THE STEPHEN B. KLEIN FACULTY OF AEROSPACE ENGINEERING

Guidance, Navigation, Control
Autonomous Systems
Human-Machine Interfaces

OPEN POSITIONS AND ON-GOING RESEARCH

Autonomous Vehicles

Research Fields	Optimization, Planning, Simulation, Agent Based Modeling (ABM)
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	Coordinated Operation of a Fleet of Autonomous Taxis
Status	Open Position

Given 20-30 autonomous vehicles operating in an urban environment, the challenge is to coordinate their operation such that the customers' waiting time and travel time to destination is minimized. This task involves many aspects and de- pends on the information available to the planning center, which issues desired routes to the vehicles. It can be assumed that the following information is given or continuously reported:

- The map of the urban segment where the fleet is operating, including the driving direction in each street, location of traffic lights, parking places, bus stops and bus lanes, pedestrian crossings, and other features
- A subset of streets not permitted for autonomous driving
- Current location of each vehicle, its status (free/on task), its battery state, its current task, and the traffic situation it is continuously monitoring: the average traffic speed, the amount of pedestrians, the timing of the traffic lights, encountered obstacles (road works, accidents, etc.)
- The location of all current clients and a queue of new orders
- The previous operation history, for example, averaged for each day and time traffic speed on every street, amount of orders (pick-up places and destinations), amount of unexpected delays, etc.

The validation of the designed algorithm for the planning center can be performed by the means of Monte Carlo simulations. A simulation of the operation described above will be adopted/ developed for this purpose. It will include a city segment with all the features mentioned above, the incoming orders, and autonomous taxis.

Requested profile

a good background or a strong desire to acquire knowledge in dynamic systems, dynamic programming, and optimization; experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Autonomous Vehicles

Research Fields	Automatic Control Design, Optimization, Simulation, Modeling, System Identification
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	Autonomous Driving Strategy Utilizing the Battery Capacity to the Full Extent
Status	Open Position
Prior Work	Research Project: Lapid Bar David. Enhancing Battery Management in Autonomous Electric Vehicles via Physics-Informed Neural Networks. 2024. URL https://doi.org/10.6084/m9.figshare.25917652.v1

For a fleet of autonomous vehicle operating in urban environment (e.g. taxis) the amount of time each vehicle can operate before it needs a battery re-charge is very significant. In order to maximize the operation time many factors can be taken into account when designing driving policy and control algorithms:

- Designing optimal profiles for braking and accelerating, while implementing the safety requirements (maintaining the safety distance, practicing defensive driving, performing evasive maneuvers)
- Designing optimal velocity profiles in urban scenarios,taking into account the traffic situation and static constraints (e.g. traffic lights) along the desired route
- Designing an optimal driving policy: considering lane changing, overtaking,and other maneuvers in terms of saving the battery power
- Designing an optimal control strategy in traffic jams
- Computing the expected (most probable) battery usage for driving from start to final destination along different routes, given the current traffic situation
- Investigating the trade-off between control loops accuracy (e.g. when tracking a desired velocity profile) and battery usage

The resulting driving strategy can be tested in simulation, which can include a model of dynamics of electric vehicle, and its operating environment: a city segment with different traffic scenarios. There is an option to test the developed driving strategy in one the autonomous vehicles currently operating in Mobileye Vision Technologies, Jerusalem.

Requested profile

a good background or a strong desire to acquire knowledge in dynamic systems, control theory, optimal control, and optimization; experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Autonomous Vehicles

Research Fields	Estimation, Navigation, Sensor Fusion, Path Planning, Vehicle Dynamics, Optimization, Simulation, Agent Based Modeling (ABM)
Degree	MSc
Offer description	Autonomous Valet Parking: Navigation and Perception Challenge
Status	In Progress

State-of-the-art sensing technologies provide an accurate estimation of the vehicle's location and available routes in highway and urban scenarios. Lane markings,road signs, buildings, trees, traffic lights, and many other features enable sensing algorithms to perform localization and build a map of the area. These technologies become less accurate when the amount of visible features is small and when the vehicle is stationary/ driving slowly and performing sharp turns. These challenges are present in an underground parking scenario: the parking lot may have multiple floors, many exits, sharp turns and ramps, markings that are obscured, tight space for maneuvering, short view range and many types of obstacles. Therefore, autonomous valet parking is the next open issue within the rapidly extending performance envelope of autonomous operation.

