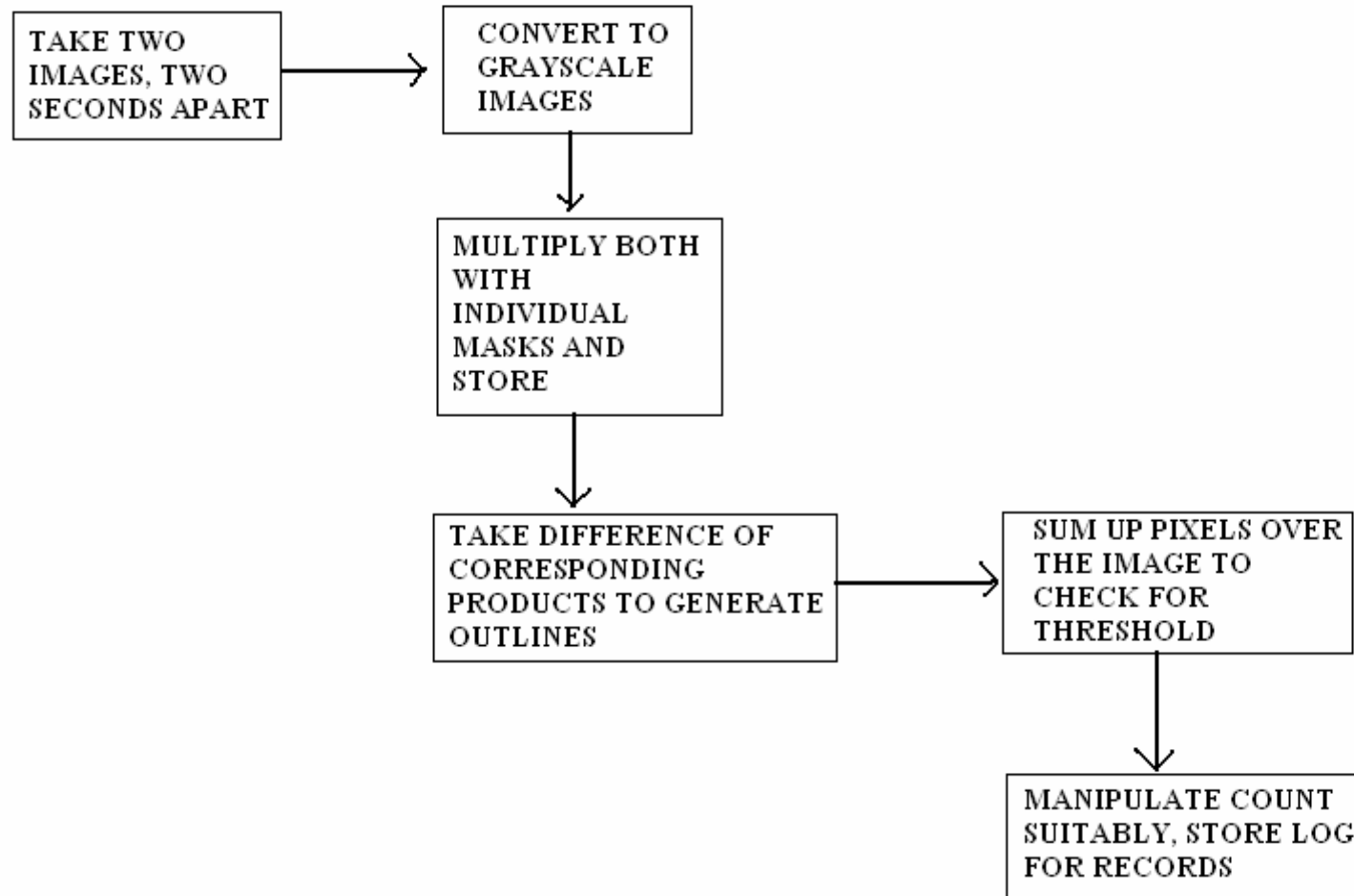
- We utilized the fact that humans almost always move in an interval of time. As a result, two photographs taken within a small interval, on subtraction would yield the outline of a human face.

