Group 3: Smart Traffic Prediction
Final Project Presentation

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Telecommunication Networks Group | Sensor Networks Lab Project

Outline

- Background

- Goal Statement

- Functional Specification

- Architecture

- Demonstration

- Conclusion

- Challenges Faced

- Project Organization

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Background

- Big cities around the world need an smart traffic detection system to reduce traffic congestion.

- Huge number of road accidents take place each year due to human error, implementing an automated system will help reduce human intervention.

- Various countries around the world are developing smart cities. Smart Transport system is an integral part of smart cities.

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Goal Statement

- Traffic prediction system.

- Each road has a traffic controller station, at a point where traffic can be diverted or can be let through.

- All the vehicles are the moving nodes, with can transmit at very low power and small range.

- Vehicles always pass through a controller, before reaching a major junction and makes itself known with an polling acknowledgement.

- Traffic controllers sample the traffic density at a regular interval.

Goal Statement

- Traffic controllers can pair with nearby controllers to access traffic situation.

- When the incoming traffic from other pair would result in a heavy traffic in next junction, the controller decides how many vehicles needs to be diverted.

- The traffic controller picks the vehicles, and sends them alert to divert by indicating on LEDs.

- Base station (Traffic Administrator) is picking up these communications and displaying traffic conditions, with details.

- Base station (T.A.) can also be used to set the threshold for traffic management system, and send it to controllers.

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Vehicles

Functional Specification

- **Traffic Management**
    - Standard TelosB PppRouter
    - Monitors controllers.
    - Helps in managing thresholds.
    - Keeps track of traffic and displays it.
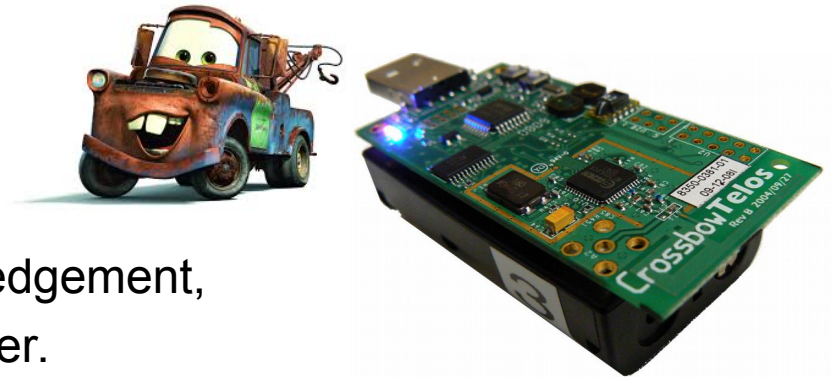
- **Traffic Controller**
    - Standard TelosB
    - Can talk to vehicle, other controller, and management center.
    - Detects vehicles, and current traffic density
    - Alerts vehicles to upcoming traffic.
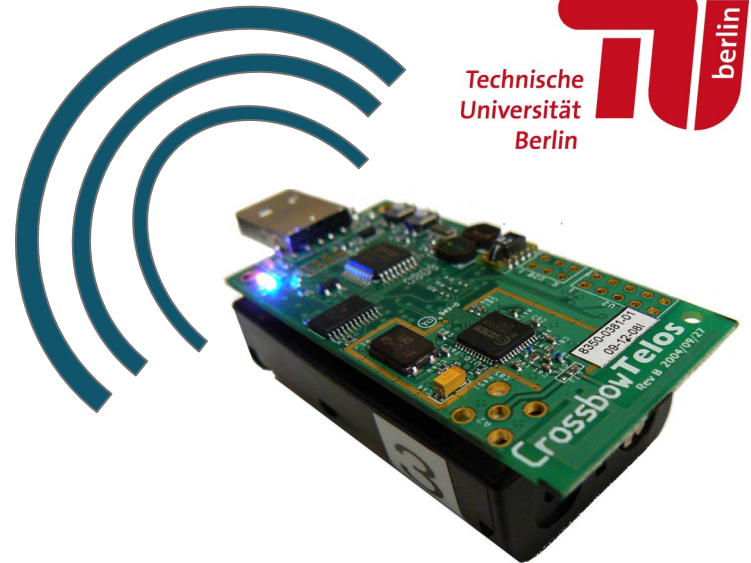
Functional Specification

- **Vehicles**

    - Standard TelosB with transmission power controlled.

