Lecture-Track Software

Project Requirements / Specifications

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Objectives and Background

The Lecturer-Tracker software is designed to maintain a visual of the professor giving a lecture at during the designated meeting times during a class. The software eliminates the need for human intervention in camera control, and fully automates the process of tracking the professor.

1. Target platform: Windows 7 64 bit
2. Vaddio Camera System
3. Vaddio A/V bridge
4. Computer will connect to camera via Telnet
5. OpenCV is implemented for frame analysis on video feed for a professor
6. Pan and tilt camera to follow professor as they walk around the room
7. Zoom in/out so that the professor fills ⅓ of the frame
8. If the professor unexpected leaves the frame then, recover by panning in last known direction

1. Commands

The software will have a graphical user interface (GUI) responsible for sending two manual commands capable of controlling the initialization and halting of the algorithm. The start command and a stop command is incorporated in the GUI as their respective symbols, right-facing triangle and a square. No other interfacing is required.

1. Start
   a. The start command will occur when the start button is single-clicked.
   b. This will run the algorithm that will automatically maintain the subject within the frame of the camera.
   c. The professor does not need to be within the frame when the start button is clicked, but is recommended to more efficiently begin tracking

2. Stop
   a. The stop command will occur when the stop button on the user interface is manually single-clicked or pressed.
   b. This will halt the algorithm, allowing manual control of the camera to resume without interruption by the algorithm.

2. Automated Commands

The Lecturer-Tracker software generates specific commands to maintain a visual existence of the professor within a subframe created by the tracking frame of the camera. In doing so, there are different commands generated that maintain the necessary view using the VISCA camera control protocol:

1. Pan Left <camera pan left 'speed 1-24'>
2. Pan Right <camera pan right 'speed 1-24'>
3. Tilt Up <camera tilt up 'speed 1-24'>
4. Tilt Down <camera tilt down 'speed 1-24'>
5. Zoom In <camera zoom in 'speed 1-24'>
6. Zoom Out <camera zoom out 'speed 1-24'>

3. Expected Operation

The software will track a subject near the front of the classroom using computer vision algorithms, and issue commands to the VADDIO camera using the RS232 protocol. The software will track the subject for long periods of time (i.e. duration of lecture) without human intervention. It will have robustness to occlusion (subject is obscured by another person, etc.) and be able to recover if it loses tracking.

The software will adjust the camera when necessary to maintain a view of the person in focus. This will include zooming (in and out), panning (left and right) and tilting (up and down) in order to fill roughly 33% of the frame with the professor.

4. Features/Methods

1. Person Detection

   A frame is generated, based on the recognition algorithm chosen, about the person in focus. The person is recognized by the software based on specific human features.

2. Person Tracking

   After a frame is generated the frame follows the movement of the person in focus using the generated frame. Tracking uses known features of speed and direction of the person in focus. This decreases the amount of time taken to follow the person, and allows a known location to be maintained even when features are occluded from detection.

5. Assumptions

1. Only one person is required to be tracked at a given time.
2. Utilize only the camera on the back wall to track
3. A professor has the necessary facial/body features to be tracked by the facial/body recognition software.

Visuals
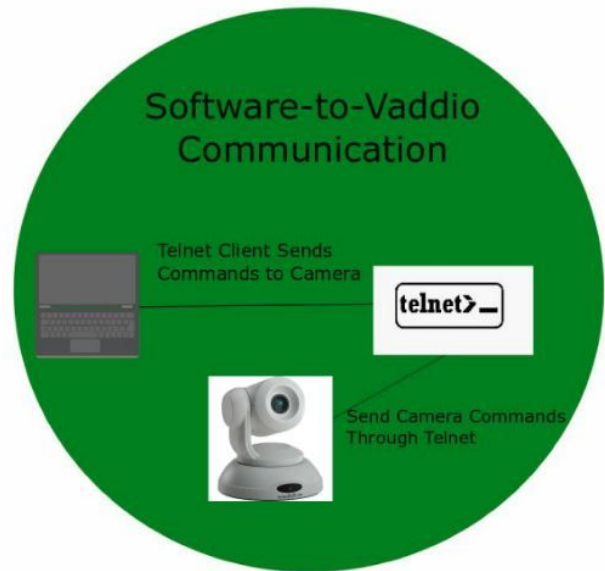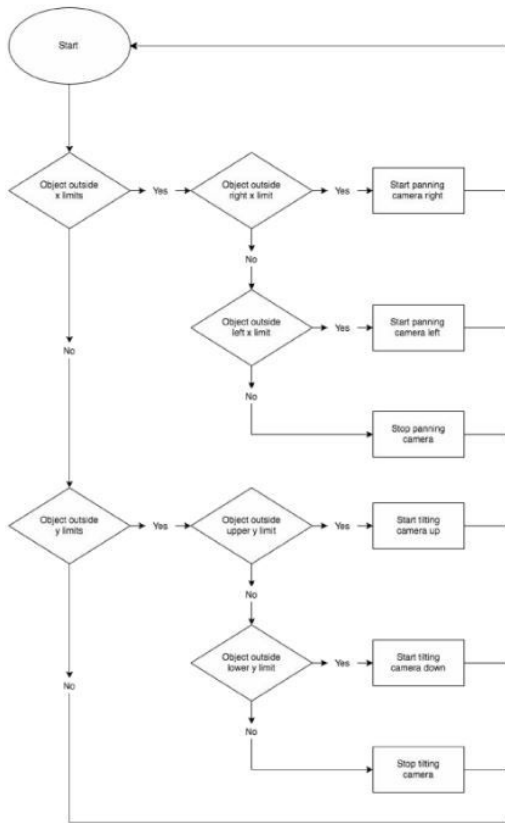
Lecturer-Tracking Project Agreement and Statement of Work

This Project Agreement and Statement of Work is designated for the production and delivery of the Lecturer-Tracking Software. This software will be designed to limit the need of manual inputs from human beings and automate a majority of the lecturer tracking necessary for generating video recordings for distance education students and archives.

