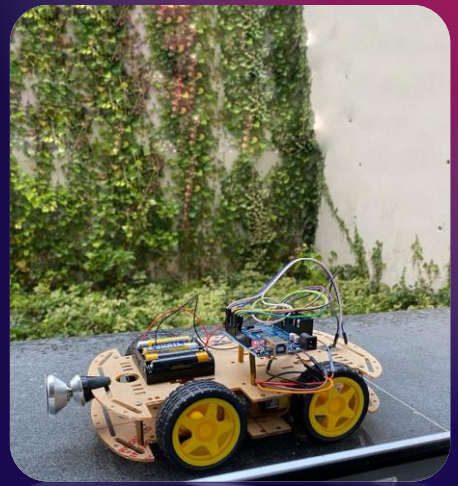
Autonomous Vehicle

KAŞİF UGV



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PROJECT DEFINITION

In our project, it is aimed to develop national unmanned ground vehicle which acts as a spy or guardian of a field.

Therefore, our project will not be only self-driving car, it will also be able to detect objects which can be threads, enemies, suspicious objects, or events.

MAIN FEATURES

01

Object Detection for upcoming threads

02

Object Detection for spying

03

Capability of autonomous and manual driving

MAIN CONTRIBUTION

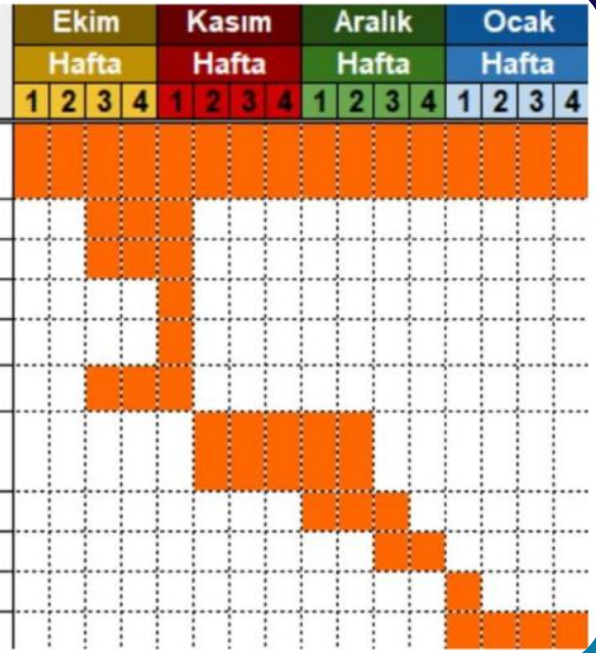
VEHICLE NAME	YEAR	DIMENSIONS	WEIGHT	DETECTION TYPE	RANGE	ARMED
TARANTULA UGV	2018	500x222x210 cm	2,000 kg	Unknown	3 km	YES
ACROB UGV	2021	65x31x14 cm	Unknown	Day/Night Cameras	500 m	NO
O-İKA 2 UGV	2019	Unknown	1100 kg	Mast-mounted Camera	Unknown	YES
ALPAN UGV	2020	142x106x164 cm	500 kg	Day/Night Cameras, LIDAR, RADAR	3 km	YES
BARKAN UGV	2021	140x90x110 cm	500 kg	Day/Night Cameras, LIDAR, RADAR	Unknown	YES
URAN-9 UCGV	2015	512x253x250 cm	10,000 kg	Electro-optic and thermal cameras	3 km	YES
Gladiator TUGV	2005	178x112x135cm	725 kg	Day/Night and Thermal Cameras	Unknown	YES
Miloš UGV	2017	172x70x95 cm	680 kg	Day/Night and Thermal Cameras	3 km	YES

KAŞİF UGV

YEAR	2021-2022
DIMENSIONS	Height = 31 cm Width = 3.5 cm
WEIGHT	0.866 kg
DETECTION TYPE	ESP32 Camera
RANGE	10 meters
ARMED	No

WORK PLAN

TASK DEFINITION	Status	START DATE	FINISH DATE
DOCUMENTS	In progress	26.Eki.21	25.Eki.22
Project Proposal Form	Complete	23.Eki.21	5.Kas.21
Project Selection Form	Complete	24.Eki.21	5.Kas.21
GitHub Repository	Complete	28.Eki.21	5.Kas.21
Project Work Plan	Complete	7.Kas.21	12.Kas.21
Literature Review	Complete	25.Eki.21	12.Kas.21
Software Requirements Specification (SRS)	Complete	12.Kas.21	10.Ara.21
Project Webpage	Complete	11.Ara.21	17.Ara.21
Software Design Description (SDD)	Complete	18.Ara.21	31.Ara.21
Project Report / Project Tracking Form	Complete	1.Oca.22	7.Oca.22
Presentation	Not started	5.Oca.22	23.Oca.22



MATERIALS

ESP32 AI CAM APPLICATION

We use it to receive real time video from KAŞİF UGV.

BLUETOOTH RC CAR APPLICATION

We use it to operate KAŞİF UGV manually.

ESP32 CAMERA

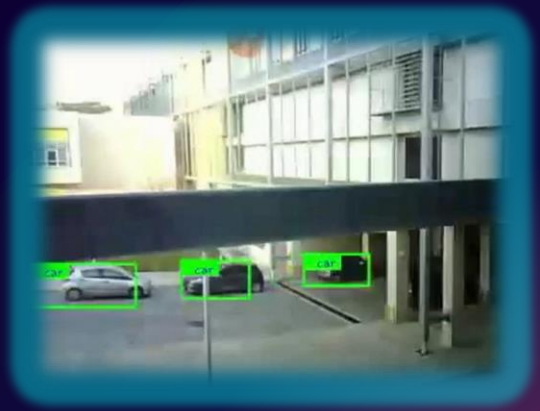
Real time video is sent from ESP32 Camera module.