- Thus, two photographs are taken from each camera, 2 seconds apart in time.

- Both these images are converted to grayscale and multiplied with masks. Corresponding results are then subtracted.

METHOD (CONTD)

- A suitable threshold was assigned to the value of the sum of pixels in the subtracted image (taken as 0.0001 based on empirical evidence)

- Exceeding the threshold means the presence of a human face in the photograph.

- Finally, the no. of faces is counted and stored.

FLOWCHART

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┌─────────────────┐        ┌─────────────────┐
│ TAKE TWO        │        │ CONVERT TO      │
│ IMAGES, TWO     │ ─────► │ GRAYSCALE       │
│ SECONDS APART   │        │ IMAGES          │
└─────────────────┘        └─────────────────┘
                                    │
                                    ▼
                           ┌─────────────────┐
                           │ MULTIPLY BOTH   │
                           │ WITH            │
                           │ INDIVIDUAL      │
                           │ MASKS AND       │
                           │ STORE           │
                           └─────────────────┘
                                    │
                                    ▼
           ┌──────────────────────────┐        ┌──────────────────────┐
           │ TAKE DIFFERENCE OF       │        │ SUM UP PIXELS OVER   │
           │ CORRESPONDING            │ ─────► │ THE IMAGE TO         │
           │ PRODUCTS TO GENERATE     │        │ CHECK FOR            │
           │ OUTLINES                 │        │ THRESHOLD            │
           └──────────────────────────┘        └──────────────────────┘
                                                         │
                                                         ▼
                                               ┌──────────────────────┐
                                               │ MANIPULATE COUNT     │
                                               │ SUITABLY, STORE LOG  │
                                               │ FOR RECORDS          │
                                               └──────────────────────┘
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REQUIREMENTS AND ASSUMPTIONS

- Ideally, a photograph of the entire class for purposes of reference (for creation of masks).
- Suitable illumination.
- It is assumed that the students always sit at the same place in their classes.