THIS PROJECT AGREEMENT AND STATEMENT OF WORK (this "Agreement") is entered into by and between the undersigned Buyer and Service Provider as of the Effective Date. The Buyer and Service Provider are sometimes referred to collectively herein as the "Parties" and individually as a "Party." This Agreement is made in pursuance of the Project described herein.

1.   BACKGROUND AND INITIAL OBLIGATIONS.

1.1   The "Buyers" are:

Legal Names:	**Matthieu Ostrander, Andrew Tibor**
Organization:	**University of Alaska Anchorage**
Jurisdiction of Organization:	**University Efficiency**

1.2   The "Service Providers" are:

Legal Names:	**Henry Thomas, Devon Olson, Tevin Gladden**
Type of Legal Organization or Proprietorship:	**University**
Jurisdiction of Organization:	**Education**
Address of Principal Place of Business:	**3211 Providence Dr, Anchorage, AK 99508**

1.3   The "Project" is:

Project Name:	**Automated Lecture Tracking**

1.4   **Milestone Deliverables. The Parties will submit the following "Milestone Deliverables," "Delivery Dates," and "Amounts" in the Web form at the "Business Terms" page for the Project on the Site:**

Milestone Deliverable	Delivery Date
1. Integrate OpenCV	9/25
2. Integrate Telnet	10/03
3. Pan/Tilt Camera	10/10
4. Implement Tracking Algorithm	11/04
5. Test in Lecture Hall	11/14
6. Deploy Software in Control Room	11/24
Final Delivery Date & Amount	Dec 1, 2017

1.5   **Statement of Work. If Buyer and Service Provider have agreed to a written statement of work, written project plan, or other written communication to specify in more detail the Project scope, required features or functionality, deliverables, milestones, development methods, resources, communications, training, acceptance, change control, payment, or other terms, such writing ("SOW") is incorporated in and made a part of this Agreement. The SOW may be appended to this Agreement as an Attachment.**

1.6   **Private Message Board; Upload. Service Provider will upload a true and correct copy of both this Agreement and any SOW as fully executed, to the "Private Message Board" for the Project at the Site. Buyer will consult the Private Message Board to confirm that the Agreement and any SOW posted on the Private Message Board are true and correct as fully executed. By entering into a course of dealing with each other in connection with the Project, Service Provider and Buyer are contractually agreeing to the terms and conditions of this Agreement, the Business Terms, and any SOW as posted on the Private Message Board, and to the further terms and conditions of the Terms of Service.**

1.7   **Escrow. The Parties   [__]will / [__]will not   require "Escrow" in the Business Terms for the Project. If Escrow is required, the Escrow Terms and Conditions contained in the Terms of Service will govern this Agreement.**

2.   **ENGAGEMENT AND PERFORMANCE OF SERVICES.**

2.1   Project Work Product. Buyer hereby engages Service Provider to deliver the Work Product to Buyer, and Buyer will pay Service Provider for the Project Work Product, in accordance with the terms and conditions of this Agreement and the Terms of Service. As used in this Agreement, the "Work Product" means any and all work product developed by Service Provider as required to complete the Project and delivered to the Buyer in the performance of the Project, as specified in the Business Terms, the SOW, and this Agreement.

2.2   Performance. Service Provider will perform the services necessary to complete the Project in accordance with the procedures described on the Site, in a timely and professional manner, consistent with industry standards, at a location, place and time that Service Provider deems appropriate, and all in accordance with the Business Terms, the SOW, and this Agreement. The manner and means that Service Provider chooses to complete the Project are in Service Provider's sole discretion and control. In completing the Project, Service Provider agrees to provide its own equipment, tools, and other materials at its own expense.

2.3   Duration of Services. The duration of performance of services under this Agreement commences on the Effective Date and terminates on the Final Delivery Date set forth in Section 1.4 above, unless the Parties otherwise agree in a writing signed by both parties and uploaded to the Private Message Board

2.4   Change Control. "Provider" will provide "Buyer" project management with comprehensive status reporting on a regular basis. These reports will indicate the work activities performed, progress against project milestones, as well as any expenses incurred in the furtherance of this work to date.

Material deviations from the baseline scope and budget documented herein will be mutually reviewed and agreed by Provider and Buyer. The following provides the process to be followed for any such material change to the SOW:

1.   A Change Request ("CR") will be the vehicle for requesting a change to the SOW. The CR will describe the change, the rationale for the change, the impact on the implementation timeline, and the impact on the Compensation. Both Provider and Buyer may initiate a CR.

2.   The designated Project Manager of the requesting party will review the CR and determine whether to submit the CR to the other party.

3.   Both Project Managers will review the proposed CR and either approve for further investigation or reject. Provider may specify additional charges for such investigation. If the investigation is authorized, the Project Managers will sign the estimation portion of the CR, which constitutes authorization for the investigative changes. The investigation will determine the effect that the implementation of the CR will have on compensation, schedule and other terms and conditions of the Agreement.

4.   A written CR must be signed by both Buyer and Provider to authorize implementation of the CR

SIGNATURES

BUYER 1: _____**Signature**   _____**Date**

BUYER 2: _____**Signature**   _____**Date**

SERVICE PROVIDER 1: _____**Signature**   _____**Date**

SERVICE PROVIDER 2:: _____**Signature**   _____**Date**

SERVICE PROVIDER 3:: _____**Signature**   _____**Date**