The idea is to leave the vehicle at the entrance to the (previously unknown) parking lot and it should autonomously drive inside it, find an empty slot, park and when called - find the exit and drive out, while the exit might be in a different place than the entrance. This challenge may be approached from different directions and the final solution may be assembled from several algorithms, each addressing a specific subproblem. Therefore, three M.Sc. students are independently working in the following directions:

1. **Mapping:** the main effort is directed to constructing a map of the parking lot from visible features and localizing the host vehicle. This might require relying on sensing such features as color of walls/ markings, numbers/letters assigned to slots, and may be even requiring dedicated QR codes posted in strategic locations inside the parking lot.

2. **Estimation of ego-motion:** the main effort is directed to accurately estimating ego motion from inertial sensors, wheel sensors, and detailed internal model of vehicle dynamics.

3. **Replicating Human Behavior:** the main effort is directed to designing an efficient decision making and/or short term path planing algorithm that allows to navigate inside the parking lot relying only on the closest visible surroundings, similar to how a human would address this task.

The basic sensing information is assumed available: the position and speed of other vehicles, pedestrians, and objects relative to the host vehicle, the semantic classification of all visible space into: empty/not empty,detection of some of the markings on the floor, such as slot boundaries and driving direction arrows, detection of exit sign.

We plan to test the developed algorithms in one the autonomous vehicles currently operating in Mobileye Vision Technologies, Jerusalem.

Autonomous Vehicles

Research Fields	Vehicle Dynamics, Automatic Control Design, Simulation, Modeling
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	Autonomous Operation of Vehicles with Independent Corner Modules
Status	Open Position

Autonomous ground vehicles have been intensively researched, built, tested, and even serially manufactured in the recent years. Once electric vehicles appeared on the market they were also adopted for autonomous operation, allowing control engineers to utilize the advantages of their faster dynamics. The next step seems to be transitioning to vehicles with independent corner modules: separate steering, braking, suspension, powertrain, and control for each wheel. Such platforms are already being produced (e.g. REEcorner™), and, therefore, the purpose of this research is developing an autonomous control for such vehicles.

The advantage of these vehicles is that the tire forces can be allocated freely to each wheel. The control challenge is thus related to over-actuation and can be viewed from different perspectives:

- formulating a tire-force allocation problem, achieving a fault tolerant system, improving safety, reliability, and durability
- utilizing additional degrees of freedom for plant shaping: achieving a wider operation envelope (performing lateral maneuvers impossible for vehicles with conventional chassis)
- formulating an optimal control problem, tailoring the cost function to achieve specific goals dictated by the vehicle's mission

Requested profile

a good background or a strong desire to acquire knowledge in dynamic systems, control theory, optimal control, and optimization; experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Automatic Control Theory

Research Fields	Automatic Control, Estimation, Optimization, Non-Linear Dynamics
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	Unscented Transform Controller (UTC) Stability and Performance Analysis
Status	Open Position
Prior Work	

Anna Clarke and Per-Olof Gutman. The Unscented Transform Controller: A new model predictive control law for highly nonlinear systems. *American Control Conference (ACC), San Diego, CA, USA, May 31 - June 2 2023*, 2023a

Siddharth A Dinkar, Ram Padmanabhan, Anna Clarke, Per-Olof Gutman, and Melkior Ornik. Analysis of the unscented transform controller for systems with bounded nonlinearities. *arXiv preprint arXiv:2504.08579*, 2025

UTC was developed during investigating control of advanced skydiving maneuvers. The goal was reconstructing in simulation performance of these maneuvers by the means of changing the body posture of a virtual skydiver, as well as muscle tension (represented by dimensionless input moment coefficients and damping moment coefficients). Conventional methods, such as learning these coefficients via RNN and controlling the posture via classic control methods, didn't allow to achieve the desired accuracy and robustness.

UTC utilizes the skydiver non-linear model to predict the skydiver's inertial motion during a prediction horizon for a number of representative combinations of control variables (chosen via Unscented Transform). The outcome of each case is compared to the desired maneuver and a weighted average is assigned to the controller output. This controller showed a very good performance in simulations, and could be conveniently tuned to obtain several different ways to execute the same maneuver, thus reconstructing the experience reported by skydivers.