    - Sends vehicle registration acknowledgement, with vehicle details to traffic controller.

    - Receives traffic alert from traffic controller.

    - Shows it recieved alert.

Central Controller

SET
PEAK ALLOWED
TRAFFIC (T).

GIVE LIVE STATUS
OF TRAFFIC.

If c l traffic > c ll
Traffic diverted at
coordinator ii for
some cards over
thresh hold on
heavy traffic.

ALL BLOCKS ARE MOTES.

Technische
Universität
Berlin

Traffic Coordinator I

1.Detect vehicles
and register.

2. Send a report
to next controller.

3. Get the traffic
report from other
coordinators.

Traffic Coordinator ll

4. Make a combined
report to decide on
upcoming traffic
status.

5. Determine if traffic
is going to be high in
next crossover.

6. Alert relevant
vehicles over
threshold to reduce
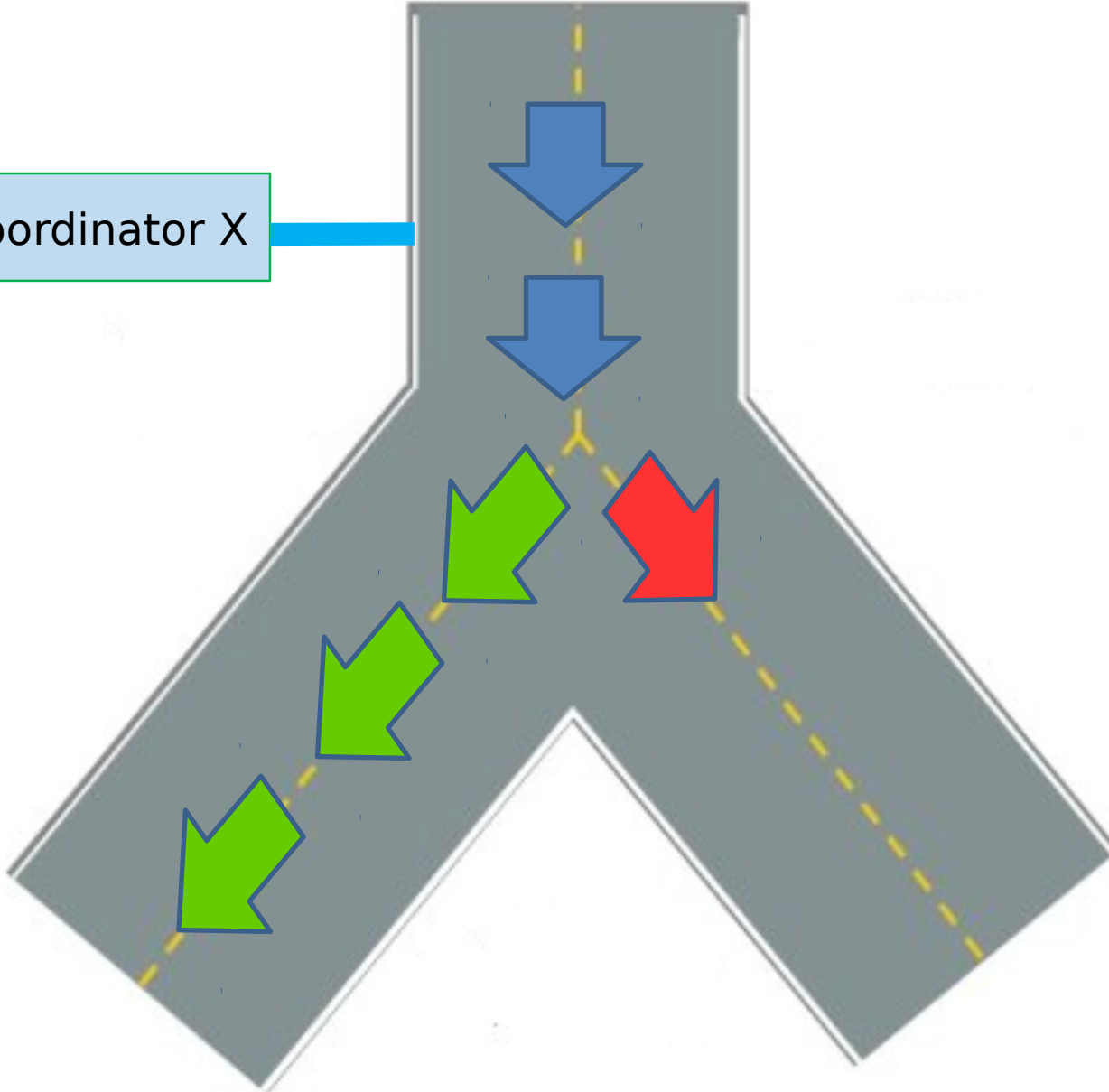the traffic.

CAR 1	CAR 2	CAR 3

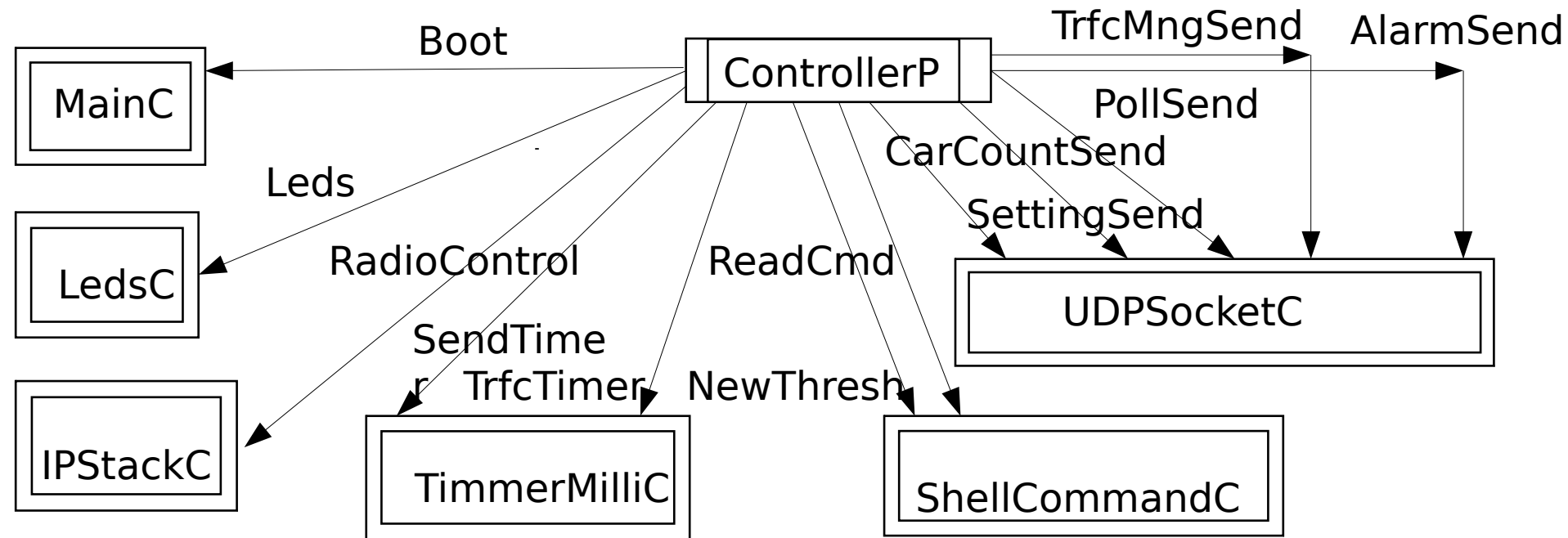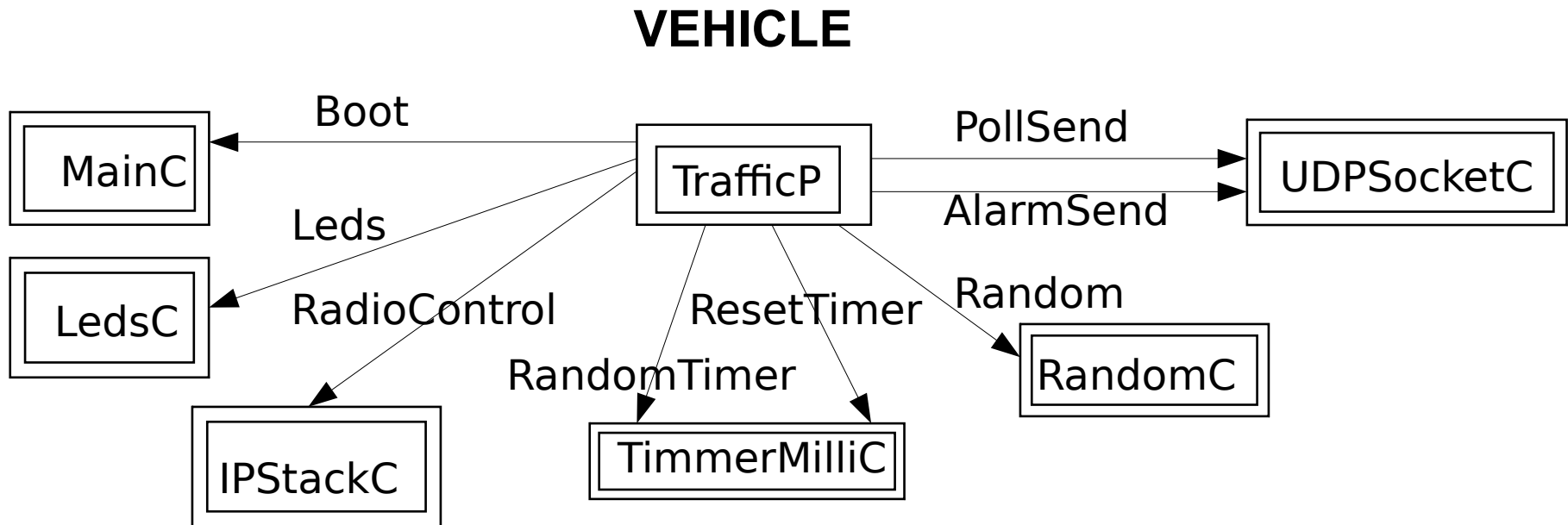| CAR 4	CAR 5	CAR 6