CONTROLLER USING HC05

Vehicle is enabled to control manually using HC05 Bluetooth module.

METHODS

YOLO



We used YOLO Object Detection Technique since it provides satisfying accuracy and speed results. The obtained results will be shown in demo.

POTENTIAL RISKS

01

Autonomous Mode may not work as it is expected.

- For such case, we will support our system with additional or better sensors and software.

02

Our improved dataset may not be enough to detect variety of threads.

- For such case, we can try to import specific objects to our dataset.

03

As the object detection algorithm improves, the FPS that we obtained may decrease.

- For that purpose, we can provide faster Internet connection or make the algorithm running more efficient.

POTENTIAL RISKS

04

ESP-32 CAM module send video continuously via Wi-Fi. Therefore, Wi-Fi password must be protected to prevent leaks.

- Since we set password in our source code, it must be carefully saved in computer or external hard drive.

06

Our vehicle can move manually. Therefore, anyone who has a smartphone can easily connect to our Bluetooth module.

- To prevent this, our module asks pin before connection is completed.

05

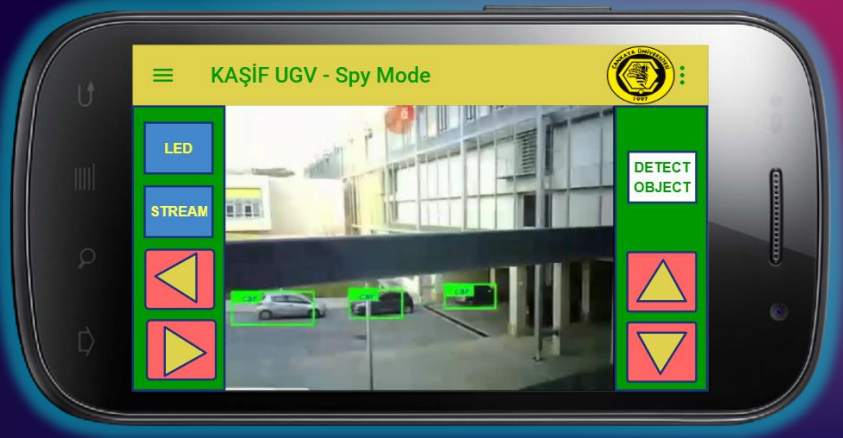
We will develop an application which displays video sent from ESP-32 CAM. Therefore, if apk file of our application is leaked, it could cause threats.

- Therefore, apk file of application must be also protected.

EXPECTED RESULTS

01

Implementing our own software for controlling car and receiving real time video.



EXPECTED RESULTS

02

Implement additional features to that software.
These features will be as follows :

- ❑ Warning messages when object identified as thread.
- ❑ Selection GUI for both self-driving and manual modes.
- ❑ Saving and displaying the threads/objects that are detected in another page.

EXPECTED RESULTS

03

Making the vehicle capable of self-driving.

EXPECTED RESULTS

04

Expanding our dataset or improving the algorithms we used to receive better results on suspicious objects or threads.

OBTAINED RESULTS

Real Time Video

Real Time Video is Received by Module succesfully.

Object Detection

Object Detection algorithms are tested continuously.

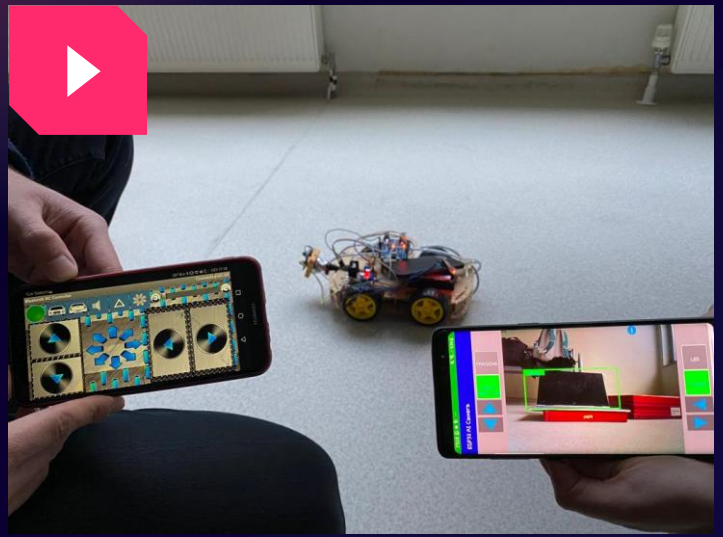
Manuel Driving

Manuel driving implementation is completed.

Assembly

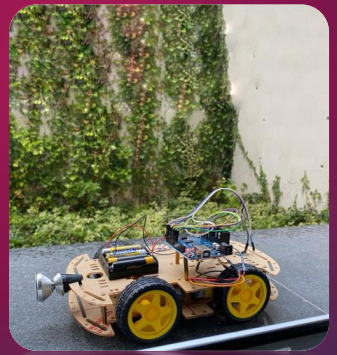
Car prototype is assembled.

DEMO



OUR DEMO VIDEO CAN BE REACHED USING BELOW LINK:

https://www.youtube.com/watch?v=kkanOoQVD4A



THANK YOU!

QUESTIONS?