SAMPLES

- The following slides show a sample of our implementation. These contain the original images, the converted grayscale photographs, the mask, the results of multiplication and the difference operations.
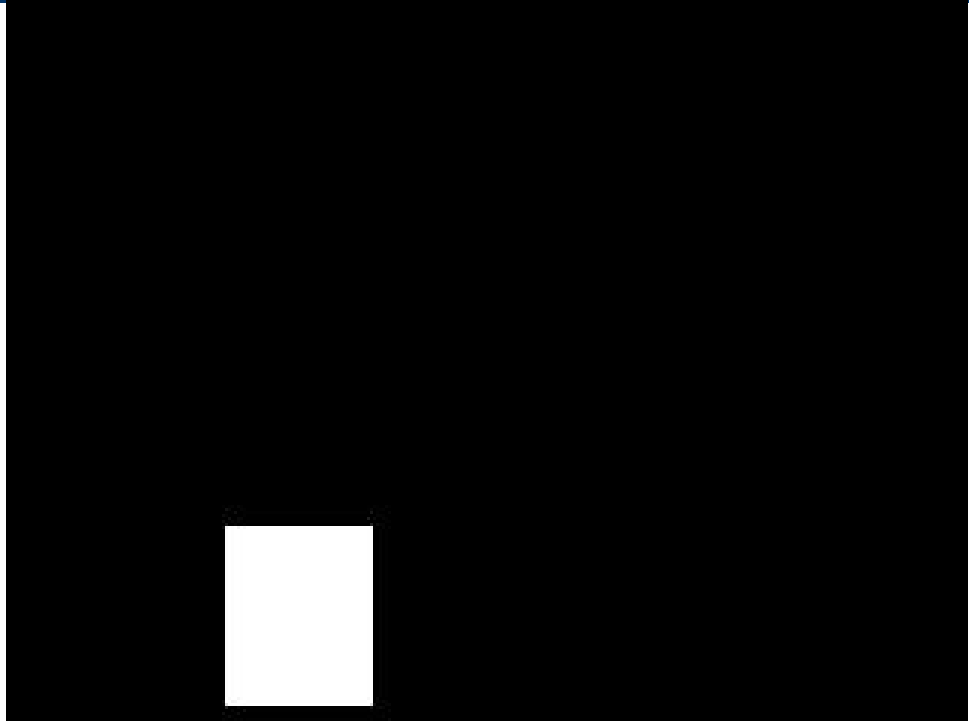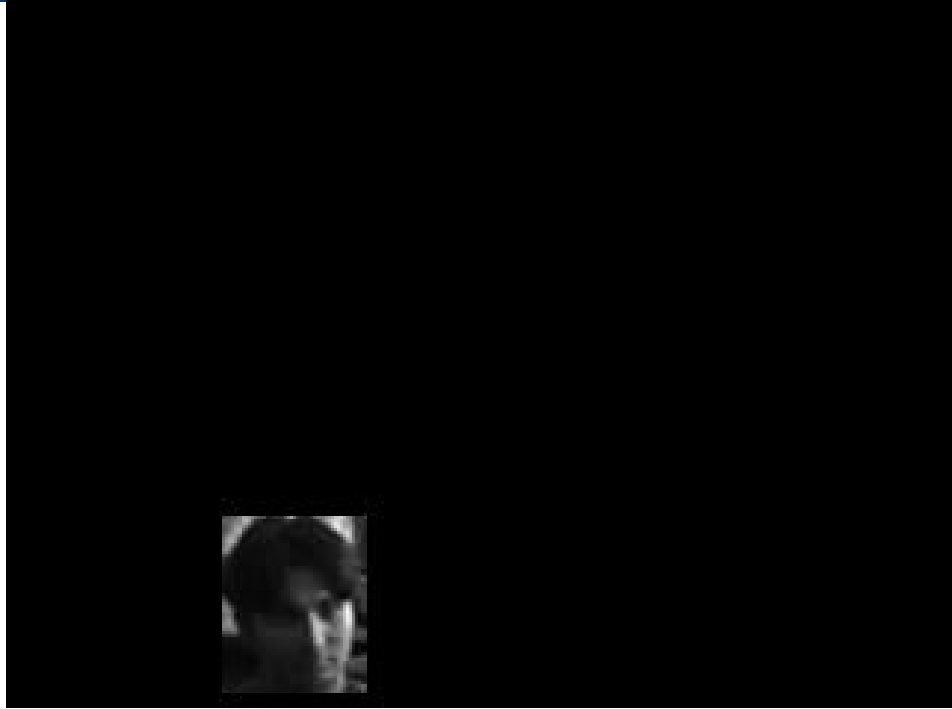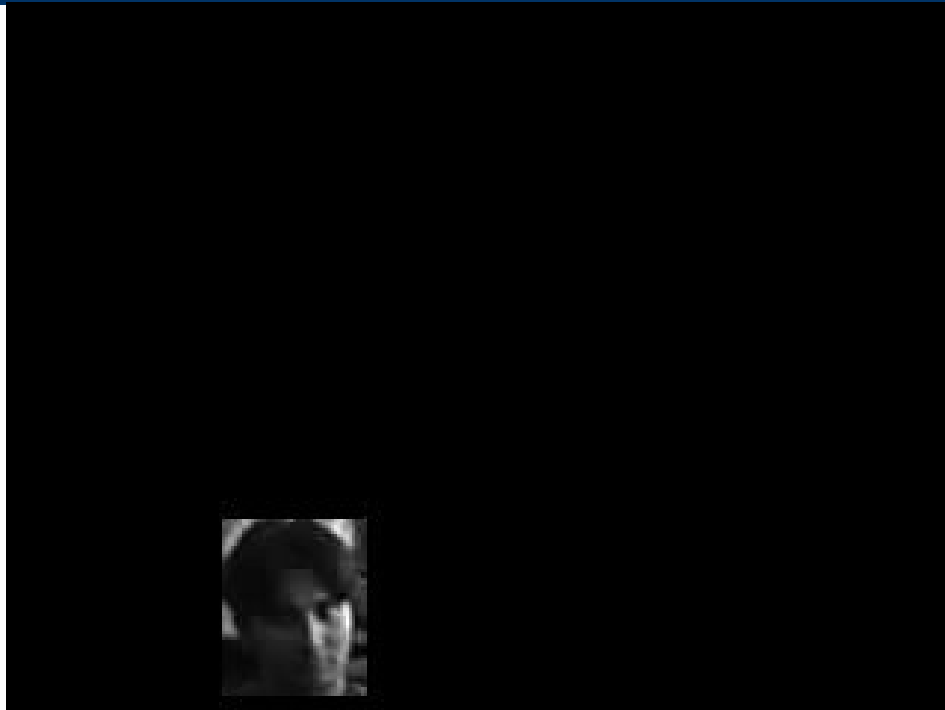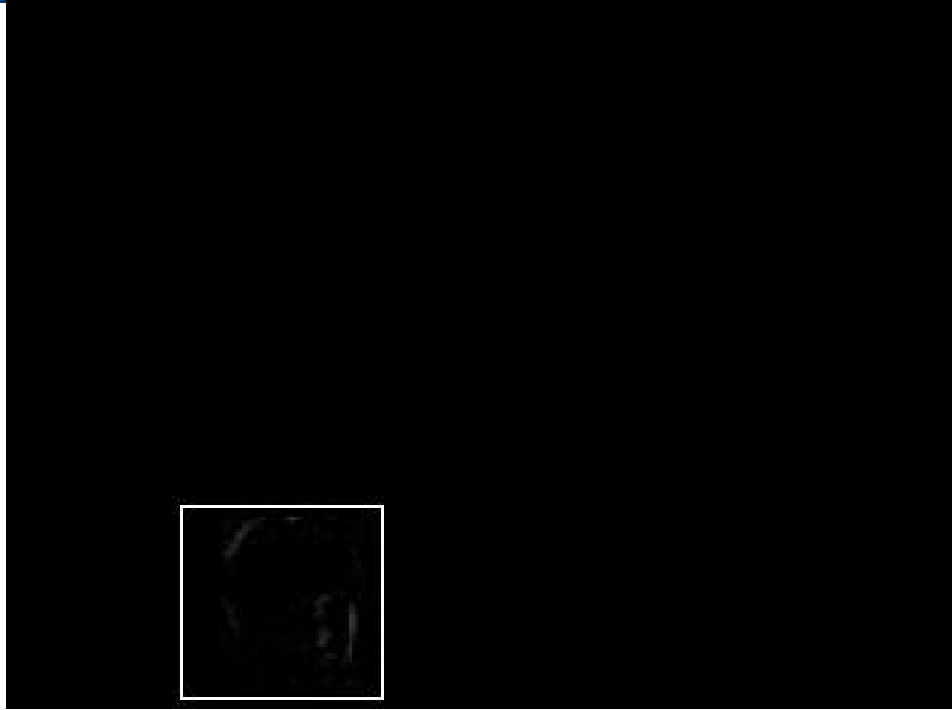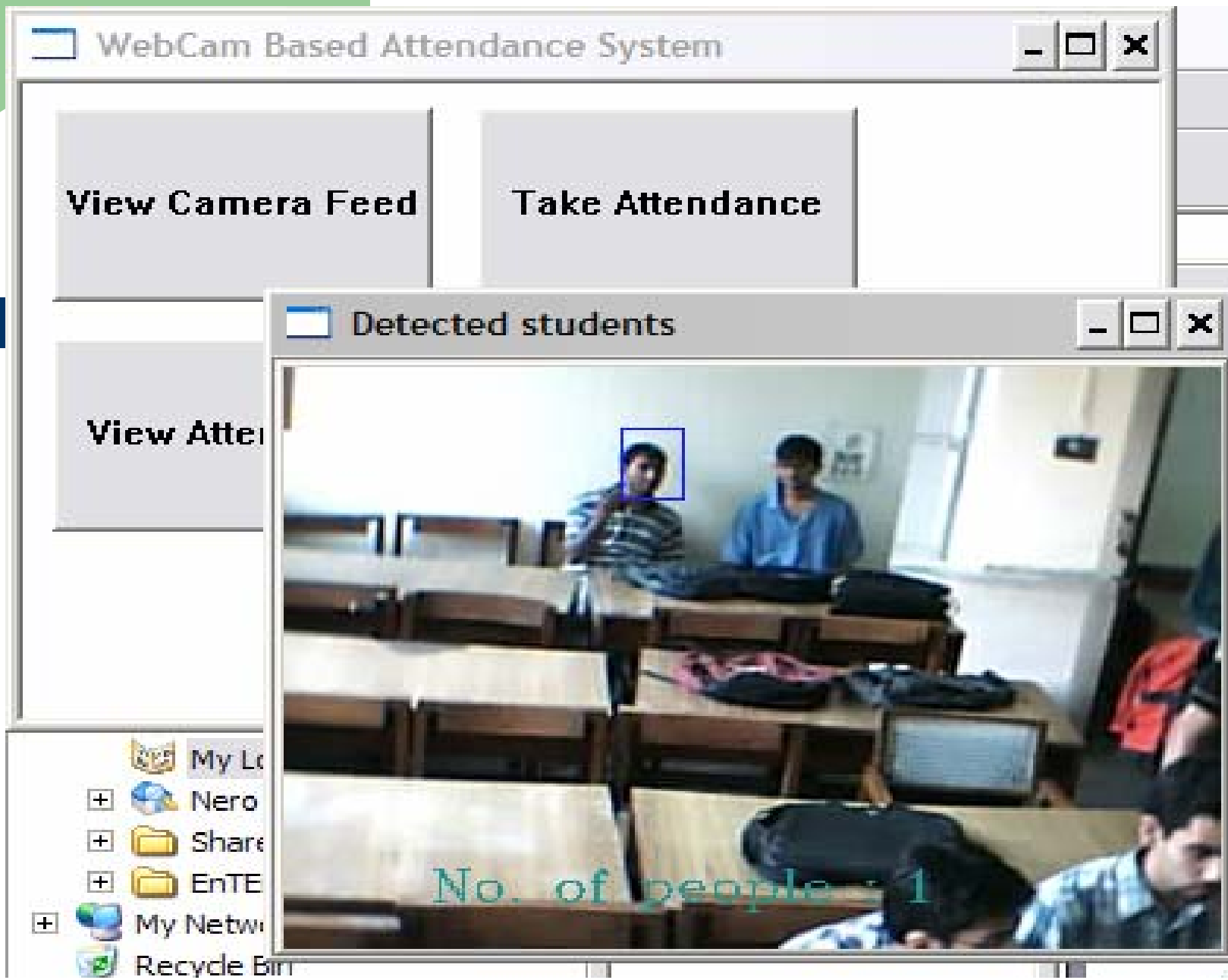
HARDWARE USED

- Logitech Quick Cam Easy webcams (2) with still resolution of 1.3 MPixel, video of 320x240 at 30fps.

- Wooden stands made for purpose of fixing the cameras in their desired positions.

STRENGTHS OF THE SYSTEM

- Extremely simple and user-friendly
- Does everything with a few clicks
- Creates attendance logs for future reference
- Can also be used for live CCTV feed if needed

SUGGESTIONS AND LIMITATIONS

- More rigid supports for the cameras would be extremely beneficial
- OpenCV does not recognize two cameras at a time

COSTS UNDERTAKEN

- 2 webcams : Rs 3400/-
- 2 clamps : Rs 250/-
- 2 connecting cables : Rs 50/-
- Miscellaneous : Rs 250/-

ACKNOWLEDGEMENTS

- We would like to thank Prof Ajay Kumar Pathak for his constant (though strict) support and guidance throughout the project.