TKN

Coordinator X

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Architecture

TRAFFIC CONTROLLER

MainC — Boot — ControllerP

ControllerP — TrfcMngSend — AlarmSend

ControllerP — PollSend — UDPSocketC

ControllerP — CarCountSend

ControllerP — SettingSend

ControllerP — Leds — LedsC

ControllerP — RadioControl — IPStackC

ControllerP — SendTimer, TrfcTimer — TimmerMilliC

ControllerP — ReadCmd, NewThresh — ShellCommandC

Architecture

VEHICLE

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Challenges

- Synchronizing and interference handling.

- Power Regulation.

- Interfacing with python GUI.

- Serial port snooping, and serial forwarding

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Conclusion

- Smart Traffic Detection can lead to reduction in traffic congestion and achievement of traffic fluency.

- Automated systems lower the risk of human errors, as a result number of accidents can be reduced considerably.

- The model shown here is just a basic prototype which can be modified and extended in the future to construct a Intelligent Traffic Management System.

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Project Organization

Anirudh

- Contribution to the creation of the program architecture
- Contribution to the implementation of various software parts.
- Transmission power management, and serial port snooping.
- Issue fixes, final presentation,
- Project report, and project documentation.

Yatindra

- Contribution to the creation of the program architecture.
- Contribution to the implementation of various software parts.
- Final testing.
- Initial short presentation.

Sarjo

- Evaluating GUI interface.
- Implementation of the Python Tools.
- Final testing.
- First short presentation.

Git Repository

https://github.com/AnirudhShetty/SNL_Group_3