TOWARDS IMPROVING TRAFFIC DATA COLLECTION:the use of GPS/GIS

Joseph Owusu/Francis Afukaar/B.E.K Prah

Kwame Nkrumah University of Science and Technology,College of Engineering, Department of Geomatics Engineering,UST.

INTROUCTION:

➢ **Conventional Techniques of collecting Road Traffic data are:**

- ❖ **Cost Prohibitive.**
- ❖ **Time consuming.**
- ❖ **Prone to Human Errors**

The Technique:

- ❖ **Required Observations at certain locations and manual recording of data.**
- ❖ **Sometimes demand for a large number of observers/enumerators**

➢REMEDY TO THIS PROBLEM

❖ **Use of GPS receivers in the estimation of traffic conditions for a road network as it is able to record positions, travel time and speed data at a regular time interval.**

❖ **GPS receivers does not required human measurements and cuts down on cost.**

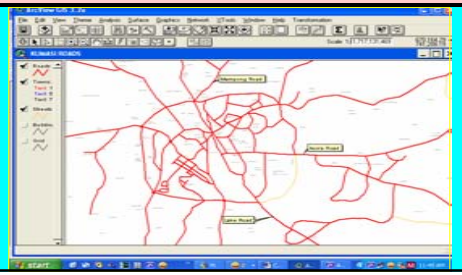
❖**Kinematics DGPS or Real Time Kinematic DGPS positioning produce accurate results for most applications.**

➢DATA COLLECTION AND ANALYSIS:

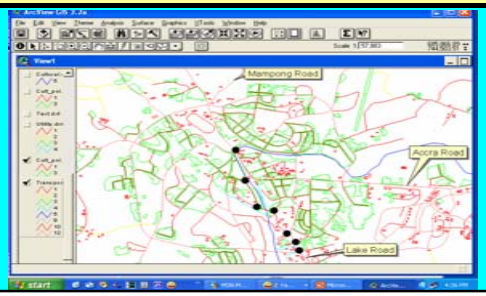
1.GPS Receiver:

The System was used for the determination of traffic conditions in:

- ❖ **The Central Business District (CBD)**
- ❖ **The Area within the ring road but outside the CBD of the city of Kumasi as shown in fig 2. below**

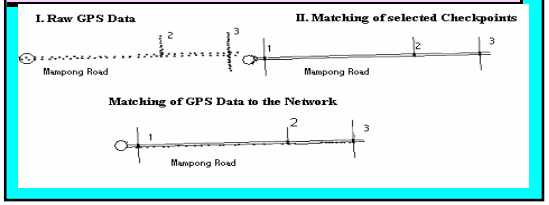


❖ The road network was divided into segments starting and ending at some pre-selected controls on the roadway. Fig. 3.



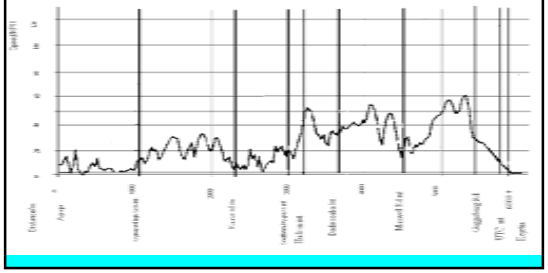
DATA MODELLING

❖ A comparison of the positional data measured with the GPS to the digital map of the area gave very good results for most of the roads traveled as indicated in fig.4 below.



RESULTS:

Fig 5. Speed/Distance Profile. An example of processed results from a GPS file for Lake road. AM period towards the CBD.



Summary of Average Travel speed for the various sections selected for the Lake road. Table 1: Example for the AM period

Route Section	Length (km)	Average Travel time (min)	Average Speed (km/h)	Average Impedance (min/km)	Level of service
Agogo stn – Gyinase jn.	1.1	16.1	4.1	14.6	F
Gyinase jn – Kaasi Rd int	1.3	8.0	9.8	6.1	F
Kaasi Rd int.- southern by pass	0.6	6.4	5.6	10.7	F
Southern By-pass-Hudson int.	0.3	0.8	22.6	2.5	D
Hudson int.- Dadiesoaba int	0.4	0.6	38.9	1.5	B
Dadiesoaba int-Maxwell Rd	0.8	1.6	30.4	2.0	B
Maxwell Rd-Guggisberg Rd	1.3	2.1	36.9	1.6	B
TOTAL	5.8	35.6	9.8	6.1	F

Summary of Average Travel speed For Some selected Routes. Table2:

Route Name	Length (km)	Period of Day	Direction	Average speed (km/hr)	Average Impedance (min/km)	Level of Service (LOS)
LAKE ROAD	7.2	AM	Atonsu Agogo Taxi Station – Kejetia	9.8	6.1	F
			Kejetia - Atonsu Agogo Taxi Station	21.7	2.8	D
		PM	Atonsu Agogo Taxi Station -	29.5	2.0	C
			Kejetia-Atonsu Agogo Stn	12.3	4.8	F
MAMPONG ROAD	5.0	AM	Tafo market –Kejetia	6.6	9.1	F
			Kejetia – Tafo Market	25.9	2.3	C
		PM	Tafo market –Kejetia	22.6	2.7	D
			Kejetia – Tafo Market	16.2	3.7	E
SUNYANI ROAD	5.8	AM	Tanoso Market - Kejetia	10.3	5.8	F
			Kejetia - Tanoso Market	29.1	2.1	C
		PM	Tanoso Market - Kejetia	23.1	2.6	D
			Kejetia - Tanoso mkt	12.5	4.8	F
OFFINSO ROAD	6.1	AM	Kronom. – Kejetia	16.6	3.6	E
			Kejetia –. Kronom	31.2	1.9	B
		PM	Kronom. – Kejetia	29.7	2.2	C
			Kejetia – Kronom	15.7	3.8	E

Summary of average travel speed for AM and PM peak periods for the selected routes. table 3:

	AM PEAK	
ROAD NAME	In (km/hr)	OUT (km/hr)
LAKE	9.8	21.7
MAMPONG	6.6	25.9
SUNYANI	10.3	29.1
OFINSO	16.6	31.2

	PM PEAK	
ROAD NAME	In (km/hr)	OUT (km/hr)
LAKE	29.5	12.3
MAMPONG	22.6	16.2
SUNYANI	23.1	12.5
OFINSO	29.7	15.7

Generally,

- Speeds are lower when traveling towards the city center (Kejetia) in the morning registered lower speeds (7-17Km/hr) than when traveling in the opposite direction (22-31km/hr).

- Congestion was Rife on most of the road sections when traveling towards Kejetia in the morning resulting in the low average speeds. The speed trend reversed in the evening, experiencing congestion when traveling out of the CBD to the outskirts.
- A tidal flow situation is thus being experienced in Kumasi, where travelers encountered delays in the morning when entering the CBD, but it reversed in the evening except Mampong road where the situation is directional .

Conclusions And Recommendations

- The application of GPS technology in data collection gives detailed study of traffic conditions in space and in time. The GPS technology makes the task of database building more manageable and cost effective.
- The technology not only guarantees data accuracy and precision but also allows staff to assess and process data in a more timely manner, thus overcoming the mechanical and human errors that have prevailed in the manual traffic data collection method
- Updating the time database is an easy task that can be done even in real time by employing existing vehicle fleets (e.g. trotro and taxi vehicles).
- Therefore, the technology is highly recommended for future use.

THANK YOU!!!!!!!