However, stability and robustness of this controller need to be further investigated. If applied to linear systems with prediction horizon of one step it can be proved that UTC satisfies a Discrete Algebraic Riccati Equation (DARE), and for the first simulation step the UTC controller is identical to LQR. From the second step onward the UTC controller has a part that depends on the previous controller's output (as opposed to LQR). For linear systems and prediction horizon of multiple steps the stability condition of UTC has a structure of DARE with one additional term. The structure of the stability condition for one prediction step UTC for non-linear systems has the same structure as a state-dependent DARE. The stability of multiple step UTC for non-linear systems is yet to be explored.

The robustness of UTC can be explored by providing it with an uncertain model of the plant, a partial state feedback, and adding noise to the feedback signals.

Requested profile

a strong background in linear algebra; a strong background in dynamic systems, control theory, non-linear systems, and Kalman filtering; experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Automatic Control Theory

Research Fields	Automatic Control, Neural Networks, Reinforcement Learning, AI
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	AI for Automatic Control
Status	Open Position

Lately there has been some interest to use AI for the design of control systems, and impressive results from simulations and laboratory experiments have been reported. However, practitioners are reluctant to implement the controllers, inter alia because of the following reasons: a) stability and performance proofs and indicators are lacking, also for control systems that are well understood when controlled with conventional methods; b) reluctance towards poorly understood non-linear controllers including the AI generated neural networks ; c) complete lack of tuning methods after deployment.

This thesis is meant to address these and other issues, depending on the scope of the thesis (MSc or PhD). We will start with a literature survey, and then use an AI method, e.g. Reinforcement Learning, to train a Neural Network (NN) controller to control a SISO plant, for which there exists a linear or almost linear controller that makes the closed loop satisfy the given specifications. The successful NN will then be analyzed from a control theoretical perspective, e.g. finding stability margins, frequency responses, etc. This process will yield insights, e.g. how to choose the AI training parameters and the structure of the NN, and further problems to investigate.

Since controllers, including the simplest PID controller, are dynamic systems that can be represented in state space form, it is important to choose or propose NNs that are able to represent non-linear state space systems. Another task is to choose AI methods, and their parameters such that the training is efficient and transparent.

Requested profile

excellent grades in the BSc mathematics courses; a strong background in automatic control, and an equally strong background and interest in AI and optimization; experience in integrating automatic control software (Matlab and Simulink) and AI software tools; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Automatic Control Theory

Research Fields Automatic Control, System Identification, Estimation, Optimization, Reinforcement Learning

Degree MSc/ PhD

Offer starting date Immediate

Offer description Digital Twin via Estimation and Learning Algorithms Synergy

Status Open Position

Development of a low-cost (i.e. computationally efficient, suitable for real-time) Digital Twin is vital for many industrial control systems. For instance, mass production of vehicles with an option of autonomous operation introduces additional challenges, new to the well-researched fields of system identification and parameters estimation. Initially, test drives can be conducted for the vehicle's prototype, collecting the necessary data for estimating the plant transfer function and unknown parameters. However, individual vehicles (even from the same production line) may differ from the prototype, vehicle's parameters may change during its life cycle, the vehicle is loaded differently in each drive, it operates in various roads, weather conditions, and may have unexpected software and/or mechanical issues (e.g. increase in communication delays, reduced pressure in one of the tires, overheating, and etc.) To address these challenges, an on-line method for verifying, updating, and monitoring the plant changes is required. It will operate at all times when the vehicle is autonomous, converting the vehicle dynamics identification and simulation frameworks into a complete Digital Twin. The interaction between the virtual and real vehicle is twofold: autonomous algorithms (navigation, policy, control) provide commands to the actuators of a real vehicle and to the plant model of a Digital Twin. In parallel, the real vehicle's motion is measured and compared to the response of its Digital Twin during a certain time window, the discrepancy is used to update the parameters of a specific sector of the plant model: the sector matching the conditions and scenario of vehicle operation during the time window under investigation.

The proposed update computation is based on the Unscented Transform method, and the choice of the sector is initialized utilizing Fuzzy Logic and continuously adjusted via reinforcement learning. This framework provided good initial results, however it can certainly be further improved/ completely changed during the research. The proposed low-cost Digital Twin can be applied to other interesting control systems (in addition to/ instead of autonomous vehicles).

