Soofiyan Atar

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RESEARCH INTEREST

Legged Robotics, Computer vision, Deep learning, Aerial Robotics, Control systems.

EDUCATION

K.J. Somaiya College of Engineering   **Mumbai, India**
B.Tech in Electronics and telecommunication Engineering   *March,2016-March,2020*
CGPA: 8.17/10.00

Swami Vivekanand Junior College   **Mumbai, India**
H.S.C.   *March,2014-March,2016*
Percentage: 86/100

Swami Vivekanand High School   **Mumbai, India**
S.S.C.   *April,2014*
Percentage: 88.6/100

EXPERIENCE

Team Member, Team K.J.S.C.E. Robocon :   **June 2017 - March 2018**

Robocon is an International robotics competition in which our college takes part every year in which host country every year gives a theme based on their culture and thus we have to compete first at national level and the winner qualifies for international level and I was the programmer for the team and also worked on Wheeled Mobile robotics, Embedded systems, legged robotics, Computational Motion planning. In 2018 it was held at MIT, Pune(got 30th rank).

Senior Team Member, Team K.J.S.C.E. Robocon :   **June 2018 - June 2019**

I was the Senior programmer for the team and also guided juniors by teaching them basics of robotics, also worked on Perception, legged robotics, Autonomous Locomotion, ARM Micro controller, Localization. In 2019 it was held at IIT, Delhi. We grabbed 5th rank amongst 140 teams.

Team Member, E-yantra Competition :   **July 2018 - March 2019**

E-yantra is a National robotics competition in which our team won Third prize and I was the programmer for the team and also worked on Wheeled locomotion and Computational Motion Planning. It was held at IIT, Bombay. We won 3rd prize amongst 12681 participants.

Organized a 3-day Robotics workshop at K.J. Somaiya College of Engineering   **July 2018**

Conducted robotics workshop for 2nd year and 1st year students from K.J. Somaiya College of Engineering. In this workshop we organized for all departments so that every one will be getting equal exposure in Robotics and also we were creating an excitement to join the Team K.J.S.C.E. Robocon.

5-day Training for Virtual Labs   **January 2019**

Virtual Labs is a project initiated by the Ministry of Human Resource Development, Government of India, under the National Mission on Education through Information and Communication Technology. Attended a 5 day workshop organized by IIT Bombay on Virtual labs and also created one virtual lab under Digital communication subject. Achieved silver certificate for this workshop. Our virtual lab is

also hosted on Virtual labs website. Link for the website is : `http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/comp_networks_sm/index.php`

INTERNSHIPS

ATOS, Project intern :   **July 2019 - August 2019**

In this internship I was working on Aerial Robotics and Deep learning where we had to detect Wind turbines defects and also identify the type of defect. In this project we also collected all the data from scratch and then used Faster RCNN algorithm with bounding box detection. Then applied it on the on board camera on the drone for detection.

Faclon Labs, Research Intern :   **May 2019 - July 2019**

In this internship I worked on three different project, e-Rickshaw Charging station where LCD Touch screen display was used for the interface of the Customer to charge their batteries for the Auto-Rickshaw and also used CAN Communication protocol to get the data from battery to the station and also used RS-485 to get the battery parameters from Battery Management system(BMS which provides temperature battery percentage, etc). This project also used 2g communication using Quectel MC60 micro-controller for getting the ID of the customer after connection of the battery is established. In Second project I had to send SMS ("ON" and "OFF") so that the motor at a remote place starts or stops using 2g communication with Quectel MC60 micro controller. In the third project PT100 was used which is a temperature sensor(with accurate readings) and post the data on the server using MQTT protocol with Quectel MC60 micro-controller.

Intern, E-yantra Internship :   **July 2018 - August 2018**

This internship was organised by K.J. Somaiya College of engineering and in this internship I interfaced MPU 6050 with Atmega 2560 Micro controller using I2C communication and also used Complementary filter for better output by reducing noise. Also we implemented I2C communication between two Atmega 2560 micro-controller.

KEY SKILLS

Programming Language	Python, C, C++, Octave, Embedded C
Web Based Language	HTML, CSS, Javascript
Embedded platforms	ARM,STM32F4,AVR,Arduino,Quectel MC60
Microprocessors	Raspberry pi, Jetson Nano
Operating systems	Ubuntu, Macos, Windows
Meta-operating system	ROS(Robot Operating system)
Software	Atmel studio, STM32CubeMX, MATLAB, Eclipse
Simulation software	VREP, Gazebo
Communication protocol	USART, I2C, SPI, RS-485, CAN
Other skills	OpenCV, Deep learning, Machine learning, Computer vision

PUBLICATIONS

○ **Soofiyan Atar**, Shreyas Borse *"Photo transistor array with SPI communication for Robot Sensing"* Presented at IEEE 5th International Conference for Convergence in Technology 2019, Pune, India 29th - 31st March 2019.

RESEARCH EXPERIENCE

"4 legged Robot with autonomous locomotion with LQR implementation for gait analysis using pneumatic actuators"

- The main goal of this research was to obtain optimum results using pneumatic actuator and optimal controller LQR using perception and SLAM techniques for autonomous locomotion along with efficient implementation.
- This research also tries to eliminate any power consumption and thus decrease the battery load along with precise force control with sufficient position control.
- In this study we explore a Quadruped Robot capable of achieving multi-gait locomotion with just 2 degrees of freedom leg joint module. This provides an advantage in a way that the mechanism is less complex with adequate amount of manoeuvrability.