Requested profile

a strong background in dynamic systems, control theory, non-linear systems, and Kalman filtering; a good background or a strong desire to acquire knowledge in optimization and learning algorithms, experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Automatic Control Theory

Research Fields	Automatic Control, Non-linear Dynamical Systems, Bifurcation Analysis, Numerical Analysis
Degree	MSc/ PhD
Offer starting date	Immediate
Offer description	Bifurcation Analysis of a Skydiver Dynamic Model
Status	Open Position
Prior Work	

Anna Clarke and Per-Olof Gutman. A dynamic model of a skydiver with validation in wind tunnel and free fall. *IFAC Journal of Systems and Control*, 22:100207, 2022. ISSN 2468-6018. https://doi.org/10.1016/j.ifacsc.2022.100207

Bifurcation analysis in aerodynamic, mechanical, chemical, and biological systems is a very important tool for getting an insight into system's dynamics, predicting its behavior, and designing controllers. Multiple works in many areas of science are devoted to bifurcation analysis. Numerical packages for creating bifurcation diagrams for systems that are too complex for analytical representation (computation of Jacobian) have been developed, e.g. MATCONT. Bifurcation analysis for the skydiver model has proved to be tricky and is yet to be formalized. This task is very exciting due to the high dimension of the parameter space: the multiple body Degrees-Of-Freedom, the muscle tension in multiple limbs, and the damping moment coefficients. With so many variables, high non-linearities, and strong longitudinal-lateral coupling in the model even computing the equilibrium points becomes very challenging. The MATCONT package seems to have many limitations when dealing with such cases. It seems that one possible approach to bifurcation analysis of the skydiver model is utilizing our knowledge of movement patterns to reduce the number of control parameters and the dimension of the state space. From experiments we know that novices exhibit oscillations (stable and unstable limit cycles) around longitudinal and frontal axes, until they learn to control their muscle tension and aerodynamic moments damping. Therefore, the first research activity could be finding the Hopf bifurcation as a function of damping pitch and roll moment coefficients, for the neutral body posture (which can be unsymmetrical for novice skydivers).

Requested profile

a strong background in mathematics and numerical analysis, as well as in dynamic systems, control theory, and non-linear systems; experience in Matlab/Python/C++; open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

A Multi-Disciplinary Project

Virtual Reality Simulator for Training RAM Air Parachute Pilots

This is an on-going research involving a diverse team of students, scientists, and engineers, aimed to reduce the risks faced by military paratroopers and civilian skydivers during parachute piloting training. The goal is to train the essential and advanced piloting skills in VR. The main research idea is to develop an autonomous agent capable of performing the task (piloting and landing a RAM air parachute) and convert the computed solution (control variables) into learning aids, utilized in a training simulator.

This task involves several major aspects, which can be developed in parallel:

Automatic Control

Research Fields	Automatic Control, Non-linear Dynamical Systems, Estimation, System Identification, Aerodynamics of Low AR Wings
Degree	MSc
Offer description	Dynamic Model and Autonomous Control Design of a RAM Air Parachute
Status	In Progress
Prior Work	Research Project: Tamar Alperin. Nine Degrees-Of-Freedom Dynamical Model of a RAM Air Parachute. 2024. URL https://aerospace.technion.ac.il/wp-content/uploads/2024/11/TAMAR-RAM_Air_flight_simulator.pdf

Human-Machine Interfaces

Research Fields	Automatic Control, Human-In-The-Loop Control Systems, Virtual Reality, Motor Learning and Motor Control
Degree	MSc Project Track/ MSc/ PhD
Offer starting date	Immediate
Offer description	Developing a Virtual Reality Piloting Simulator Equipped with a Human-In-The-Loop Control System
Status	Open Position
Prior Work	Research Project: Edos Osazuwa. Building the Setup for the Canopy Flight Training Simulator: Integrating User Steering Inputs. 2024. URL https://aerospace.technion.ac.il/wp-content/uploads/2024/08/Project-Edos-Osazuwa.pdf Anna Clarke and Per-Olof Gutman. An automatic control system with human-in-the-loop for training skydiving maneuvers: Proof-of-concept experiment. *International Journal of Human-Computer Studies*, 170:102960, 2023b

The focus of this research is developing the VR part of the piloting simulator and integrating the human trainee into the closed control loop. The VR world will show the inertial motion of the skydiver under canopy from his perspective given his steering inputs, and the task parameters (e.g. obstacles and the landing area). The steering inputs and the instantaneous position and orientation of the parachute and the skydiver will be continuously received from the Dynamics Module of the simulator (currently is being implemented in Matlab). The generated VR world will be displayed to the trainee via VR goggles.

The novelty of the proposed simulator is in the training concept. The VR visual cues displayed to the trainee in real-time are extracted from a virtual performer: an autonomous agent guided by automatic control algorithms capable of performing the desired maneuvers given an access to a trainee's body (as an actuator). The human pilot becomes a part of a closed control loop, which, according to our prior work, can significantly accelerate the skill acquisition process. The challenge is to design such graphical cues that clearly and simply convey the complex non-linear response of the parachute to the pilot's inputs.

The first stage of this research is developing a VR world for one trainee performing basic parachute maneuvers. The advanced stages include: introducing multiple pilots (human and autonomous) flying in the same virtual environment and interacting with each other; designing the graphics and training procedures for various emergency situations (parachute malfunctions, stall, collisions); conducting thorough experiments with human subjects; and, finally, converting the VR environment to AR (Augmented Reality) enabling pilots to use the aiding control system during real parachute jumps.

Requested profile

a strong background in programming in C++ and Matlab; experience with Unity 3D; a good background or a strong desire to acquire knowledge in computer graphics, computer vision, and control theory (for PhD candidates - also in motor learning, motor control, and cognitive sciences); open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il

Automatic Control Implementation

Research Fields	Control Engineering, Inertial Sensors, Sensor Fusion, Data Processing
Degree	MSc Project Track
Offer description	Building and Testing a Prototype of an Autonomously Controlled RAM Air Parachute RC Model
Status	Starting Soon
Prior Work	Research Project:
	Omri Bar Zeev. Processing of GPS data collected during maneuvers of RAM-air 135 ft^2 parachute. 2024. URL https://doi.org/10.6084/m9.figshare.25751169.v2

Robotic Path Planning

Research Fields Automatic Control, Path Planning, Optimization, Machine Learning

Degree PhD

Offer description Cooperative Maneuvers of Multiple Autonomous RAM Air Parachute Agents

Status In Progress

Signal Processing

Research Fields Stochastic Processes, Estimation, Data-Driven Modeling

Degree MSc

Offer description Modeling of Wind: Prediction of Turbulence in the Atmospheric Boundary Layer Based on Anemometry Analysis and Stochastic Differential Equations

Status In Progress

Prior Work

Maayan Shimony and Anna Clarke. Hourly scale model of wind magnitude and direction based on stochastic differential equations. In *The 63rd Israel Annual Conference on Aerospace Science (IACAS), Technion*, 9 May, 2024

Jacobi Ian Shimony, Maayan and Anna Clarke. Inner outer predictive model applied to atmospheric surface layer turbulence. In *The 64th Israel Annual Conference on Aerospace Science (IACAS), Technion*, 20 March, 2025

Human-Machine Interfaces

Research Fields	Robotics, Automatic Control, Human-In-The-Loop Control Systems, Virtual/Augmented Reality, Human-Robot Synchronization
Degree	MSc Project Track/ MSc/ PhD
Offer starting date	Immediate
Offer description	A Mixed Reality Study of Synchronized Movement in Human-Robot Joint Actions
Status	Open Position

Some joint actions of humans and robots (H-R) require a synchronized H-R movement. Related research questions are: What should be the synchronization modes and parameters? What are the critical influencing factors on synchronized H-R movement? How do humans know the robot's movement is synchronized with their movement?

To study these questions, we developed an innovative approach whereby the human participant walks in the "real world" but experiences the interaction with the moving robot in a corresponding VR environment, making it a Mixed Reality experience. This approach primarily preserves the element of real human walking, in addition to providing greater flexibility in manipulating tracking parameters, movement scenarios, and extracting measures of the resulting synchronized walk.