"Swerve drive controlled by Customized controller for semi-autonomous locomotion using Kinematics equations and PID controller"

- This is the project done for Robocon Competition in which we have to implement a manual robot but to increase the efficiency we implemented it as semi autonomous robot.
- We used customized controller in which we made some modification and communicated it using esp8266 modules. Customized controller was only to indicate the path it has to be traversing by pressing button or giving joystick values to the bot for speed values. We used fence following algorithms for precise and faster movement of the robot.
- We also used Encoders(which gives angular displacement) for getting precise steering angle and also used Encoders for driving wheels. We used STM32f4 micro-controller which is ARM Cortex M4 based micro-controller.

"Three wheel suspension holonomic Drive with autonomous locomotion with LQR implementation for position and velocity control also using lasers for precise localization."

- In this research we have implemented three wheeled holonomic drive system with autonomous locomotion for optimal results which is not possible with manual control.
- In this research we use drive encoders for transformation, lasers and IMU(9 axis inertial measurement unit which gives pitch, roll and yaw in every axis) for localization of the bot. We used AMP flow motors for better speed performance and also used 'Roboclaw' motor controller for controlling the motors and also using in built braking system for the motor.
- In this research we explored many path planning techniques for autonomous path traversal using a given map.

ACADEMIC AND PERSONAL PROJECTS

SIFT descriptor for matching images   *Feb 2019*
- This descriptor was used to detect the position in the given map by matching the pre-stored image and the image taken on board by the bot so that it can act according to the matched template.
- It works for many other application where we want to match two templates and apply corresponding action to it.

Smart shoes with self lacing capabilities   *August 2018*
- In this project I implemented self lacing functionality with inbuilt pedometer(pedometer means a device which counts steps). It uses MPU6050 sensor(6axis sensor which gives reading of gyroscope and angular acceleration) along with flex sensor for precise detection of steps.
- It also uses planetary geared motor for high torque requirement with low speed output. I used Atmega 328p micro-controller for controlling all the peripherals.

Cervical trainer   *Nov 2018 – Jan 2019*
- This project was made for people with neck or head problems. We have used MPU9250(9 axis sensor which gives gyroscope, acceleration and magnetometer readings). Thus we created an communication between Bluetooth and the Computer where GUI was been played using python programming language.
- We also made it more feasible by enabling WiFi functionality by this doctors can train their patients remotely using the webcam from camera.

Hand number recognition for gesture controlled robot   *July 2019*

- First I implemented YOLO algorithm using Python programming language with scikit-learn libraries. Then send the classification of hand numbers through Bluetooth to the robot.
- The robot is then controlled by sending particular direction for corresponding numbers classified by the algorithm using Bluetooth. YOLO algorithm also gives the bounding box after classifying it.

Manual controlled 3 wheel drive for particular task with precise Locomotion *November 2018*
- 4 wheel drive using it as a 'X' drive while traversing for maximum efficiency and used DC motors with Spur gears.
- In this project we used Rack and pinion for transferring an object attached to a string and a gripper which use to roll out the whole string along with object by changing the direction of rotation.
- I also used MPU6050(6axis sensor with gyroscope and acceleration) for correcting the YAW(also known as azimuth) angle of the bot and used ultrasound sensors for fence following function by which it can localize itself along the edges and use controller to control the speed.

2 wheel Drive Simulation on V-REP *August 2019*
- 2 wheel drive with castor wheel was implemented on V-REP simulator with Line following algorithm using LQR control.
- In this project I used 2 wheel drive system and using Kinematics equation I used LQR control to precisely control the bot to follow the black line path.

AWARDS AND ACHIEVEMENTS

- Won 3rd prize(1st and 2nd not given to any teams) in E-yantra competition amongst 12681 participants and it was a national level competition held at IIT Bombay on March 2019. Also won a cash prize of 4000 Rupees.
- AIR 5 in National level competition ABU Robocon held at IIT Delhi on June 2019 amongst 150 teams. We also won Springer award which includes a cash prize of 100 Euros.
- AIR 30 in National level competition ABU Robocon held at MIT Pune on March 2018. We got 30th rank in this competition amongst 140 teams.
- Won 1st prize in Find-a-way-Fade-away competition held at K.J. Somaiya College of Engineering.In this competition we had to apply line following algorithm using Color sensor(TCS sensor) by detecting colors on the track.

COURSES AND CERTIFICATES

- **Coursera :** Machine learning with MATLAB Software.
- **Coursera :** Deep learning using Python programming language.
- **Coursera :** Algorithmic Toolbox by University of California San Diego.
- **edX :** Autonomous Mobile Robot by ETH Zurich University.
- **Udemy :** Mastering Microcontroller with Embedded Driver Development.
- **Udemy :** ROS for Beginners : Basics, Motion and OpenCV.
- **Udacity :** Computer vision.
- **Udacity :** Artificial intelligence for Robotics.

EXTRA-CURRICULAR ACTIVITIES

- Team member of Kabaddi team of K.J. Somaiya college of engineering.
- Finalist of Box cricket tournament at "Skream" event of our college

DECLARATION

- Soofiyan Atar declare that all the details in this document are true and a valid proof of the same will be made available if required.