With an avatar of the robot in the VR environment we replicate real world scenarios of human walking with a quadruped robot. The virtual environment corresponds to the dimensions and directions afforded in the physical environment. We study the appropriateness of the robot tracking parameters to different walking episodes such as stopping, turning, and more, and the human awareness of the robot's location and synchronization. Preliminary findings suggest humans tend to be slow and switch their attention to the following robot to ensure the movement is coordinated mostly at the beginning of the walk and at turns. In addition, attention-grabbing tasks such as search and identify tend to be at the expense of being aware of the robot's location and proximity to the human. While the study is in progress, we can report preliminary implications to synchronized H-R movement parameters, human attention and cognitive load, and the need to provide alternative reliable feedback.

This research will greatly benefit from a multidisciplinary approach: introducing automatic control design, path planning, motion estimation and guidance algorithms into the robot's behavior may reveal interesting and novel aspects of the human behavior and the H-R interaction.

The scope of the research can vary depending on the degree pursued by the candidate: The MSc project track will mainly focus on modeling the dynamics of the virtual robot, the VR world, and the experimental set-up; the MSc research track will focus mainly on the algorithms guiding the robot's behavior; and the PhD research will also include extensive experiments with human subjects and a thorough investigation of the H-R interaction.

Requested profile

a strong background in programming in C++ and Matlab; experience with Unity 3D; a good background or a strong desire to acquire knowledge in computer graphics, computer vision, and control theory (for PhD candidates - also in motor control, perception and cognitive sciences); open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il and aparush@technion.ac.il

Human-Machine Interfaces

Research Fields	Automatic Control, Inertial Sensors, Signal Processing, Human-In-The-Loop Control Systems, Augmented Reality, Biomechanics, Motor Learning, Perception, Cognition
Degree	MSc Project Track/ MSc/ PhD
Offer starting date	Immediate
Offer description	Kinesthetic Training Module - Building and Testing a Prototype
Status	Open Position
Prior Work	Anna Clarke and Per-Olof Gutman. Computerized methods and systems for motor skill training, January 25 2018. US Patent App. 15/658,548 Anna Clarke and Per-Olof Gutman. An automatic control system with human-in-the-loop for training skydiving maneuvers: Proof-of-concept experiment. *International Journal of Human-Computer Studies*, 170:102960, 2023b

In the center of this research activity will be building and testing the first prototype of the Augmented Reality training system, called Kinesthetic Training Module (KTM). It was developed for accelerating the acquisition of the body-flight skill: maneuvering during the free-fall stage of skydiving. The key component is the automatic closed loop control system running in real-time and augmenting the trainee with visual cues enabling him to perform maneuvers and guiding the learning process. The concept was successfully tested in a Virtual Reality (VR) simulator (on the ground), while the most exciting experimental stage is still ahead: building the KTM prototype and introducing it into training in real-time, during the actual activity.

Testing of the prototype will take place in the wind tunnel. The KTM visual cues (feedback and desired body postures, and predicted inertial motion) must be displayed to the user via AR goggles (Magic Leap). A portable small computer must be adopted for computation of the cues and transmitting them to Magic Leap. Alternatively, the Xsens suit can transmit wireless to a PC station outside of the wind tunnel, where the cues will be computed and transmitted, in their turn, to Magic Leap. Once the prototype is built, it will be possible to investigate the effect of the KTM cues on the learning process (evolution of trainee's Movement Patterns (MPs)).

From this point the research can evolve in many possible directions (depending on the research scope), e.g.:

- designing novel control/ reinforcement learning/ optimization algorithms for computation of the 'desired body posture' cue; and estimation/ signal processing/ sensor fusion algorithms for computation of the 'predicted inertial body motion' cue
- investigating biomechanical, motor learning, and skill acquisition theoretical aspects via the novel perspective provided by the human-in-the-loop control system; analyzing the body-flight technique; guiding the evolution of trainee's MPs by the means of the KTM's control and MPs construction algorithms

Requested profile

a good background, or a strong desire to acquire knowledge in control theory, computer graphics, modeling and simulation, and signal processing (for PhD candidates - also in biomechanics, motor control, perception and cognitive sciences); experience in Unity3D, Matlab/Python/C++; hands-on experience with embedded systems; self-motivation, open mind and enthusiasm

Applications should be sent to: anna.clarke@technion.ac.il